

# Building to "Green" Standards



## New Trend: Whole House Approach to Building



## New Trend: Whole House Approach to Building

### Consumers

Put expectations on builder & manufacturers

### Industry

Develops standards for sustainable building practices

### Federal and State Government

Enforces standards and provides financial incentives

## Brave New World of Building

*Building is no longer a just a trade that has been passed down from generation to generation.*



## Brave New World of Building

Today we expect our builders to have a "PHD" in

- Building durability
- Energy performance
- Renewable energy
- Building science
- Sustainability
- Forestry
- Chemical Analyses
- Etc...



## Brave New World of Building

Conclusion:

It takes more than just a builder – to build a sustainable, high performance home.

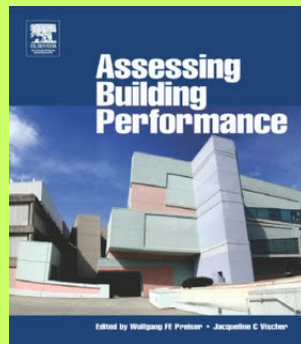


## Brave New World of Building

Modern Building Movement

Education  
Certification  
Inspection

New Technology



## Building to "Green" Standards

- Certification of People
- Certification of Buildings
- Certification of Products
- Building Certification Guidelines
  - ENERGY STAR®
  - LEED® for homes
  - Model Green Homes
- Incentives for New Hampshire residents

## Certification for People



### Home Performance Experts Required

- Certified Home Energy Raters
- LEED AP
- Model Green Home Certified Verifiers

## Certified Home Energy Rater



### MINIMUM HOME ENERGY RATER CERTIFICATION PROCEDURES

- Pass national rater test
- Complete at least 3 home ratings under supervision certified provider.
- Complete 12 hours of approved continuing education credits over 3 years

*This certification applies to new construction*

## Certified Home Energy Rater

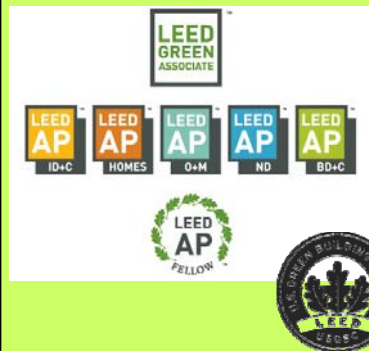


3<sup>rd</sup> party testing by a Certified Home Energy Rater

requirement for all new homes going through certification programs

*This certification applies to new construction*

## LEED Professional Accreditation



LEED Professional Credentials indicate professional excellence

AND

strong depth of knowledge and practical understanding of green building practices & the LEED Rating Systems

## Model Green Home Verifier



Required to Maintain an appropriate knowledge base and skill sets for NAHB Model Green Home Building Guidelines & the National Green Building Standard



Complete a [verifier training session](#) by the NAHB Research Center, and pass a test on how to verify compliance based on the national program criteria.

## Build Green NH®



An affiliate program of National Green Building Program

[www.buildgreennh.com](http://www.buildgreennh.com)

New Hampshire's official green building certification program

## BPI - Certified Professional



*BPI = Building Performance Institute for existing buildings*

- Complete Class work
- Pass Exam
- Spend numerous hours doing field work
- Pass field test

## Certification of New Homes



ENERGY STAR® Home Program

NAHB Model Green Home

USGBC LEED® for homes

## ENERGY STAR® Certification

ENERGY STAR® homes meet strict guidelines for energy efficiency set by the U.S. Environmental Protection Agency (EPA).



These homes are at least 20% more energy efficient (in NH) than homes built to the 2006 International Residential Code (IRC),

and include additional energy-saving features that typically make them 20–30% more efficient than standard homes

## ENERGY STAR® Certification

### In New Hampshire – Currently paid by Utilities



ENERGY STAR is funded in many states by Utility Companies

[www.energystar.gov](http://www.energystar.gov)

## ENERGY STAR® Certification

### Getting Started

#1. Contact a Certified Home Energy Rater

GDS & Associates

[www.gdsassociates.com](http://www.gdsassociates.com)

(603) 656-0336

[www.energystar.gov](http://www.energystar.gov)

## ENERGY STAR® Certification

Get Your Rater Involved Early ~  
Save Time and Money in your Project

### What they want to see

Effective insulation

High Performance Windows

Tight Construction on Ducts

Efficient Heating & Cooling System

ENERGY STAR® Lighting & Appliances



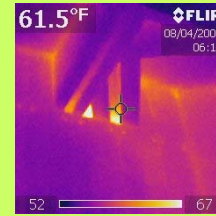
## Final Site Inspection



- Verify the plan has been followed
- Perform Blower door and duct blaster test
- Install ENERGY STAR® light bulbs (depending on the utility)

## Certification Process

**Infrared cameras**  
Another way to identify heat loss



## ENERGY STAR® - Final Report

Provides homeowners with a summary of home performance

2 Maplewood Dr Leopold, NH 03273	Ratee's Name: Gretchen Tibbitts
Leopold, NH Maplewood Dr PLANS 103	Ratee's No.: 003-010
	Rating Type: Verified Condition
	Rating Date: 6/8/09

	Blower door test	
	Heating	Cooling
<b>House Infiltration</b>		
Natural ACH	0.25	0.24
ACH @ 50 Pascals	1.28	1.28
CFM @ 25 Pascals	287	287
CFM @ 50 Pascals	458	458
ET Leakage Area	24.7	24.7
Specific Leakage Area	0.00068	0.00068
ELA/100 sq ft shell	0.47	0.47
<b>Leakage to Outside</b>		
CFM @ 25 Pascals		N/A
CFM50 / CFMfan		N/A
CFM50 / CFA		N/A
CFM per 100 sq ft		N/A
CFM per 100 sq ft / CFA		N/A
CFM @ 50 Pascals		N/A
ET Leakage Area		N/A
Thermal Efficiency		0.00
<b>Ventilation</b>		Exhaust Only
Mechanical		
Sensible Recovery Eff. (%)		0.0
Total Recovery Eff. (%)		0.0
Rate (cfm)		57
Hours/Day		24.0
Fan On/Off		20.0
Cooling Ventilation		Natural Ventilation

**ASHRAE 62.2 - 2003 Ventilation Requirements**

• comply with ASHRAE Standard 62.2 - 2003 Ventilation and Acceptable Indoor Air Quality in Low-Rise Buildings, a minimum of 57 cfm of mechanical ventilation must be provided continuously, 24 hours per day. • intermittently operating mechanical ventilation system may be used if the ventilation rate is adjusted. • example, a 14-cfm mechanical ventilation system would need to operate 12 hours per day, at long as rates to provide required average ventilation once each hour.

## Air Leakage Report

FUEL SUMMARY - P1 - 12008 NH UD04 v1.0.2F.xls

Page 2

**Magnuswood Drive, #25**

Annual Energy Cost (\$/yr)					
Propane	\$	971	\$	622	\$ 349 35.9%
Electric	\$	815	\$	809	\$ -7 0.8%
Wood	\$	906	\$	229	\$ 677 74.6%
<b>Annual End-Use Cost (\$/yr)</b>					
Heating	\$	834	\$	359	\$ 475 56.9%
Cooling	\$	0	\$	0	\$ 0 0%
Water Heating	\$	411	\$	297	\$ 114 28.0%
Lights & Appliances	\$	1007	\$	1003	\$ 4 0.3%
Photovoltaics	\$	0	\$	0	\$ 0 0%
Service Charges	\$	107	\$	107	\$ 0 0%
<b>Total</b>	\$	<b>2309</b>	\$	<b>1767</b>	\$ <b>542</b> 23.5%
<b>Annual End-Use Consumption</b>					
Heating (Gallons)		163		85	98 60.0%
Heating (kWh)		21		0	21 100.0%
Heating (Cordft)		3		1	1 33.3%
Water Heating (Gallons)		225		149	77 34.0%
Lights & Appliances (kWh)		97		97	100 100.0%
Annual Energy Demands (kBtu)		5305		5263	22 0.4%
<b>Annual Energy Demands (kBtu)</b>					
Heating	0.0	0.0	0.0	100.0%	
Cooling	0.0	0.0			
Water Heating (Winter Peak)	0.0	0.0			
Water Heating (Summer Peak)	0.0	0.0			
Lights & Appliances (Winter Peak)	0.4	0.4	0.0	0.3%	
Lights & Appliances (Summer Peak)	1.1	1.1	0.0	0.4%	
Total Winter Peak	0.4	0.4	0.0	1.9%	
Total Summer Peak	1.1	1.1	0.0	0.4%	

**Utility Rates:**

Electricity: PSNH - 2009  
 Propane: Propane \$2.00/gal  
 Wood: Wood \$200/cord

### Fuel Summary

**Home Energy Rating Certificate**

25 Magnuswood Dr  
Newport, NH 03273

**5 Stars Plus  
Verified Condition**

1 Star	2 Stars	3 Stars	4 Stars	5 Stars	6 Stars	7 Stars	8 Stars	9 Stars	10 Stars
100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000	1000-1100

**ENERGY INDEX: 45**

**General Information:**  
 Conditioned Area: 2000 sq. ft. | Heating Type: Single-family detached  
 Conditioned Volume: 27000 cubic ft. | Foundation: Conditioned basement  
 Bedrooms: 3

**Mechanical System Features:**  
 Heating: Fuel-fired hybrid gas/builer, Wood, 80.0 % hpf  
 Water Heating: Instant water heater, Propane, 92.7 % hpf  
 Duct Leakage to Outside: NA  
 Ventilation System: Exhaust Only, 57 cfm, 20.0 wats  
 Programmable Thermostat: Heating: No | Cooling: No

**Building Shell Features:**  
 Ceiling Fan: R-00 | Expanded Foam: NA  
 Vaulted Ceiling: NA | Window Type: Double-Pane - Vinyl  
 Above-Grade Walls: R-19 | Subfloor: NA  
 Foundation Walls: R-20 | Sill: Hg. 450; Cfg. 450 (CFR60)  
 Slab: R-10.0 Edge, R-10.0 Under | Method: Shower door seal

**Lighting and Appliance Features:**  
 Percent Fluorescent Fix-Based: 93.00 | Ceiling Organ Fuel: Propane  
 Percent Fluorescent CFL: 93.00 | Range/Oven Fuel: Propane  
 Refrigerator (2004-yr): 775.00 | Ceiling Fan (Std/Stat): 0.00  
 Dishwasher Energy Factor: 0.40

**REIRate - Residential Energy Analysis and Rating Software v12.7**  
 The information here is not intended as a warranty of energy cost or savings.  
 © 1989-2008 Residential Energy Corporation, Boulder, Colorado

**Rating Number: 000-P1-NHES-899**  
 Certified Energy Rater: Gordon Train  
 Rating Date: 6/8/08  
 Rating Ordered For: Richard Roberts

**Estimated Annual Energy Cost**

Item	Verified Condition	Cost	Percent
Heating	28.9	\$256	20%
Cooling	0	\$0	0%
Hot Water	13.9	\$234	17%
Lights/Appliances	28.9	\$160	9%
Photovoltaics	-6.0	\$-60	-4%
Service Charges		\$107	8%
<b>Total</b>		<b>\$1767</b>	<b>83%</b>

**This home meets or exceeds the minimum criteria for all of the following:**  
 EPA Energy Star Home

**Home Energy Ratings of New England**  
 000 Associates  
 1101 Elm St, Box 208  
 Manchester, NH 03101  
 603-696-0204  
 603-696-0201  
 www.000associates.com

## ENERGY STAR Incentives

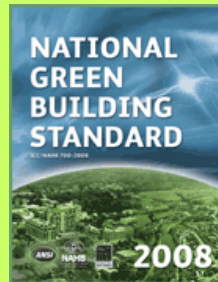


NH ENERGY STAR offers incentives **up to \$2,500** + reduced monthly operating costs

[www.DSIREUSA.org](http://www.DSIREUSA.org)

Database of state incentives for renewables & efficiency

## NAHB - Certification Process



National Green Building Standard Established!!

Partnership of National Home Builders Association & International Code Council

This ANSI approved ICC-700-2008 National Green Building Standard defines green building for single and multifamily homes,

## NAHB - Certification Process

- ▶ Point System based on national green building standard
- ▶ Builders navigate through a checklist, assigning point values for each item
- ▶ Minimum number of points required for each principle
- ▶ Three levels of completion – Bronze – Silver –Gold



## NAHB - Certification Process

Building Checklist	Bronze	Silver	Gold
Lot Design Preparation & Development	8	10	12
Resource Efficiency	44	60	77
Energy Efficiency	37	62	100
Water Efficiency	6	13	19
Indoor Environmental Quality	32	54	72
Operation, Maintenance and Homeowner Education	7	7	9
Global Impact	3	5	6
Additional Points from Sections of Your Choice	100	100	100

Provides Whole House Approach



## NAHB - Certification Process

### Cost to Homeowner:

- \$200.00 for builder to register your project
- \$500.00 (varies) for NAHB certified verifier



## NAHB - Certification Process

### Getting Started

Visit: [www.nahbgreen.org](http://www.nahbgreen.org)

- ❖ locate a certified verifier
- ❖ register your project on-line
- ❖ download guidelines



## NAHB - Certification Process

### Steps to Certification

Contact NAHB Verifier

Identify Project Team  
- this team works together to prepare project goals

Build the home to the stated goals

Certify the Project  
-field inspection and performance testing  
  conducted by rater  
-review of paperwork conducted by NAHB Provider



## LEED® for Homes



A voluntary rating system that promotes the Design & Construction of high performance green homes



## LEED® for Homes

Projects must be registered through an approved LEED for Homes Provider –

Provider is an organization chosen by USGBC to provide certification services To LEED for homes projects in their local area. The provider will work with a project's LEED consultant.

The Jordan Institute,  
[www.jordaninstitute.org](http://www.jordaninstitute.org)

## LEED® for Homes



Point system developed by USGBC

Rating System based on Industry Best Practices

- ✓ Innovative Design Process
- ✓ Location & Linkages
- ✓ Sustainable Sites
- ✓ Water Efficiency
- ✓ Energy Atmosphere
- ✓ Materials & Resources
- ✓ Indoor Environmental Quality
- ✓ Awareness & Education



## LEED® for Homes

### Steps to Participating

- Contact LEED for Home Provider
- Identify Project Team
  - this team works together to prepare project goals
- Build the home to the stated goals
- Certify the Project
  - field inspection and performance testing conducted by rater
  - review of paperwork conducted by LEED Provider



## LEED® for Homes

Category	Mandatory	Minimum	Maximum
Innovation & Design	3	0	11
Location & Linkages	0	0	10
Sustainable sites	2	5	22
Water Efficiency	0	3	15
Energy & Atmosphere	2	0	38
Materials & Resources	3	2	16
Indoor Environmental Quality	7	6	21
Awareness & Education	1	0	3



## LEED® for Homes

Silver	60-74	
Gold	75-89	
Platinum	90-136	
Total Points Available	136	

## LEED® for Homes

### LEED for Homes Pricing

	Single-Family Housing		MultiFamily Housing		Volume PRICING
	Registration	Certification	Registration	Certification	project specific
USGBC Member	\$150	\$225	\$450	\$0.035 per sq ft	CONTACT PROVIDER FOR DETAILS
Non-Member	\$225	\$300	\$600	\$0.045 per sq ft	

Note: The LEED for Homes Rating System requires completion of on-site inspections prior to certification. Additional Provider and Green Rater verification costs apply and are based on market prices..

## Green Building Vocabulary

**R-value:**

measurement of thermal resistance -the bigger the number the better the insulation

**U-value:**

Measurement of rate of heat transfer through a building - the lower the number the better

**Urea-Formaldehyde- (Bad) • Phenol Formaldehyde - (GOOD)**

**Recycled Content:**

Percentage of your product that is manufactured using pre-consumer or pre-industrial recycled products

**FSC (forest stewardship council) Certified:**

Wood products that have been proven to come from forests that are managed to meet the social, economic and ecological needs of present and future generations.

**VOC:**

Chemical compounds that vaporize into atmosphere in normal circumstances

**Off Gassing:**

The release of VOC into the atmosphere from materials such as: paints, stains, varnishes, carpet, insulation, flooring, cabinets, countertops, plywood, particleboard, and paint strippers.

## Green Labels

Identifying ECO-Products & Professionals



## Make Friends

Network, Network, Network

**Trade Organizations**

- NESEA (Northeast Sustainable Energy Association)
- New Hampshire Sustainable Energy Association
- NH AIA
- Northeast Energy Raters Association
- NH Home Builders Association
- National Grid

## QUESTIONS??



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