

BGE Smart Energy Savers ProgramSM

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Baltimore Gas and Electric ENERGY STAR[®] v.3 Pilot Study



Agenda

- **Safety Message** – Heather Anderson, Baltimore Gas and Electric
- **Pilot Study Overview** – Heather Anderson
- **Lessons Learned from the Field** – Rick Gazica, ICF
 - Building Science Methods
 - Costs comparisons
 - Energy Savings
- **Training for Program Participants** – Rick Gazica
- **Q&A**

Safety Message

Spring is finally here! Spring cleaning is an annual event for many people. Here are some safety tips:

– **Remove all hazards**

- Frayed or damaged appliance cords, wiring, fuses or breakers.
- Piles of rubbish, trash and yard debris.
- Remove stacks of paper and magazines; take them to recycling centers.
- Check for water leaks, especially near electrical appliances.
- Check for good clearance between heating appliances and combustibles.

– **Properly Store Flammable Liquids and Home Chemicals**

- Make sure that gasoline and cleaning fluids are well marked and are out of the reach of children and pets. Store in a cool, dry place outside the house.

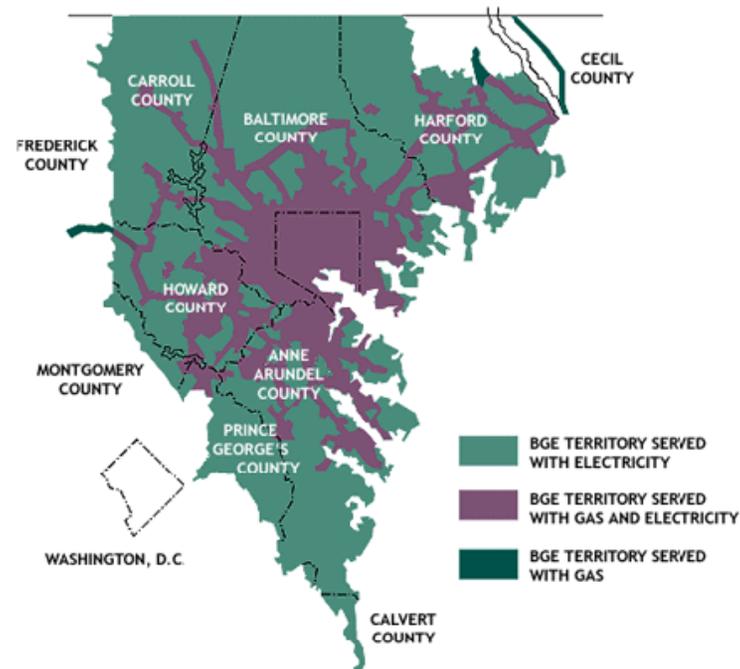
– **Check Fire Protection and Safety Equipment**

- Check your smoke and CO detector. Change the batteries.
- Check fire extinguishers for proper type and placement.
- Check and make sure you have a working flashlight and battery-powered radio for the approaching storm season.

Pilot Study Overview

Baltimore Gas and Electric

- Constellation Energy Group: BGE
 - Customers: 1.8 million



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Current Program

ENERGY STAR Qualified Homes:

- \$400 for an ENERGY STAR qualified home with a HERS Index of ≤ 85 .
- \$800 for an ENERGY STAR qualified home with a HERS Index of ≤ 80 .
- \$1,000 for an ENERGY STAR qualified home with a HERS Index of ≤ 75

Advanced Lighting Package (ALP):

- \$325 for completion of the ALP in *attached* homes.
- \$525 for completion of ALP in *detached* homes.

Marketing support/training

- Model home sales and marketing kits
- In person training for sales agents

Technical support/training

- In field training on issues in local market
- Training on changes to ENERGY STAR specification
- Limited plan reviews

Pilot Study Objectives and Design

- **Goal: To proactively prepare for ENERGY STAR for v.3.**
 - Minimize program disruptions and ensure program goal achievement.
 - Assess implementation strategies and develop transition guidance and training materials.
 - Evaluate incremental costs and savings associated with the new guidelines.
 - Obtain feedback from builders, subcontractors, and raters on best practices for specific details and for transitioning organizational processes to the 2011 Guidelines.
 - Quantify the increase in energy savings compared to ENERGY STAR v.2.
- **Design:**
 - Incentivized pilot study builders with an additional \$2,000 incentive.
 - Selected a cross section of builders and home types.
 - Homes constructed to the draft specification released in October.
 - Developed pilot study metrics to ensure that necessary data is collected.
 - Held an open house for each pilot home to allow other program participants and industry allies to “kick the tires”.
 - Develop pilot home case studies that address both rater and builder training needs.

Lessons Learned from the Field

Better Building Science: Thermal Enclosure Checklist

- Dow SIS Board used in place of OSB for exterior sheathing.
- R-value rating of R-3 for ½ inch and R-5.5 for 1 inch. It is American Plywood Association (APA) approved for structural sheathing.
- Eliminates the need for house wrap.
- Costs are estimated at an additional \$.05 per square foot for ½ inch and \$.25 per square foot for 1 inch when compared to traditional OSB and house wrap.
- Reduces thermal bridging.



Better Building Science: Thermal Enclosure Checklist

- Advanced Framing techniques such as “California Corners” allow insulation to be placed along the entire wall
- Spacing 2” x 4” @ 16” on center using only one “king stud” on each side of the windows to decrease thermal bridging



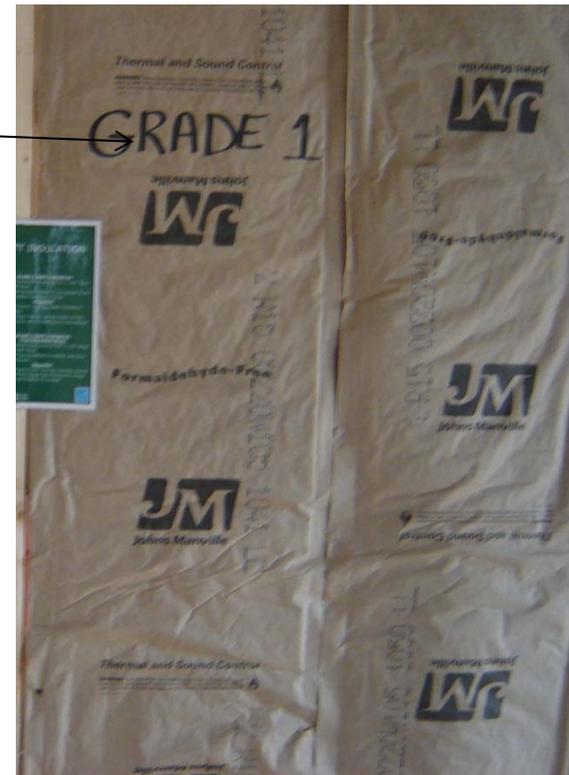
Better Building Science: Thermal Enclosure Checklist

- Using “Ladder” construction allows insulation to be placed where interior walls intersect with exterior walls.
- Using a “warm corner”, insulating with rigid insulation behind an interior wall intersecting with the exterior.



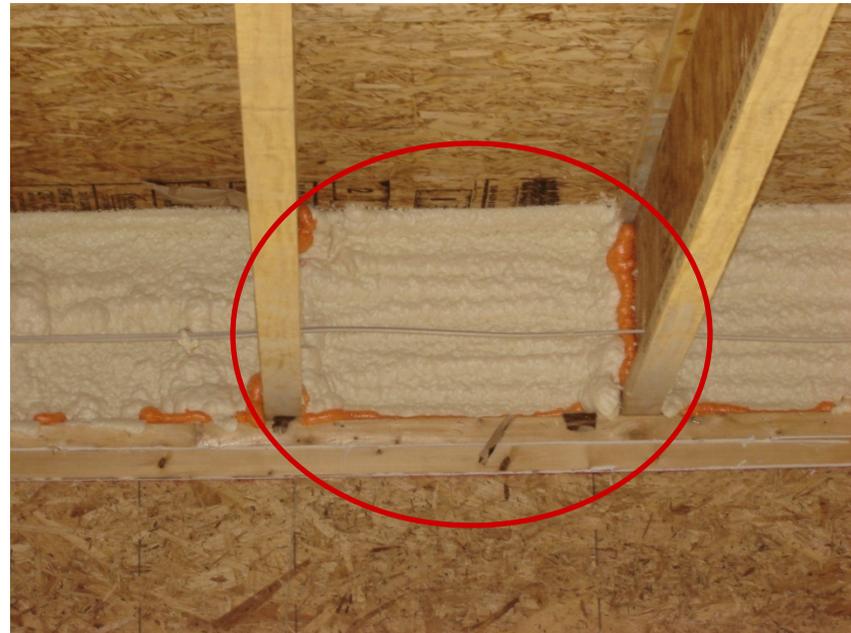
Better Building Science: Thermal Enclosure Checklist

- Change in specification requiring Grade 1 insulation installation to exterior walls.
- Example: Grade 2 insulation



Better Building Science: Thermal Enclosure Checklist

- The new specification requires air barriers at all rim joists in the house.
- This can be achieved with closed cell foam, or traditional air barriers such as thermal-ply or rigid insulation.



Better Building Science: Thermal Enclosure Checklist

- Requirement that windows are ENERGY STAR rated with Low-E.



- Utilization of “Raised Heel Trusses” to allow for full depth insulation at the edge of the attic.



Better Building Science: HVAC

- Utilization of 90+ Annual Fuel Utilization Efficiency (AFUE) furnaces to increase energy efficiency.
- The incremental cost for a higher efficiency unit will be slightly offset since it eliminates the need for b-



Better Building Science: HVAC

- Using UL 181 mastic as a duct sealer decreases duct leakage.



- Also use mastic to seal the air-handler since a majority of conditioned air loss occurs here.



Better Building Science: Water managed construction

- Proper flashing of windows and “back caulking” will prevent airflow and moisture from getting into the home.



Better Building Science: Energy efficient Lighting and Appliances

- The reference house for the new 3.0 Specifications require 80% of all lighting installed to be energy efficient.
- All appliances must have the ENERGY STAR Label.



Cost Comparisons

Item Changed	Material Cost	Labor Cost	Total Cost per house
Exterior Sheathing Dow SIS Board ½ inch = R-3 1 inch = R-5.5	\$.05 per square foot for ½ inch \$.25 per square foot for 1 inch	Decreases need for exterior house wrap	\$160 per house for ½ inch and \$800 per house for 1 inch
Framing members (studs)	(-\$2.50) for every exterior corner -\$5) for every window (-\$5) for every interior wall intersect	No change in labor costs	(\$25) per house (\$75) per house (\$40) per house
Furnace	Between \$700 and \$900 more than 80% furnaces	(\$150) less because do not have to install b-vent	\$550 more per house
Duct distribution system (transfer grilles)	\$10 per bedroom	\$6 per bedroom	\$16.00 per bedroom
Grade 1 insulation for walls	No addition	\$.05 more for Grade 1 installation with fiberglass batt	\$225.00 per house

Cost Comparisons (cont)

Item Changed	Material Cost	Labor Cost	Total Cost per house
Air barriers at all rim joists	\$120 dollars for foam and thermal ply	\$100	\$220 per house
80% energy efficient lighting	\$2 dollars more per bulb	No addition	\$80
Fresh air ventilation	\$200 for continuous running fan	\$50 dollars for installation	\$250
ACCA Manual J, D, and S HVAC contractors checklist	No increase	\$250 for testing	\$250
Windows ENERGY STAR rated	\$5 per window	No addition	\$100
Rater costs	No increase	\$100 more for equipment and extra paperwork	\$100
Total Costs			\$1860 to \$2340

Energy Savings from 2006 ENERGY STAR Home

- Craftstar Homes
- 2300 Square Foot Home
- HERS Index = 83
- Estimated Kwh Savings = 677 Kwh
- Estimated Electric Bill Savings per year = \$101.55
- Estimated Therm Savings = 100 Therms
- Estimated Gas Bill Savings per year = \$92.14

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Version 3.0 Pilot

- Jenkins Builders Pilot Home
- 2200 Square Foot Two Story Home
- HERS index = 62
- Estimated Kwh Savings = 2,378 Kwh
- Estimated Electric Bill Savings per year = \$356.85
- Estimated Therm Savings = 121 Therms
- Estimated Gas Bill Savings per year = \$112.53



Energy Savings from 2006 ENERGY STAR Home

- Bob Ward Homes
- 4300 Square Foot Home
- HERS Index = 78
- Estimated kWh Savings = 1244 kWh
- Estimated Electric Bill Savings per year = \$186.55
- Estimated Therm Savings = 202 Therms
- Estimated Gas Bill Savings per year = \$187.86

Version 3.0 Pilot

- Columbia Builders Pilot Home
- 4200 Square Foot Home
- Hers Index = 59
- Estimated Kwh Savings = 5,799 Kwh
- Estimated Electric Bill Savings per year = \$869.85
- Estimated Therm Savings = 331 Therms
- Estimated Gas Bill Savings per year = \$307.83



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Training for Program Participants

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Builder Training

- Three pilot study open houses at pre-dry wall open to all program participants.
- Three trainings scheduled for 2010 on ES v.3 that will educate builders on the final specification and utilize information garnered from the pilot study to assist in smoothing the transition.
 - Will include an overview of how the specification changes affect building practices and the energy savings of the home.
 - It will also present estimated costs for both material and labor.
- BGE will also facilitate training with participating HVAC contractors regarding compliance with the new HVAC contractors checklist.
- Quarterly training is also being anticipated for 2011.

Rater Training

Will focus on new requirements for qualifying a home under V.3 as well as strategies for accomplishing inspections in two trips.

Pre-drywall

- Thermal Enclosure System Rater Checklist
 - Windows shall meet or exceed 2009 IECC requirements
 - Quality-installed insulation
 - Fully aligned air barriers
 - Reduced thermal bridging
 - Air sealing*
- Water Management System Rater Checklist
 - Interior surface of below-grade walls not finished with continuous vapor barrier
 - Water-managed wall assembly - flashing at bottom of exterior walls with weep holes included for masonry veneer and weep screed for stucco cladding system
 - Fully sealed continuous drainage plane behind exterior cladding that laps over flashing in water managed wall assembly
 - Window and door openings fully flashed
 - Building materials with visible signs of water damage or mold not installed at time of inspection

Pre-drywall, Cont.

- HVAC System Quality Installation Rater Checklist
 - Duct Quality Installation
 - Duct Insulation
 - Duct Leakage
 - Air Inlets & Ventilation Source Air inlets located > 10 ft. from contamination sources such as stack, vent, exhaust hood, or vehicle exhaust
 - Air inlets > 2 ft. above grade in Climate Zones 1-3 or > 4 ft. above grade in Climate Zones 4-8 and not obstructed by snow, plantings, or other material at time of inspection
 - Ventilation air comes directly from outdoors and not from adjacent dwelling units, garages, unconditioned crawlspaces, or attics
 - If fans share common exhaust duct, back-draft dampers installed
 - Common exhaust duct not shared by fans in separate dwellings
 - Clothes dryers exhaust vented directly to outdoors
 - Combustion & Non-Combustion Pollutants
 - Filter accessible for maintenance by owner

Post Construction

- **Thermal Enclosure System Rater Checklist**
 - Attic access panels and drop down stairs insulated and fully gasketed or sealed.
 - Recessed lighting fixtures ICAT labeled and fully gasketed, caulked, or otherwise sealed
 - Bathroom and kitchen exhaust fans sealed to drywall using caulk or foam
 - Whole-house fans equipped with insulated cover gasketed to opening
- **Water Management System Rater Checklist**
 - Patio slabs, walks, and driveways sloped > 0.25 in. per ft. away from home to edge of surface or 10 ft., whichever is less.
 - Final grade sloped > 0.5 in. per ft. away from home for > 10 ft. and back-fill tamped to prevent settling
 - Sump pump covers shall be air-sealed (i.e., mechanically attached with full gasket seal or equivalent)
 - Water-Managed Roof Assembly
 - Wall-to-wall carpet not installed within 2.5 feet of toilets and bathing fixtures (e.g., tubs and showers)

Post Construction, Cont.

- HVAC System Quality Installation Rater Checklist
 - Whole-Building Delivered Ventilation
 - Ventilation Controls
 - Air inlets provided with mesh rodent / insect screen with mesh < 0.5 in.
 - Doors to garage gasketed or made substantially airtight
 - Filtration - MERV 6 or better filter installed in ducted mechanical systems
 - Filter located so that return and ventilation air pass filter prior to conditioning
 - Filter access panel includes gasket or comparable sealing mechanism and fits snugly against the exposed edge of filter when closed to prevent bypass

Conclusion

- Four other collaborative utility program pilot studies across the nation:
 - Public Service Company of New Mexico
 - Joint Management Committee (MA)
 - AEP Texas Central Co.
 - Public Service Company of Oklahoma
- Once homes from all pilot studies are complete we will synthesize data and develop a generalized framework for responding to v3 that can be applied to any market. Some initial findings include:
 - Some guidelines were less challenging for builders than they initially predicted.
 - Builders and raters needed more assistance understanding and troubleshooting the guidelines than anticipated.
 - Pre-construction meetings or mini-charrettes were critical to identifying problems early and communicating expectations.
 - Stick framing alternatives to raised heel trusses are easy to do and preferable for some builders.
 - It can be challenging to fulfill the TEC using Grade II cavity insulation and rigid insulation due to product thicknesses and insufficient racking strength for nonstructural products.

Q&A

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