



HERS 101

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2014 RESNET Conference
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Agenda

- HERS Industry
- HERS Ratings
- Becoming a HERS Rater
- Business models
- Equipment
- ENERGY STAR
- Other Government Programs
- Green Building Programs
- Rebates and Financial Incentives
- Resources

About Me



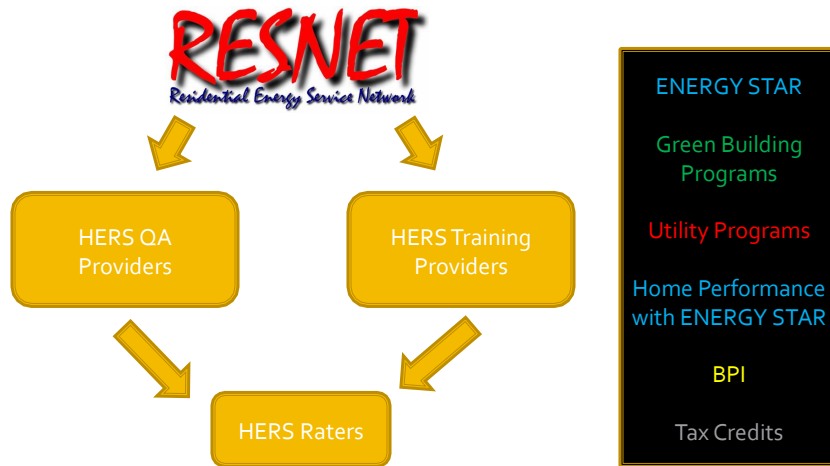
- HERS Rater & Trainer/QAD
- BPI Building Analyst & Proctor
- LEED AP Homes & ND
- LEED Green Rater
- EarthCraft Technical Advisor
- Educator
- Curriculum development
- Member RESNET Training & Education Committee
- Utility DSM Program Design & Implementation



Introductions

- Audience
 - HERS Raters?
 - Code officials?
 - HVAC contractors?
 - Insulators?
 - Architects?
 - Government employees?
 - Where from?

HERS industry



RESNET

The Residential Energy Services Network's (RESNET®) mission is to ensure the success of the building energy performance certification industry, set the standards of quality, and increase the opportunity for ownership of high performance buildings. RESNET is a membership 501-C-3 non profit organization.

www.resnet.us

RESNET

- Board of Directors
- Staff
- Committees
 - Quality Assurance
 - Training and Education
 - Standards
 - COMNET
 - Ethics and Appeals
 - Accreditation

RESNET

- HERS Standards
- Represent the industry- our lobbyists!
- Annual conference



HERS Ratings

- HERS Ratings consists of
 - Assessment of building components
 - Performance testing
 - Software modeling
 - Reporting

Based on standard U.S. Government tests

ENERGYGUIDE

Water Heater - Natural Gas
Capacity/Year Rating: 97 Gallons

OSW Water Heating Company
Model: JWS4004A
16480

Compare the Energy Use of this Water Heater with Others Before You Buy.

This Model Uses **268** Therms/year

Energy use (therms/year) range of all similar models

Uses Least Energy: 238 | Uses Most Energy: 273

Therms/year is a measure of energy use. Your utility company uses it to compute your bill. Only models with first hour ratings of 96 to 64 gallons are used in this scale.

Natural gas water heaters that use fewer therms/year cost less to operate. This model's estimated yearly operating cost is: **\$162**

Based on a 1994 U.S. Government national average cost of \$0.024 per therm for natural gas. Your actual operating cost will vary depending on your local utility rates and your use of the product.

HERS Rating is the Home's Mileage



Uniform Energy Rating System

1 Star | 2 Stars | 3 Stars | 4 Stars | 5 Stars

HERS Index: **81**

General Information

Conditioned Area: 4796 sq. ft. | House Type: Single-family detached
Conditioned Volume: 41054 cubic ft. | Foundation: Conditioned basement
Bedrooms: 4

Mechanical Systems Features

Heating: Fuel-fired air distribution, Natural gas, 92.1 AFUE
Cooling: Air conditioner, Electric, 13.0 SEER
Heating: Fuel-fired air distribution, Natural gas, 90.0 AFUE
Duct Leakage to Outside: 262.00 CFM
Ventilation System: None
Programmable Thermostat: Heating: Yes | Cooling: Yes

Building Shell Features

Ceiling Ins: U-0.040, R-38 | Exposed Floor: R-30
Vaulted Ceiling: NA | Window Type: Dist:LE/Arg - Vinyl60
Above Grade Walls: R-19, R-13 | Infiltration:
Foundation Walls: R-5.4, R-11.0 | Rate: Htg: 1976 Cjy - 1976 CFM50
Slab: R-5.0 Edge, R-0.0 Under | Method: Blower door test

Lights and Appliances Features

Percent Fluorescent Fix:Based: 10.00 | Clothes Dryer Fuel: Electric
Percent Fluorescent CFL: 0.00 | Range/Oven Fuel: Natural gas
Refrigerator (MJ/yr): 775.00 | Ceiling Fan (int/Watt): 0.00
Dishwasher Energy Factor: 0.46

Rating Number: 122897-01
Certified Energy Rater: Lee O'Neil
Rating Date: December 29, 2007
Rating Ordered For: Stanley Martin Custom Homes

Estimated Annual Energy Cost

Use	MMBtu	Cost	Percent
Heating	77.6	\$232	13%
Cooling	11.3	\$298	15%
Hot Water	19.8	\$60	4%
Lights/Appliances	\$0.0	\$1146	67%
Plumbing/Leak	0.0	\$0	0%
Service Charges		\$222	11%
Total		\$2030	100%

This home meets or exceeds the minimum criteria for all of the following:

- EPA Energy Star Home
- ASHRAE Standard 90.2 - 1992
- 2003 International Energy Conservation Code
- 2004 International Energy Conservation Code
- 2006 International Energy Conservation Code



Compare this vehicle to others in the FREE FUEL ECONOMY GUIDE available at the dealer.

CITY MPG 14 | **Fuel Mileage Information** | **HIGHWAY MPG 19**

Actual Mileage will vary with options, driving conditions, driving habits and vehicle's condition. Results reported to EPA indicate that the majority of vehicles with these estimates will achieve between 11 and 17 mpg in the city, and between 16 and 22 mpg on the highway.

For Comparison Shopping, all vehicles classified as STANDARD PICKUP have been issued mileage ratings ranging from 14 to 26 mpg city and 15 to 27 mpg highway.

Estimated Annual Fuel Cost: \$115

Compare this vehicle to others in the FREE FUEL ECONOMY GUIDE available at the dealer.

CITY MPG 23 | **Fuel Economy Information** | **HIGHWAY MPG 30**

Actual Mileage will vary with options, driving conditions, driving habits and vehicle's condition. Results reported to EPA indicate that the majority of vehicles with these estimates will achieve between 19 and 27 mpg in the city, and between 26 and 35 mpg on the highway.

For Comparison Shopping, all vehicles classified as COMPACT have been issued mileage ratings ranging from 18 to 31 mpg city and 16 to 41 mpg highway.

Estimated Annual Fuel Cost: \$850

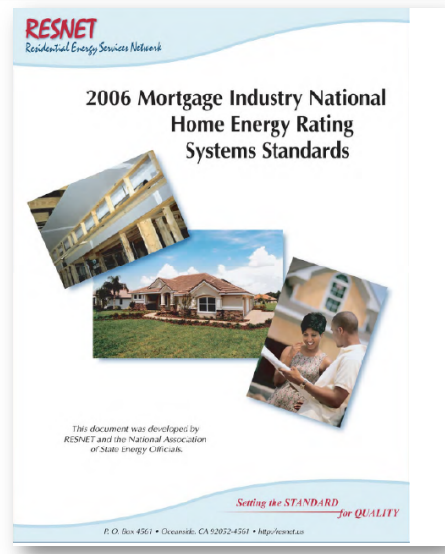
HERS is Recognized by

- Mortgage industry for capitalizing energy efficiency in mortgages
- Financial industry for certification of “white tags”
- Federal government for verification of building energy performance for:
 - Federal tax credit qualification
 - EPA ENERGY STAR labeled homes
 - U.S. Department of Energy Building America program
- Method of minimum code compliance in 16 states

HERS Standards

Rules and Regulations

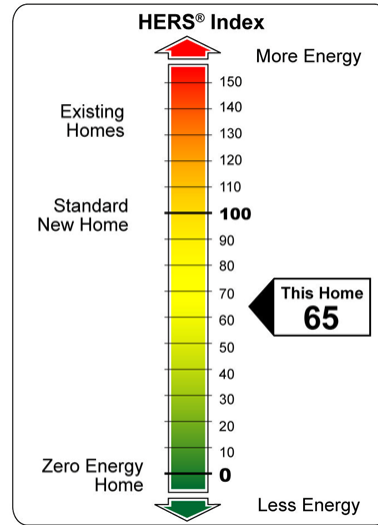
- Raters
- Rating Providers
- Trainers
- Software developers
- RESNET



HERS Ratings

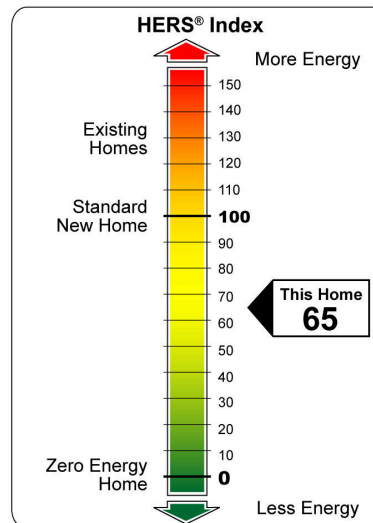
HERS Index of 100 represents the energy use of the "American Standard Building".

HERS Index of 0 (zero) represents a home using no net purchased energy (a Zero Energy Building).



HERS Index

- HERS Index accounts for:
 - Heating
 - Cooling
 - Water Heating
 - Lights
 - Appliances
- Lower is better



Rated vs. Reference Home

Feature	Rated Home	Reference Home
Location	Actual	Actual
Size & Shape	Actual	Actual
Windows	Actual	18% of floor area, evenly distributed
Insulation	Actual	2004 IECC
HVAC	Actual	2004 IECC
Infiltration	Actual	SLA = 0.00048

HERS Training Providers

- Accredited by RESNET
- 70+ Training Providers around the country
- A full list can be found here:

<http://www.resnet.us/programs/training/directory.aspx>

HERS Training

- Typically a week long course
- Classroom and field
- HERS Software
- RESNET Rater test
 - 2 hours
 - 50 questions
 - $\geq 80\%$ passing score



Training Topics

- Basic principles of building science (i.e., viewing the home as a system)
- The minimum rated features for buildings
- Blower door & duct leakage testing procedures
- Types and efficiencies of windows
- Types and efficiencies of heating, cooling, water heating, and lighting systems
- Types and characteristics of HVAC and domestic hot water
- On-site inspection procedures
- Producing a scaled and dimensioned drawing of a home
- Geometry
- Completing a home energy rating checklist or entering data into a home energy rating software program
- Completing a home energy improvement analysis or entering data into a home energy rating software program that performs improvements analysis
- Basic knowledge of financial incentive programs and energy efficient mortgages
- Communicating the benefits of energy saving measures and practices to the consumer
- Quality assurance

<http://www.resnet.us/rater/certified/default.htm>

Becoming a Training Provider

- Rating and/or training experience
- RESNET non-refundable \$500 application fee
- Annual accreditation fee of \$1,750
- Submit all training materials for review
- Must have a HERS Trainer, which requires
 - Pass the RESNET Trainer Test with $\geq 90\%$ correct
 - Annual CEU's

HERS QA Providers

- Supplies the Rating software
- Each Rating Provider must employ a certified Quality Assurance Designee (QAD)
- QAD must check a minimum 10% of all building input files
- QAD must verify a minimum of 1% of each certified Rater's homes
- Maintain rater registry, records of CEUs, financial disclosure forms, complaints, etc.
- RESNET ensures Rating Providers compliance



Finding a QA Provider

- 100+ around the country
- Full list here:

<http://www.resnet.us/programs/providers/directory.aspx>

- Considerations
 - Where are they located?
 - Do you like working with them?
 - Will they help you develop your business and supply leads and advice?
 - Do you have a conflict of interest?

Becoming a QA Provider

- Be a Rater first
- RESNET non-refundable \$500 application fee
- Annual accreditation fee of \$1,750
- Must have a QAD, which requires
 - Perform ≥ 25 Ratings
 - Pass the RESNET QAD Test with $\geq 90\%$ correct
 - Can not check their own ratings

HERS Raters

- Rating Field Inspector
 - Trained and certified to **only** perform inspections
- HERS Rater
 - Performs inspections **and** HERS software models



Becoming a Rater

- Complete week-long training
 - Accredited by RESNET
- Pass national online test
- Contract with Rating Provider
- Perform 5 “provisional” ratings under the supervision of QAD/Trainer
- Equipment
- Insurance

Rater Code of Ethics

- Professional Conduct
- Representation of Fees & Services
- Conflicts of Interests

Standard Disclosure

- Complete for every home.
- Given to the Rating client who is responsible to provide a copy to the homeowner/buyer.
- Each form must include, at a minimum, the name of the community or subdivision, city and state where the home is located.

**RESNET HOME ENERGY RATING
Standard Disclosure**

For home(s) located at: _____
City: _____ State: _____

Check the applicable disclosure(s) in accordance with the instructions on the reverse of this page:

1. The Rater or the Rater's employer is receiving a fee for providing the rating on this home.
2. In addition to the rating, the Rater or Rater's employer has also provided the following consulting services for this home:
 A. Mechanical system design
 B. Moisture control or indoor air quality consulting
 C. Performance testing and/or commissioning other than required for the rating itself
 D. Training for sales or construction personnel
 E. Other (specify) _____

3. The Rater or Rater's employer is:
 A. The seller of this home or their agent
 B. The mortgagee for some portion of the financed payments on this home
 C. An employee, contractor or consultant of the electric and/or natural gas utility serving this home

4. The Rater or Rater's employer is a supplier or installer of products, which may include:

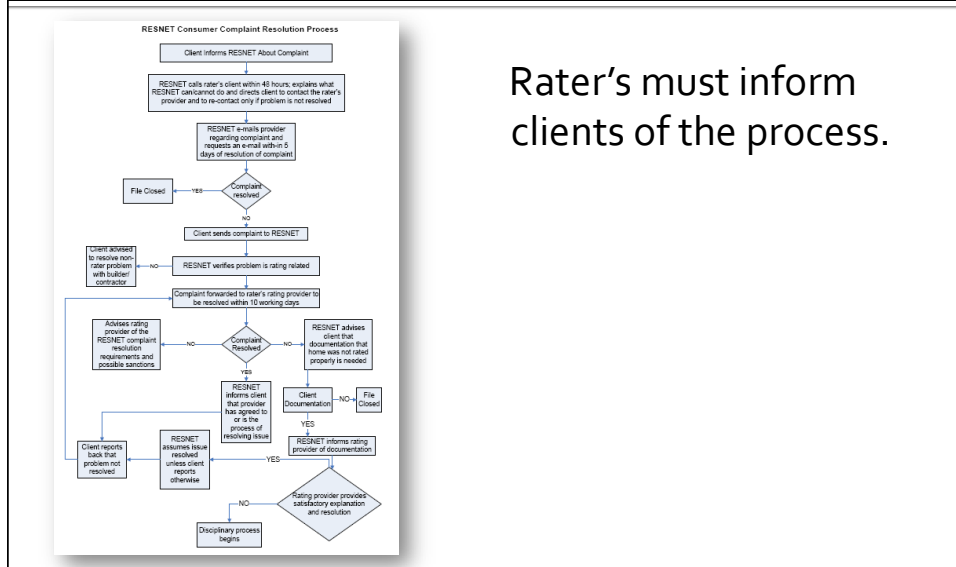
	Installed in this home by:	OR Is in the business of:
HVAC systems.....	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer
Thermal insulation systems.....	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer
Air sealing of envelope or duct systems.....	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer
Windows or window shading systems.....	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer
Energy efficient appliances.....	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer
Construction (builder, developer, construction contractor, etc)	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer

Other (specify): _____ Rater Employer Rater Employer

This home may have been verified under the provisions of Chapter 6, Section 803 Technical Requirements for Sampling of the Mortgage Industry National Home Energy Rating Standard as set forth by the Residential Energy Services Network (RESNET).

Rater's Printed Name _____ Certification # _____
Rater's Signature _____ Date _____

Complaint Resolution Process



Rater's must inform clients of the process.

HERS Raters

- New construction inspections
 - ENERGY STAR
 - Green building programs
 - Energy Efficient Mortgages (EEM)
- Existing homes
 - Energy audits/home performance assessments
 - Utility programs
 - Weatherization
 - Energy Improvement Mortgages (EIM)
 - Home Performance with ENERGY STAR

Green Raters

- RESNET classification of Rater to perform green building inspections.
- Additional two day
- RESNET Green Rater Certificate
- **NOT a USGBC Green Rater!**



BPI Certification

- Building Performance Institute (BPI) founded in 1993 by building tradespersons, project managers and public program professionals.
- Originally focused on certification for weatherization auditors and installation personal.
- Now certification for all residential and multifamily building performance contractors.

www.bpi.org



Rater Business Models

- Performance testing with conventional limited scopes
- Performance testing with broader work scopes and subcontracting
- Integrated whole-house approach with all services offered in-house
- Many offer new and existing home inspections
- 3 case studies

Performance Point



- Based in Charlotte, NC
- Key partnerships with HVAC, waterproofing and spray foam insulation contractors.
- Services
 - Air sealing
 - ENERGY STAR and green building inspections
 - Manual J and D calculations
 - Consulting
 - Existing home inspections and improvements

<http://www.theperformancepoint.com/>

Environmental Services Group



ENVIRONMENTAL SOLUTIONS GROUP

- Based in Greensboro, NC
- Services
 - ENERGY STAR and green building certifications
 - Energy audits for homes and businesses
 - IEQ assessments for mold, lead, asbestos, bacteria, moisture and industrial hygiene
 - Environmental health forensics
 - Construction management
 - No improvement/remediation work

www.esgtesting.com

Southern Energy Management



- Based in Raleigh, NC
- Service NC and parts of SC and VA
- ENERGY STAR and green building certification
- Solar PV and hot water for residential, commercial and industrial

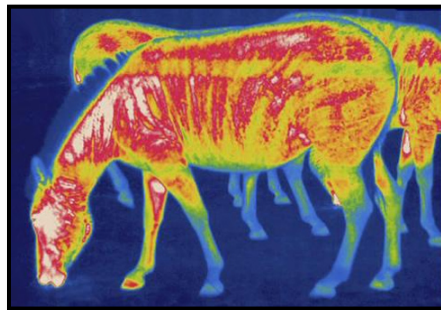
www.southernenergymanagement.com

Building Science Consultant

- How it should work
 - Train builders sales team
 - Train builders and supers
 - Train subcontractors
 - Consult during design phase
 - Review Manual-J load calculation
 - Predrywall inspection
 - Final inspection

Equipment

- At a minimum
 - Blower Door
 - Duct Blaster
 - Computer for HERS software
 - Tape measure
- Additional ~~tools~~ equipment
 - IR Camera
 - Moisture meter
 - Thermometer
 - Air flow meter
 - Digital camera



Zebras at the London Zoo shot with a FLIR camera

Blower Door

The Energy Conservatory



Minneapolis Blower Door

<http://www.energyconservatory.com/>

Retrotec



Q42 and Q46 Automated Blower Doors

<http://www.retrotec.com/>

Duct Leakage

Energy Conservatory



Minneapolis Duct Blaster

<http://www.energyconservatory.com/>

Retrotec



Q32 Duc-Tester

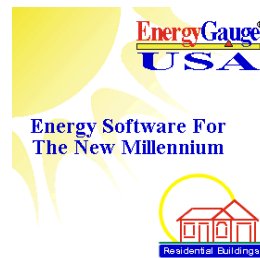
<http://www.retrotec.com/>

HERS Software

- What you use will be dictated by where you are and what your Rating Provider uses.



REM/Rate
www.archenergy.com



Energy Gauge
www.energygauge.com

Insurance

- RESNET and the IRS for Tax Credit Verifiers require \$500,000 in professional liability insurance.
- RESNET has arranged a package through Lockton Affinity.

Basic premium for individual Raters with at least one year of experience is approximately \$1,650* for Professional Liability coverage.

<http://www.locktonaffinity.com/resnet/>

*These examples represent basic pricing. Premiums can vary depending on the size of the rating enterprise and/or the nature of its operations.

Insurance, cont.

- Green building programs may require something too....

General Liability	\$1,000,000
Automobile Liability	\$500,000
Workers Compensation	As required by law
Employer's Liability <small>This is typically part of Workers Compensation</small>	\$500,000
Professional Liability	\$500,000
<ul style="list-style-type: none"> • Covers professionals for negligence and errors and omissions that injure clients. • Professionals are expected to have extensive technical knowledge or training in their particular area of expertise. They are also expected to perform the services for which they were hired, according to the standards of conduct in their profession. If they fail to use the degree of skill expected of them, they can be held responsible in a court of law for any harm they cause to another person or business. • Professionals that operate their own businesses need professional liability insurance in addition to an in-home business or business owner's policy. This protects them against financial losses from lawsuits filed against them by their clients. • When liability is limited to acts of negligence, professional liability insurance may be called "errors and omissions" liability. 	

NAHB Requirements for verifiers

Recap

We've covered...

- RESNET
- HERS Rating
- HERS Training
- HERS Rating
- HERS Rater
- Green Rate
- BPI Certification



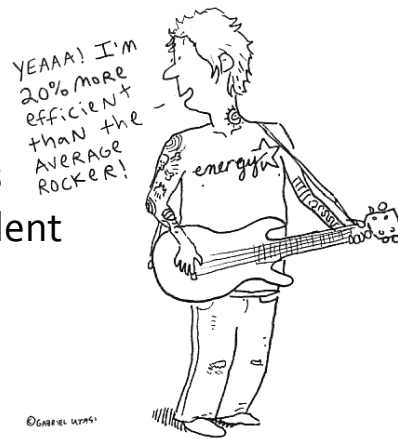
ENERGY STAR

The national, US government-backed
symbol for
cost-effective
energy efficiency
while assuring same or better performance



ENERGY STAR Background

- 1992 launched
- 50+ products categories
- 1+ Billion products sold
- \$14 Billion annual savings
- 25 Million vehicles equivalent GHG



http://gabrielutasi.com/012007.energy_star.gif



A Growing Brand

- **70%** awareness in 2004
- **4,700+** Active Builder Partners
- **1,400,000+** Labeled Homes



Top ENERGY STAR Markets

Total number of verified homes to date*

- Houston, TX
- Dallas-Fort Worth, TX
- Las Vegas, NV
- Phoenix, AZ
- Greater Los Angeles, CA
- Greater New York, NY
- Tucson, AZ
- San Antonio, TX
- Sacramento, CA
- San Diego, CA
- Columbus, OH
- Des Moines, IA
- Indianapolis, IN
- Austin, TX
- Greater Philadelphia, PA/Wilmington, DE

*Date unknown

ENERGY STAR is...



=

- *Truly Energy Efficient*
- *Credible*
- *Environmental Leadership*

On average 15% more efficient than 2009 IECC code built homes

Energy Efficiency

Green building starts with energy efficiency

- Saving energy prevents pollution
- Saving energy saves water (?!)



Why certify

Which is energy efficient?



EarthCraft House and Energy Star certified
Atlanta, GA 2006



Standard home

Qualifying Homes



- Eligible buildings:
 - Single-family homes
 - Multi-family buildings three stories or less
 - Multi-family buildings four or five stories and have individual heating, cooling, and hot water systems
 - Multifamily High-rise (6+ stories)

Certification Pathways



Prescriptive Path

1. Build the home using the ENERGY STAR Reference Design.
2. Complete the inspection checklists.
3. Have Rater Verify Home
4. Place ENERGY STAR certification label on breaker box and provide homeowner with ENERGY STAR certificate.

Performance Path

1. Model the home and find the ENERGY STAR HERS Index Target.
2. Select upgrades that achieve a HERS Index \leq ENERGY STAR HERS Index Target and meet other program requirements.
3. Complete the inspection checklists.
4. Have Rater Verify Home
5. Place ENERGY STAR certification label on breaker box and provide homeowner with ENERGY STAR certificate.


ENERGY STAR 3.0



- More Stringent Envelope Requirements
- More Stringent Duct Leakage Requirement
- Home Size Adjustment (Performance Path)
- Five New Inspection Checklists
 - Thermal Enclosure System Rater Checklist
 - HVAC System Quality Installation Rater and Contractor Checklists
 - Water Management System Rater and Builder Checklists

Versi

ts



Hot Climates (2009 IECC Zones 1,2,3) ¹⁶	Mixed and Cold Climates (2009 IECC Zones 4,5,6,7,8) ¹⁶
Cooling Equipment (Where Provided)¹⁷	
Cooling equipment shall meet the following applicable efficiency levels:	
<ul style="list-style-type: none"> • ≥ 14.5 SEER / 12 EER ENERGY STAR qualified AC, OR; • Heat pump (See Heating Equipment) 	<ul style="list-style-type: none"> • ≥ 13 SEER AC, OR; • Heat pump (See Heating Equipment)
Heating Equipment¹⁷	
Heating equipment shall meet the following applicable efficiency levels:	
<ul style="list-style-type: none"> • ≥ 80 AFUE gas furnace, OR; • ≥ 80 AFUE oil furnace, OR; 	<ul style="list-style-type: none"> • ≥ 90 AFUE gas furnace, ENERGY STAR qualified, OR; • ≥ 85 AFUE oil furnace, ENERGY STAR qualified, OR;

Water Heater

- DHW equipment shall meet the following efficiency requirements:¹⁷

Gas:	30 Gal = 0.63 EF	40 Gal = 0.61 EF	50 Gal = 0.59 EF	60 Gal = 0.57 EF	70 Gal = 0.55 EF	80 Gal = 0.53 EF
Electric:	30 Gal = 0.94 EF	40 Gal = 0.93 EF	50 Gal = 0.92 EF	60 Gal = 0.91 EF	70 Gal = 0.90 EF	80 Gal = 0.89 EF
Oil:	30 Gal = 0.55 EF	40 Gal = 0.53 EF	50 Gal = 0.51 EF	60 Gal = 0.49 EF	70 Gal = 0.47 EF	80 Gal = 0.45 EF

Thermostat & Ductwork

- Programmable thermostat shall be installed unless thermostat controls a zone with electric radiant heat, for which a manual thermostat is allowed.¹⁸
- Supply ducts in unconditioned attics shall have insulation ≥ R-8; all other ducts in unconditioned space shall have insulation ≥ R-6.
- Total duct leakage shall be ≤ 6 CFM25 per 100 sq. ft. of conditioned floor area.^{19,20}
- Duct leakage to outdoors shall be ≤ 4 CFM25 per 100 sq. ft. of conditioned floor area.^{19,20,21}

Lighting & Appliances

- Where refrigerators, dishwashers, ceiling fans, and exhaust fans²² are installed, products shall be ENERGY STAR qualified.
- ENERGY STAR qualified CFLs, LEDs, or pin-based lighting in 80% of fixtures in RESNET-defined Qualifying Light Fixture Locations, shall be installed.²³

- Ground-source heat pump, any product type, ENERGY STAR qualified¹³

Electric:	30 Gal = 0.94 EF	40 Gal = 0.93 EF	50 Gal = 0.92 EF	60 Gal = 0.91 EF	70 Gal = 0.90 EF	80 Gal = 0.89 EF
Oil:	30 Gal = 0.55 EF	40 Gal = 0.53 EF	50 Gal = 0.51 EF	60 Gal = 0.49 EF	70 Gal = 0.47 EF	80 Gal = 0.45 EF

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Benchmark Home Size

- Homes larger must use the Performance Path with Size Adjustment Factor.

Bedrooms	1	2	3	4	5	6	7	8
Conditioned Floor Area	1,000	1,600	2,200	2,800	3,400	4,000	4,600	5,200

Value Through Building Science

If you want your homes to be..

Affordable

Comfortable

Durable

Building science says to have a..

1

Complete Thermal Enclosure System

2

Complete HVAC System

3

Complete Water Management System

Thermal Enclosure System

1

Thermal Enclosure System Checklist

• Features

- High-quality insulation installation
- High-performance windows & doors
- Tightly sealed home
- Reduced thermal bridging in walls

Thermal Enclosure System

1

Thermal
Enclosure
System
Checklist

Checklist
2013

- Why is this important?
 - A well-insulated and air-sealed home, with good windows and doors, reduces the amount of energy needed to keep the home comfortable.

Complete HVAC System

2

HVAC
System
QI
Checklists

Checklists
QI

- Features
 - A right-sized and properly installed heating, cooling, and duct system
 - A ventilation system that meets the industry standard
 - Reduced safety and air quality risks from combustion appliances

Complete HVAC System

2

HVAC
System
QI
Checklists

Checklists
QI

- Why is this important?
 - Improved airflow & efficiency maintain comfort with less energy
 - Proper sizing costs less and better manages humidity levels
 - Ventilation systems remove indoor air pollutants, provide outdoor air, and filter dust and particles

Water Management System

3

Water
Management
System
Checklist

Checklist
System

- Features
 - Water-managed roof, walls, foundation, site, and building materials

Water Management System

3

Water Management System Checklist

СHECKLIST
2013

- Why is this important?
 - Prolonged moisture in walls, floors, and ceilings can cause rot and mold, hurting durability.
 - Wet walls, floors, and ceilings in air-sealed homes don't dry as quickly; therefore, it's more important to not let them get wet.

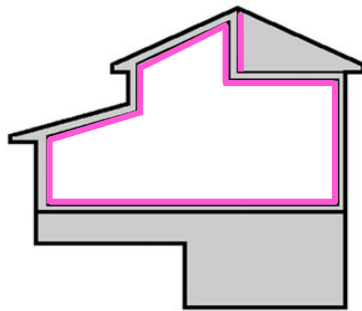
New Training Requirements

- Raters must complete Version 3 training provided by RESNET accredited training providers
- Builders must complete training provided by EPA and HVAC contractors will be required to complete training provided through industry associations

Added Costs of 2011 Specs

- EPA cost analysis suggest an approximate incremental cost range from \$4,000 to \$5,000.
- For an average weighted incremental cost of about \$4,300, the incremental monthly mortgage is approximately \$23/month at currently published interest rates.
- This incremental monthly mortgage is lower than the expected monthly energy savings of approximately \$37/month, and thus meets EPA cost-effectiveness criteria.

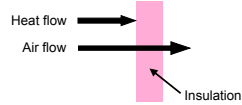
The Building Envelope



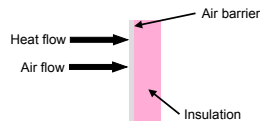
The Building Envelope consists of a thermal barrier and air barrier. They must be contiguous and continuous over the entire building envelope. The two must be perfectly aligned with the air barrier.



Building Science Basics



Most insulation does not stop the flow of air.



Air barrier prevents the flow of air through insulation.



Insulation settling away from sub-floor

Vertical Insulation

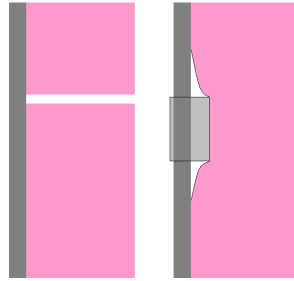
- All wall insulation must be enclosed on all 6 sides to allow proper performance.
- Problem areas: fireplace chases on exterior walls, tubs/showers on exterior walls, attic kneewalls and staircases on exterior walls.



Two installations of air barriers at tubs adjoining exterior walls

Insulation Grading

- ENERGY STAR requires the insulation installation is graded.
- Goal: no gaps, voids or compression.



Gaps (left) and voids (right) allow air to flow through insulation.

Air Sealing Measures



BAD



GOOD

Duct Sealing

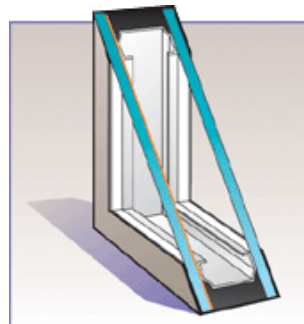
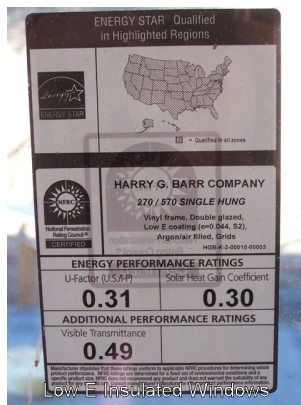


Recommended: Seal all duct connections with **mastic**



Seal the boot to subfloor/drywall connection with **caulk or mastic**

Energy Efficient Windows



Double pane low-e windows

Right-Sized HVAC

- Residential heating and cooling equipment is typically oversized
 - 143% - 322% for cooling
 - 106% - 234% for heating
- Most code officials don't check for Manual J and do not have proper training to

http://www.builtgreen.org/articles/0308_HVAC_sizing.htm

Bigger is not always better


- Higher equipment costs
- Poor dehumidification
- Short cycle
- Large temperature swings
- Lower efficiency and higher operating costs
- Shorter equipment life
- Comfort problems

Checking Load Calcs

ENERGY STAR Requires

- Must be sized according to the latest editions of ACCA Manuals J and S or ASHRAE 2001 Handbook of Fundamentals.
- Maximum over sizing of 15% .
- Outdoor temperatures shall be the 99.0% design temperatures as published in the ASHRAE Handbook of Fundamentals
- Indoor temperatures shall be 75°F for cooling;
- Infiltration rate shall be selected as "tight", or the equivalent term.

Sample Load Calc



Project Summary
Entire House
 Southface Energy Institute

Job:
 Date:
 By:

Project Information

For: Atlanta, GA

Notes:

Design Information

Weather: Atlanta, GA, US

<p style="text-align: center;">Winter Design Conditions</p> <p>Outside db 23 °F Inside db 70 °F Design TD 47 °F</p> <p style="text-align: center;">Heating Summary</p> <table border="0" style="width: 100%;"> <tr><td>Structure</td><td style="text-align: right;">61844</td><td>Btuh</td></tr> <tr><td> ducts</td><td style="text-align: right;">3882</td><td>Btuh</td></tr> <tr><td>Central vent (80 cfm)</td><td style="text-align: right;">3982</td><td>Btuh</td></tr> <tr><td>Humidification</td><td style="text-align: right;">0</td><td>Btuh</td></tr> <tr><td>Piping</td><td style="text-align: right;">0</td><td>Btuh</td></tr> <tr><td>Equipment load</td><td style="text-align: right;">68711</td><td>Btuh</td></tr> </table> <p style="text-align: center;">Infiltration</p> <table border="0" style="width: 100%;"> <tr><td>Method</td><td style="text-align: center;">Blower door</td></tr> <tr><td>Shielding / stories</td><td style="text-align: center;">(ASHRAE) 1, 1</td></tr> <tr><td>Pressure / AVF</td><td style="text-align: center;">50 Pa / 3986 cfm</td></tr> </table> <table border="0" style="width: 100%;"> <tr><td>Area (ft²)</td><td style="text-align: right;">36240</td></tr> <tr><td>Volume (ft³)</td><td style="text-align: right;">2913</td></tr> <tr><td>Air changes/hour</td><td style="text-align: right;">0.48</td></tr> <tr><td>Equip. AVF (cfm)</td><td style="text-align: right;">305</td></tr> </table>	Structure	61844	Btuh	ducts	3882	Btuh	Central vent (80 cfm)	3982	Btuh	Humidification	0	Btuh	Piping	0	Btuh	Equipment load	68711	Btuh	Method	Blower door	Shielding / stories	(ASHRAE) 1, 1	Pressure / AVF	50 Pa / 3986 cfm	Area (ft²)	36240	Volume (ft³)	2913	Air changes/hour	0.48	Equip. AVF (cfm)	305	<p style="text-align: center;">Summer Design Conditions</p> <p>Outside db 91 °F Inside db 76 °F Design TD 15 °F Daily range 50 °F Relative humidity 50 % Moisture difference 38 gr/lb</p> <p style="text-align: center;">Sensible Cooling Equipment Load Sizing</p> <table border="0" style="width: 100%;"> <tr><td>Structure</td><td style="text-align: right;">42112</td><td>Btuh</td></tr> <tr><td> ducts</td><td style="text-align: right;">1283</td><td>Btuh</td></tr> <tr><td>Central vent (80 cfm)</td><td style="text-align: right;">7337</td><td>Btuh</td></tr> <tr><td>Blower</td><td style="text-align: right;">0</td><td>Btuh</td></tr> </table> <p>Use manufacturer's data Rate/owing multiplier 0.96ⁿ Equipment sensible load 42764 Btuh</p> <p style="text-align: center;">Latent Cooling Equipment Load Sizing</p> <table border="0" style="width: 100%;"> <tr><td>Structure</td><td style="text-align: right;">4843</td><td>Btuh</td></tr> <tr><td> ducts</td><td style="text-align: right;">0</td><td>Btuh</td></tr> <tr><td>Central vent (80 cfm)</td><td style="text-align: right;">2002</td><td>Btuh</td></tr> <tr><td>Equipment latent load</td><td style="text-align: right;">2993</td><td>Btuh</td></tr> <tr><td>Equipment total load</td><td style="text-align: right;">49629</td><td>Btuh</td></tr> <tr><td>Req. total capacity at 0.70 SHR</td><td style="text-align: right;">5.1</td><td>ton</td></tr> </table>	Structure	42112	Btuh	ducts	1283	Btuh	Central vent (80 cfm)	7337	Btuh	Blower	0	Btuh	Structure	4843	Btuh	ducts	0	Btuh	Central vent (80 cfm)	2002	Btuh	Equipment latent load	2993	Btuh	Equipment total load	49629	Btuh	Req. total capacity at 0.70 SHR	5.1	ton
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Source: www.southface.org

AHRI Matching

- Indoor & Outdoor A/C or heat pump coils must be properly matched to achieve desired performance.
- ENERGY STAR requirement
- www.ahridirectory.org

Model	Manufacturer	Trade Brand Name	Manufacturer Model	Manufacturer Name	Model	Manufacturer Name	Capacity (Btu/h)	SEER	SEER2	Phase	AHRI Type	Est. Indoor Air Annual Capacity (Est. Btu/h)	Energy Star Mark
336174	Active	Call (800) 368-7000	ADP	CARRIER AIR CONDITIONING	24AB46A02	ADVANCED DETROIT/ATOR PRODUCTS	47500	13.0	13.0	1	SC-A	342	
336173	Active	Call (800) 368-7000	ADP	CARRIER AIR CONDITIONING	24AB46A02	ADVANCED DETROIT/ATOR PRODUCTS	47500	13.0	13.0	1	SC-A	342	
336171	Active	Call (800) 368-7000	ADP	CARRIER AIR CONDITIONING	24AB46A02	ADVANCED DETROIT/ATOR PRODUCTS	49000	12.5	12.5	1	SC-A	348	
336170	Active	Call (800) 368-7000	ADP	CARRIER AIR CONDITIONING	24AB46A02	ADVANCED DETROIT/ATOR PRODUCTS	50000	12.0	12.0	1	SC-A	360	
336172	Active	Call (800) 368-7000	ADP	CARRIER AIR CONDITIONING	24AB46A02	ADVANCED DETROIT/ATOR PRODUCTS	60000	12.0	12.0	1	SC-A	432	
332577	Active	Call (800) 368-7000	ADREN	CARRIER AIR CONDITIONING	24AB0176A01	ADREN MANUFACTURING	10000	11.4	14.0	1	SC-A	139	
332489	Active	Call (800) 368-7000	ADREN	CARRIER AIR CONDITIONING	24AB0176A01	ADREN MANUFACTURING	17000	11.0	13.0	1	SC-A	142	
332676	Active	Call (800) 368-7000	ADREN	CARRIER AIR CONDITIONING	24AB0176A01	ADREN MANUFACTURING	18000	11.4	14.0	1	SC-A	139	

Manual D – Duct Design

Duct System Summary
Entire House
 Fresh Air Corporation

JMI: 86
 Date: October 1, 2009
 By: John Conroy

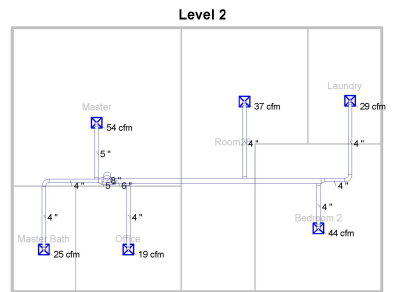
Project Information

For: Mr. and Mrs. Smith
 1 Elm Lane, Pufflet, ST 1245
 Phone: 508-552-5555 Fax: 508-552-5555
 Email: info@freshair.com

	Heating	Cooling
External static pressure	0.50 in H ₂ O	0.50 in H ₂ O
Pressure loss	0.12 in H ₂ O	0.12 in H ₂ O
Available static pressure	0.38 in H ₂ O	0.38 in H ₂ O
Supply return available pressure	0.26 / 0.13 in H ₂ O	0.26 / 0.13 in H ₂ O
Lowest velocity rate	0.050 in/ft ²	0.050 in/ft ²
Airflow per flow	605 cfm	605 cfm
Total effective length (TEL)	385 ft	

Name	Design (BR/L)	Htg (cfm)	Cool (cfm)	Design FR	Dist (ft)	Dist Size (in)	Dist Mat	Actual Lm (ft)	Eq. For Lm (ft)	Trunk
Livingroom	c 2283	52	95	0.205	5	0.0	SMW	8.0	115.0	sc2
Kitchen	h 281	40	27	0.163	4	0.0	SMW	18.0	180.0	sc1
Break	h 206	29	19	0.121	4	0.0	SMW	25.0	142.0	sc1
Master	h 378	88	55	0.235	4	0.0	SMW	7.0	185.0	sc1
Bath	h 221	21	15	0.124	4	0.0	SMW	14.0	150.0	sc1
Wes	h 343	54	38	0.159	5	0.0	SMW	7.0	225.0	sc5
Laundry	h 185	20	15	0.125	4	0.0	SMW	13.0	210.0	sc4
Bedroom 1	h 251	44	27	0.151	4	0.0	SMW	25.0	225.0	sc4
Bedroom 2	h 142	22	13	0.113	4	0.0	SMW	13.0	210.0	sc4
Wes	h 191	19	14	0.099	4	0.0	SMW	9.0	245.0	sc4
Master	h 212	21	20	0.091	4	0.0	SMW	21.0	235.0	sc4
Master	h 1887	52	78	0.151	5	0.0	SMW	27.0	140.0	sc1

Name	Trunk Type	Htg (cfm)	Cool (cfm)	Design FR	Veloc. (fpm)	Dist (ft)	Dist Size (in)	Duct Material	Trunk
LT1	Peak AVF	185	220	0.143	330	7	0 x 0	SMW	sc4
LT2	Peak AVF	32	55	0.205	697	5	0 x 0	SMW	sc4
LT3	Peak AVF	206	136	0.098	154	9	0 x 0	SMW	sc4
HTA	Peak AVF	79	15	0.105	327	4	0 x 0	SMW	sc4
HTB	Peak AVF	119	85	0.098	164	6	0 x 0	SMW	sc4
HTC	Peak AVF	79	49	0.109	382	5	0 x 0	SMW	sc4
HTA	Peak AVF	25	13	0.113	290	4	0 x 0	SMW	sc4



Wrightsoft
 2007-2010 © Wrightsoft
 11250 E. South and Valley Parkway, Suite 100, Denver, CO 80231

ENERGY STAR Process

The ENERGY STAR Process

- Plan Review
- Right sized HVAC with Load Calculation
- Duct Design
- Air Sealing Performed
- Pre-drywall Inspection
- Final Inspection with Performance Testing
- Certification

Certification Process

- Option #1: Individually verified
 - Every home receives TBC and final inspection with Blower Door and duct leakage test
- Option #2: Sampling
 - "Batch" a group of homes and test only a portion.
 - Only advised for large production builders who have proven quality control measures.

http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_sampling

Certification Includes

- Paper Certificate
- Sticker on the electrical box
- Optional Bronze Plaque

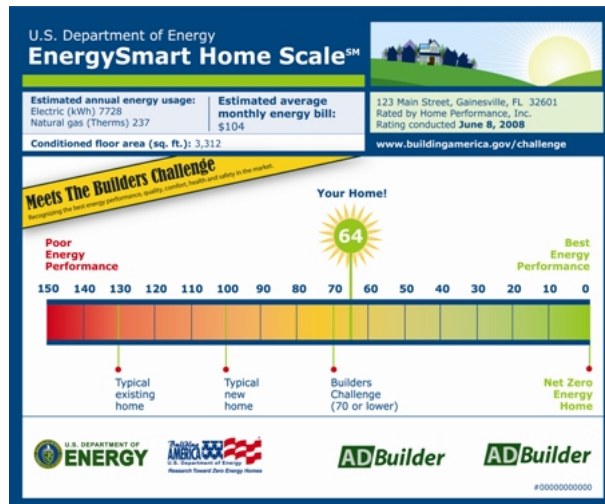


Other Programs

- DOE's Builders Challenge
- EPA's Indoor airPLUS
- EPA's Water Sense
- ENERGY STAR Advanced Lighting Package



DOE Builders Challenge



<http://www1.eere.energy.gov/buildings/challenge/index.html>

DOE Builders Challenge

- Performance Path
 - HERS Index of ≤ 70
 - HERS Rater verified
 - Builders Challenge Quality Criteria (BCQC)
- Prescriptive Path

EPA's Indoor airPLUS

Sections

1. Moisture Control
2. Radon Control
3. Pest Barriers
4. HVAC Systems
5. Combustion Systems & Garage Isolation
6. Building Materials
7. Home Commissioning



www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_iap

EPA's Indoor airPLUS

Sections

1. Moisture Control
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www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_iap

Indoor airPLUS

- Inspection by HERS Rater
- Home must be ENERGY STAR certified
- Rater gives a copy of checklist to their Provider
- Builder gives a copy to home buyer

EPA Indoor airPLUS Verification Checklist		Date		Verified by	
Address or Div./LEI:		Date:		Builder / Rater	
City/State/Zip:		Requirements (see Indoor airPLUS Construction Specifications for details)		NA	Pass
Home-Managed Site and Foundation	1.1 Site & foundation drainage (ground grade, protected drain tiles, & foundation floor drains)			<input type="checkbox"/>	<input type="checkbox"/>
	1.2 Capillary break below concrete slabs & in crawlspaces (Exception - see specification)			<input type="checkbox"/>	<input type="checkbox"/>
	1.3 Foundation wall damp-proofed or water-proofed (Except for homes without below-grade walls)			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed Wall Assemblies	1.4 Blown-in/continuous insulation & conditioned (Exception - see specification)			<input type="checkbox"/>	<input type="checkbox"/>
	1.5 Continuous drainage plane behind exterior cladding, properly flashed to foundation			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed Roof Assemblies	1.6 Blotter & vapor barrier fully sealed			<input type="checkbox"/>	<input type="checkbox"/>
	1.7 Gutter/downspout divert water a minimum of 5' from foundation (Except in dry climates)			<input type="checkbox"/>	<input type="checkbox"/>
	1.8 Fully finished overhead interior space & full roof flashing & seal penetrations			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed Mechanical	1.9 Blown-in membranes installed at valleys & penetrations (Except in dry climates)			<input type="checkbox"/>	<input type="checkbox"/>
	1.10 Ice backing installed at eaves (Except in Climate Zones 1-4)			<input type="checkbox"/>	<input type="checkbox"/>
	1.11 Moisture-resistant mold/rot/protective systems installed (i.e., flooring, tub/shower backing, & piping)			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed Interior	1.12 No vapor barriers installed on interior side of exterior walls with high condensation potential			<input type="checkbox"/>	<input type="checkbox"/>
	1.13 No wet or water-damaged materials enclosed in building assemblies			<input type="checkbox"/>	<input type="checkbox"/>
	2.1 Approved carbon-resistant fixtures installed (Exception - see specification)			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed HVAC	2.2 Fan coils test kits & instructions/appliance for follow-up action provided for buyer (laboratory use specification)			<input type="checkbox"/>	<input type="checkbox"/>
	2.3 Fresh-air vents & penetrations sealed, including air/light trap covers			<input type="checkbox"/>	<input type="checkbox"/>
	2.4 Commissioning/airflow test screens installed at all openings that cannot be fully sealed (e.g., attic vents)			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed Combustion	4.1 IMBC (see table calculated, documented, system design documented, fully installed)			<input type="checkbox"/>	<input type="checkbox"/>
	4.2 Duct system design documented & properly installed OR duct system tested (check box if tested)			<input type="checkbox"/>	<input type="checkbox"/>
	4.3 No air handling equipment or ductwork installed in garage, continuous at barrier required in adjacent assemblies			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed Combustion Source Controls	4.4 Return pressure balanced using barometric grill or pump action as required OR tested (check box if tested)			<input type="checkbox"/>	<input type="checkbox"/>
	4.5 Whole-house ventilation system installed by meet ASHRAE 62.2 requirements			<input type="checkbox"/>	<input type="checkbox"/>
	4.6 Local exhaust ventilation to outdoors installed for baths, kitchens, clothes dryers, central vacuum system, etc.			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed Combustion Source Controls	4.7 Central forced-air HVAC system(s) have minimum MERV #16, no filter bypass, & no return operation			<input type="checkbox"/>	<input type="checkbox"/>
	4.8 Additional dehumidification system(s) or central HVAC dehumidification control installed (if warm-humid climate only)			<input type="checkbox"/>	<input type="checkbox"/>
	5.1 Gas hot water tested, no heat & water heaters passed tested or direct vented (Exceptions - see specifications)			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed Attached Garage Isolation	5.2 Fireplace/heating stove vented outdoors & meet emissions/efficiency standards/restrictions			<input type="checkbox"/>	<input type="checkbox"/>
	5.3 Certified CO alarm installed in each sleeping zone (e.g., common hallway) according to NFPA 720			<input type="checkbox"/>	<input type="checkbox"/>
	5.4 Smoking prohibited in common areas, outside smoking at least 20' from building openings (Wall/Door frames only)			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed Materials	6.1 Corner wall/joining (Stone & grout) or water before installation installed, base door gasketed & door installed			<input type="checkbox"/>	<input type="checkbox"/>
	6.2 Ecolabel for minimum 70 lbs, used for continuous vent installed in garage & sealed to outdoors (concrete optional)			<input type="checkbox"/>	<input type="checkbox"/>
	6.3 Certified low-VOC or no-VOC interior paints & finishes used			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed Final	6.4 Carpet, adhesives, & underlayment qualify for CR Green Label Plus or Green Label testing program			<input type="checkbox"/>	<input type="checkbox"/>
	7.1 IMBC system & ductwork verified dry, clean, & properly installed			<input type="checkbox"/>	<input type="checkbox"/>
Home-Managed Final	7.2 Home available before occupancy OR initial ventilation instructions provided for buyer			<input type="checkbox"/>	<input type="checkbox"/>
	7.3 Completed checklist & other required documentation provided for buyer			<input type="checkbox"/>	<input type="checkbox"/>

EPA's Water Sense



ENERGY STAR certification for water fixtures and piloting new homes program.

www.epa.gov/watersense/

Advanced Lighting Package



- The ENERGY STAR ALP designation only applies to new home construction.
- Must install a minimum of 60% ENERGY STAR qualified hard-wired fixtures and 100% ENERGY STAR qualified ceiling fans.

http://www.energystar.gov/index.cfm?c=fixtures.alp_consumers

Recap

We've covered...

- ENERGY STAR
- DOE's Build
- EPA's Indoor
- EPA's Water
- ENERGY ST



ng Package

Green Building Programs

- Approximately 50 different programs around the country.
- Two most popular national programs
 - National Green Building Standard (NGBS)
 - USGBC's LEED for Homes



Green Building is...

- Energy Efficient
- Resource Efficient
- Environmentally friendly
- Healthy
- Long lasting
- Quality
- Better
- A home painted green?



It doesn't have to be...



Can be New or Existing Homes



Seville Consulting's
2006 NAHB Green Remodeling Project of the
Year



LivingHomes' LEED Platinum Certified

Guiding Principles of Green Building

- Energy Efficiency
- Lot Design, Preparation and Development
- Resource Efficiency
- Water Efficiency
- Indoor Environmental Quality
- Operation, Maintenance and Homeowner Education
- Global Impact

Lot Preparation and Design

When Designing and siting the home

- Preserve trees
- Brown field vs. green field
- Orientate home north-south
- Native, drought tolerant species
- Proximity to Transit and amenities
- Appropriate home size



Tree Protection



Resource Efficiency

Material Selection

- Engineered wood products such as trusses and LVLs
- Rapidly renewable products such as bamboo
- Sustainably harvested and certified wood products



Efficient Lighting



Most efficient light is the sun!



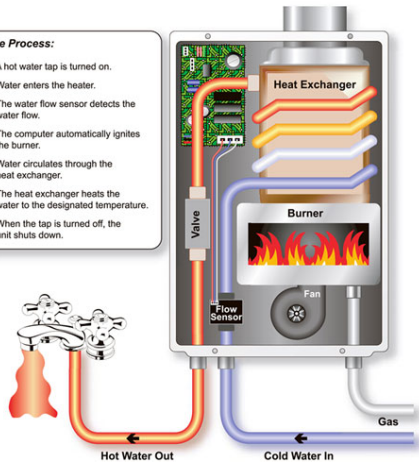
LED Lights



Pin-based CFL

Water Heating

- The Process:**
1. A hot water tap is turned on.
 2. Water enters the heater.
 3. The water flow sensor detects the water flow.
 4. The computer automatically ignites the burner.
 5. Water circulates through the heat exchanger.
 6. The heat exchanger heats the water to the designated temperature.
 7. When the tap is turned off, the unit shuts down.



Tankless water heater*

*http://www.hotwaterguys.com/images/tankless_heater_final.jpg



Solar Hot Water

Water Efficiency

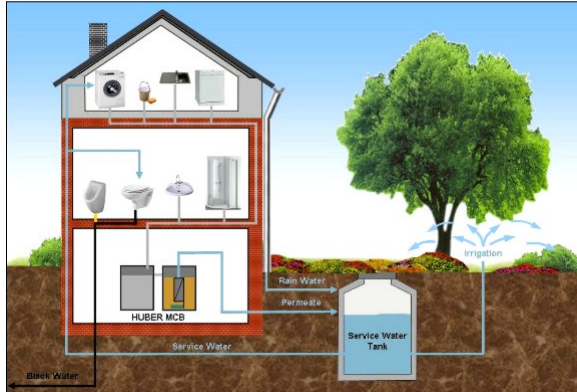
Dual-flush toilets



Low-flow shower heads



Water Efficiency



Greywater Collection

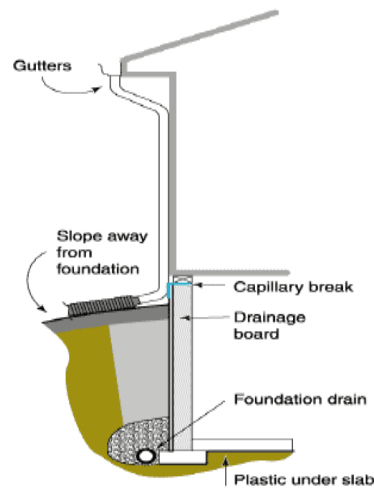


Rainwater Collection

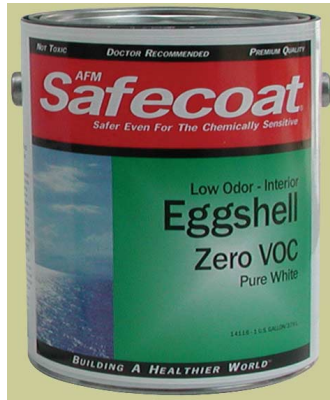
Durability

Keep moisture and bulk water out!

- Proper site drainage
- Foundation drainage board
- Foundation drain
- Sealed Crawls
- Exhaust fans
- Proper flashing details



Indoor Environmental Quality



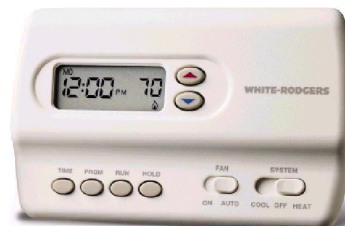
Use low or no VOC
paints and finishes



Built it **tight** and **VENTILATE** it right

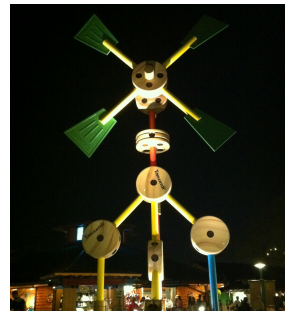
Home Owner Guidance

- Ultimately the efficiency of the home is in the hands of the user/occupant!
- Thermostat set points and set back
- Exhaust fans
- Water use
- Water heater temp
- Changing HVAC Filters



Renewable Energy

- Step 1: Make the home as energy efficient as possible.
- Step 2: Onsite renewables



Inspection Process

- Basically same as ENERGY STAR
 - Predrywall Inspection (PDWI)
 - Visual inspection
 - Final Inspection
 - Blower Door and Duct Leakage Tests
 - Visual Inspection

NGBS



- National Green Building Standard (NGBS)
- ANSI approved ICC-700-2008
- The Standard covers
 - Single and multifamily homes
 - Residential remodeling
 - Site development
- 1,000+ homes certified to date

NGBS



- The Guidelines reference
 - Lot Design
 - Resource Efficiency
 - Energy Efficiency
 - Indoor Environmental Quality
 - Homeowner Education
 - Global Impact

LEED for Homes

- Developed by the United States Green Building Council (USGBC)
- Pilot in 2004
- Program 2008
- 30,000+ units certified to date
- 100,000+ registered units



LEED for Homes

Sections

- Innovation and Design
- Locations and Linkages
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Awareness and Education



Why Green?

When surveyed by the National Association of Homebuilder's Research Center (NAHB-RC) in December of 2007, energy improvements topped homeowners choices for how they would spend an extra \$5,000 on their new homes.



- 26% would pay for energy improvements
- 22% for new countertop
- 23% for other
- 17% for upgraded flooring
- 6% for upgraded appliances
- 5% for upgraded bathroom features
- 1% for new siding

Economics of Green

	<i>Monthly</i>	<i>Annual</i>
<i>Utility Savings</i>	<i>\$45</i>	<i>\$540</i>
<i>Added Mortgage</i>	<i>\$20</i>	<i>\$240</i>
<i>Cost Savings</i>	<i>\$25</i>	<i>\$300</i>

Financial Incentives

- Local utility rebates
- Local county/city incentives
- Federal energy efficient tax credit

Benefits to Builder

- Less call backs
- More desirable product
- Marketing benefits
- Differentiation in the market

Benefits to Homeowner

- Lower operating costs
- Increased comfort
- Improved environmental quality
- Enhanced durability and less maintenance
- Increased home value



Recap

We've covered...

- Green building
- NAHB Green
- LEED for Ho
- EarthCraft
- Why green
- Financial in



Existing Homes

- Utility programs
- Home Performance with ENERGY STAR
- REGREEN
- EarthCraft House- Renovations
- Building Performance Institute (BPI)
- Market that supports an inspection fee or has rebates key



Home Performance with ENERGY STAR



- “National”, but only where local sponsor
- ~40 programs
- Test in and Test out
- Improvement priorities list
- Financing available
- Some markets have rebates

http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_hpwes

REGREEN

- Developed by the American Society of Interior Designers' Foundation and USGBC
- "The nation's first green residential remodeling guidelines."
- The guidelines are free to download and are full of best practices, case studies, and other resources.



REGREEN
ASID & USGBC
Residential Remodeling
Guidelines

REGREEN GUIDELINES 2008

http://www.greenhomeguide.org/guide_for_green_renovation/index.html

CO Poisoning

New & Existing construction



Why do Home Performance?

- Many contractors claim taking a home performance approach improves closing rates.
- Same closing rate, but high profit percentage per job and larger sales.
- Some markets contractors offer free inspections, but have higher gross profit margins
- Prequalify customers- make sure they are aware of likely improvement costs

Benefits to Homeowner

- Lower operating costs
- Increased comfort
- Improved environmental quality
- Enhanced durability and less maintenance
- Increased home value



Resources

Advanced Energy, Raleigh, NC
www.advancedenergy.org

ENERGY STAR
www.energystar.gov

Florida Solar Energy Center (FSEC), Cocoa, FL
www.fsec.ucf.edu

National Association of Home Builders (NAHB)
www.nahbgreen.org

RESNET
www.resnet.us

Southface Energy Institute, Atlanta, GA
www.southface.org

USGBC
www.usgbc.org



Thank You!

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