SIPA Annual Meeting

DOE Perspective

SAM RASHKIN
Chief Architect
Building Technologies Program
April 11, 2012
First, Sam’s Perspective…

It’s important to see the whole picture…
Building Science
Efficient Components
Indoor Air Quality
Disaster Resistance
Housing Industry: Key Components

- Sustainable Land Development
- Good Housing Design
- High-Performance Homes
- Quality Home Construction
- Effective Home Sales
For Net-Zero Ready Homes, There is a…

• Right Strategy
• Compelling Builder Business Case
• Compelling Consumer Value Proposition
• Great Source of Content
There’s a Right Strategy for Net-Zero Ready Homes
‘Good Government’ As-A-System

Building America:
Develops New Innovations and Best Practices

DOE Challenge Home:
Recognizes Leading Builders Applying Proven Innovations & Best Practices

ENERGY STAR:
Recognizes Builders Who Deliver Significantly Above Code Performance

IECC Code:
Mandates technologies and practices proven reliable and cost-effective
Strategy #1:

Begin with Comprehensive Building Science;
by complying with ENERGY STAR for Homes Version 3.
Strategy #2:

Add proven technologies and practices, which along with complete building science ensures Net-Zero Ready Performance.
Strategy #3:

Include energy efficient components to complement high-performance enclosure.
Strategy #4:

Provide comprehensive pollutant control critical in homes this tight and well-insulated.
Strategy #5:

Ensure low-cost details that can save $1,000’s downstream to install solar since homes are ready for Net-Zero performance.
Strategy #6:

Start addressing related water efficiency issues in homes this environmentally responsive.

- ENERGY STAR for Homes Version 3
- Building America Technologies
- Efficient Components
- Indoor airPLUS
- Solar Ready [where applicable]
- WaterSense (encouraged)
Don’t ignore disaster resistance since homes built this well and this affordable should last 100’s of years.
Strategy #8:

Encourage QA/QC practices to help ensure the success of builder partners.
All the pieces add up to DOE Challenge Home...
Strategy Summary:

…and now homes are ready for renewable power... the right way
There’s a Compelling Builder Business Case for Net-Zero Ready Homes
Old Business Solution:

Minimize Cost

NAHB estimates for every $1,000 increase in sales price, nearly 250,000 households fail to qualify for a mortgage on a typical new home.

[http://www.nahb.org/fileUpload_details.aspx?contentTypeID=3&contentID=40372&subContentID=112293]
New Business Solution:

Maximize Value
so homebuyers are compelled
to want new housing again.
Innovation/Value Premium

Price Based on ‘Value’, NOT Cost

Profit

Cassette Cost

VS.

Innovation/Value Premium

Profit

CD Cost

Price Based on ‘Value’, NOT Cost
Home Innovation Real Cost

Standard Home VS. DOE Challenge Home

Marketing Cost
Call-Back Cost
Hard Cost

Marketing Cost
Call-Back Cost
Hard Cost
Home Innovation/Value Premium

Price Based on ‘Value’, NOT Cost

Standard Home

VS.

DOE Challenge Home

Innovation/Value Premium

Profit

Cost

Profit

Cost
Sam’s 1st Law of Innovation

The closer link to leadership, the higher the innovation/value premium.
Innovation Leadership Example
Innovation option can’t look the same as the standard option.
Innovation Looks Different

2012 Toyota Highlander

Lexus RX400
Innovation Looks Different*

Existing Home: Low Performance

Retrofitted Home: High-Performance

* Personal Experience
Innovation Looks Different
Working with Production Builders

- **Work the ‘Sweet Spot’**
  [5-20 homes; most not ready for wholesale change]

- **Measure Profit Metrics:**
  - Call-Backs
  - Marketing Costs
  - Profit Margins

- **High-Performance Looks Different!**
There’s a Compelling Consumer Value Proposition for Net-Zero Ready Homes
Take Inspiration Where You Find It

The story of Dyson

Root Cyclone™ technology

Root Cyclone™ technology uses powerful centrifugal forces to separate dust from the air. New Dyson cylinder machines have three distinct stages of cyclonic separation - each engineered to capture smaller and smaller particles.

Air velocity is: 20 metres per second in the outer cyclone, 50 metres per second in the core separator, 80 metres per second in the inner cyclones. Dust particles are subjected to forces of: 500G in the outer cyclone, 29,000G in the core separator and 100,000G in the inner cyclones (around 20,000 times greater than a roller-coaster ride).
The DOE Challenge Home Story
Think of the extra confidence going to a doctor ranked in the top one percent in his or her field. Similarly, each DOE Challenge Home builder is in the top one percent of builders in the country meeting extraordinary levels of excellence and quality specified by U.S. Department of Energy (DOE) guidelines. **Feel great knowing you choose a home offered only by a select group of leading edge builders.**
Strong Heritage

Every DOE Challenge Home starts with a solid foundation of building science specified by ENERGY STAR for Homes Version 3. Then each labeled home includes advanced technology solutions derived from world-class research conducted under the U.S. DOE building America Program.

Look for the most effective and proven innovations in every labeled home.
Beyond Current Code

There’s only one chance to build quality into a new home because it’s cost prohibitive to go back and change construction and internal systems. Every DOE Challenge Home is constructed to meet forthcoming code requirements to lock in future value.

It’s great peace-of-mind knowing the largest investment of a lifetime won’t be obsolete in a few years!
No or Ultra-Low Utility Bills

Many experts forecast it won’t be long before homebuyers insist on new homes with minimal or possibly no utility bills. There’s no reason to wait. Every DOE Challenge Home is so energy efficient, a small solar system can often offset most, or all, of your utility bills. And look for important details that can save $1,000’s installing a solar system in the future.

Enjoy never having to worry about rapidly increasing utility costs.
Luxurious Comfort

Extraordinary attention to detail (e.g., insulation, air sealing, advanced windows and engineered systems) included in every DOE Challenge Home surround you with even temperatures and quiet in every room and floor.

It’s time your next new home provides the same performance you expect in a luxury car.
Better Components

Every DOE Challenge Home is equipped with ENERGY STAR qualified appliances, lighting, fans, and space conditioning equipment. In addition, advanced water distribution helps ensure near-instant hot water at each fixture while saving 1,000’s of gallons of wasted water.

Quality products should be standard in homes this well built.
Breathe Better

Since we spend about two-thirds of our time each day inside our homes, every DOE Challenge Home has a comprehensive package of measures that control dangerous pollutants, provide continuous fresh air, and effectively filter the air you breathe.

Now you can provide a healthier home for your family.
DOE Challenge homes employ advanced construction practices that help mitigate risks of mold and moisture problems, ensure combustion safety, and minimize damaging UV radiation. In addition, builders are encouraged to include regionally appropriate disaster-resistant construction practices.

Experience living in a home built to last hundreds of years.
Quality Construction

Rigorous specifications are only good if they are adequately enforced. Detailed checklists, inspections, and advanced diagnostics with independent verifiers help ensure the performance of every DOE Challenge Home. In addition, builders are encouraged employ a comprehensive quality management program.

**Now you can hold your next new home to a higher standard.**
Sustained Value

The advanced levels of affordability, comfort, quiet, health, durability, and quality delivered in every DOE Challenge Home are too compelling to ignore. That’s why DOE believes this is where all housing is headed in the future.

Now you can feel truly confident making one of life’s largest purchase decisions.
For More Information

Visit the Challenge Home web site to learn more and find approved builder partners:

http://www1.eere.energy.gov/buildings/challenge/
Great Source of Content for Net-Zero Ready Homes
Building America Resource Tool

World Class Research…
at Your Finger Tips
Is:

Easy Access to Content:
• Guidance for Applying Targeted Energy Measures
• Tool for Preparing Customized Project Content
• Source for Proven Performance
• Link to Full References

Is Not:
• Design Tool for Customized Energy Packages
Energy Star Field Guide Baseline

Whole-House Existing

Resource Tool Taxonomy

Whole-House New

Measure Category A
- Measure Subcategory A.1
  - Measure A.1.1
  - Measure A.1.2
  - Measure A.1.3
  - Measure A.1.4
  - Measure A.1.5

- Measure Subcategory A.2
  - Measure A.2.1
  - Measure A.2.2
  - Measure A.2.3
  - Measure A.2.4

Measure Category B
- Measure B.1
- Measure B.2
- Measure B.3

Measure Category C
- Measure Subcategory C.1
  - Measure C.1.1
  - Measure C.1.2
  - Measure C.1.3
  - Measure C.1.4
  - Measure C.1.5

- Measure Subcategory C.2
  - Measure C.2.1
  - Measure C.2.2
  - Measure C.2.3
  - Measure C.2.4
  - Measure C.2.5

Measure Category D
- Measure D.1
- Measure D.2
- Measure D.3
- Measure D.4
- Measure D.5

Measure Category E
- Measure Subcategory E.1
  - Measure E.1.1
  - Measure E.1.2
  - Measure E.1.3
  - Measure E.1.4

- Measure Subcategory E.2
  - Measure E.2.1
  - Measure E.2.2
  - Measure E.2.3
  - Measure E.2.4
Comprehensive Resource Tool
Content Development

Existing Linear Audience Process

- Research Teams
- PDF
- Deployment

Future Audience Engagement Becomes *Community Driven*

- Architects & Engineers
- ESTAR
- Builder's Challenge
- Resource Tool
- Builders
- Research Teams
- Building Codes
Navigation Paths

Home/Entry Page

Component Explorer

Checklist Manager

Building Science Explorer

Content
Organizational System for BTP Research:
The following organizational structure provides
STAR Qualified Homes Field Guide information and help fill in critical gaps in energy
DOE funded best practices and technology for builders, raters, and program sponsors.

WHOLE-HOUSE BUILDING SCIENCE:
WH.1: New Home House-as-a-System
WH.2: Existing Home House-as-a-System

THERMAL ENCLOSURE (TE)
TE.1: High-Performance Window
   TE.1.1: ENERGY STAR Windows
   TE.1.2: Super Windows
   TE.1.3: Electro-chromic Window

TE.2: High-Performance Insulation
   TE.2.1. Insulation Quantity
      TE.2.1.1: IECC Code
      TE.2.1.2: Builders Choice
      TE.2.1.3: Insulation Installation

TE.3: Fully Aligned Air Barriers
   TE.3.1: Walls
      TE.3.1.1: Walls Behind Showers and Tubs
      TE.3.1.2: Walls Behind Fireplaces
      TE.3.1.3: Attic Knee Walls
      TE.3.1.4: Skylight Shells
      TE.3.1.5: Walls Adjacent Porch Roof
      TE.3.1.6: Staircase Walls
      TE.3.1.7: Double Walls
      TE.3.1.8: Garage Rim Joists
      TE.3.1.9: Other Exterior Walls

TE.3.2: Floors
   TE.3.2.1: Floor Above Garage
   TE.3.2.2: Crawl Space Floor
   TE.3.2.3: Floor Above Unconditioned Basement or Unconditioned Crawlspace

TE.3.3: Ceilings
   TE.3.3.1:ropped Ceiling / Softflex below Unconditioned Attic
   TE.3.3.2: Other Ceilings

3. Reduced Thermal Bridging

ENERGY STAR Qualified Homes, Version 3 (Rev. 04)
Thermal Enclosure System Rater Checklist

<table>
<thead>
<tr>
<th>Inspection Guidelines</th>
<th>Must</th>
<th>Builder</th>
<th>Rater</th>
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<tbody>
<tr>
<td>1. High-Performance Fenestration</td>
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<tr>
<td>1.1 Prescriptive Path: Fenestration shall meet or exceed ENERGY STAR requirements ¹²</td>
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# ENERGY STAR Qualified Homes, Version 3 (Rev. 04)
Thermal Enclosure System Rater Checklist

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## Inspection Guidelines

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### 3. Fully-Aligned Air Barriers

At each insulated location noted below, a complete air barrier shall be provided that is fully aligned with the insulation as follows:

- At interior or exterior surface of ceilings in Climate Zones 1-3; at interior surface of ceilings in Climate Zones 4-8. Also, include barrier at interior edge of attic eave in all climate zones using a wind baffle that extends to the full height of the insulation. Include a baffle in every bay or a tabbed baffle in each bay with a soffit vent that will also prevent wind washing of insulation in adjacent bays.
- At exterior surface of walls in all climate zones; and also at interior surface of walls for Climate Zones 4-8.
- At interior surface of floors in all climate zones, including supports to ensure permanent contact and blocking at exposed edges.

#### 3.1 Walls

- **3.1.1 Walls behind showers and tubs**
- **3.1.2 Walls behind fireplaces**
- **3.1.3 Attic knee walls**
- **3.1.4 Skylight shaft walls**
- **3.1.5 Wall adjoining porch roof**
- **3.1.6 Staircase walls**
- **3.1.7 Double walls**
- **3.1.8 Garage rim / band joist adjoining conditioned space**
- **3.1.9 All other exterior walls**

#### 3.2 Floors

- **3.2.1 Floor above garage**
Definitions

Scope

Ensuring Success
Climate Specific
Description
Right/Wrong Images
CAD Drawings
Compliance
Case Studies
References
Training
Resources

Scope

Tells a contractor how the measure could be described in contract documents.
Ensuring Success

Gives specific or whole-house health, safety, durability, and performance issues and test-in/test-out requirements.
Climate Specific

Provides climate-specific guidance.
Description

Provides 1) an overall explanation of the measure and 2) specific “how-to” steps and graphics.

[Diagram of attic living space with labeled steps: 1) Seal, 2) Attic living Space, 3) Headboard]
Definitions

Scope
Ensuring Success
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Right/Wrong Images
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Resources

Right/Wrong Images
Shows photographs of how the measures are correctly applied and incorrectly applied.
Definitions

Scope
Ensuring Success
Climate Specific
Description
Right/Wrong Images

CAD Drawings

Displays the drawings and provides dwg and pdf files.

Compliance

Summarizes the criteria to meet the Builders Challenge Quality Criteria, ENERGY STAR Version 3 (Rev. 04), 2009 IECC, 2012 IECC, and/or the standard (e.g., ANSI, ASHRAE).
Case Studies

Gives whole-house proven performance or measure specific real-world stories.
References

Provides a compilation of the complete references for the content.
Training

Gives links to government-sponsored videos and presentations related to this topic.
Resources

Provides links to building science resources (not previously cited).
What This Means to SIPA

• Refer Builders to DOE Challenge Home
• Provide Content for Resource Tool
Thank You

Questions?

For More Information:
http://www1.eere.energy.gov/buildings/challenge/

e-mail Contact:
buildeckerschallenge@newportpartnersllc.com