Building One Of The First LEED®-Certified Homes In Massachusetts

Doug Storey

synopsis

- The USGBC is the nation's foremost coalition of leaders from across the building industry, working to promote buildings that are environmentally responsible, profitable, and healthy places to live and work.
- The LEED® Green Building Rating System is a voluntary, consensus-based national standard for developing high-performance sustainable buildings.
- Building a home that is smaller than the national average is one of the criteria for collecting points in the rating system.
- The Project Checklist includes eight categories: Location and Linkages, Sustainable Sites, Water Efficiency, Indoor Environmental Quality, Materials and Resources, Energy and Atmosphere, Homeowner Awareness, and Innovation and Design Process.

About a-year-and-a-half ago, I was contacted by a potential customer, Margie Lynch, who wanted to build a new home for herself on family property. To be more specific, she wanted to build a "green" home and for it to be LEED® (Leadership in Energy and Environmental Design) certified. She asked if I, as a design builder, was interested in attempting to guide her through the arduous LEED-certification process while building her home.

I told her I was interested in being her builder for several reasons: first, she was referred to us by a friend, and referrals often lead to the best customers; second, she wanted to build a custom home, which is our forte; and third, she wanted to build it "green," which we care deeply about. I also knew the challenge would lead to much learning, growth, and an opportunity to differentiate our company.

We were to be participating in the U.S. Green Building Council's (USGBC) LEED for Homes Pilot Demonstration. The USGBC is the nation's foremost coalition of leaders from across the building industry, working to promote buildings that are environmentally responsible, profitable, and healthy places to live and work. The LEED Green Building Rating System is a voluntary, consensus-based national standard for developing high-performance sustainable buildings.

Over several meetings and discussions about what Margie wanted and how she defined a "green" home, we came to a mutual point of trust and comfort. Margie hired Two Storey Building prior to the design and estimating stages. As a builder, this was the best time to get involved in the full spectrum of learning and knowledge to be gained from this project.

Margie's concerns included wanting to minimize the impact on the environment and her building lot, to build a small home, to make careful product and material selections, to minimize waste generated by the construction of the home to obtain ENERGY STAR® qualification as a minimum recognition of energy efficiency, and to ultimately achieve LEED certification for the home.

She had a simple two-story layout that she wanted incorporated into a finished Georgian-style home. We reviewed the layout and encouraged her to make some design changes that would maximize efficiency of the small floor plan. We suggested that she move the stairs to a center location to ensure an efficient use of space and a smooth flow from one floor to the others. She decided on an open floor plan of an entry foyer, dining room, living room, kitchen, and powder room on the first floor, and two bedrooms, a full bath, and a large walk-in closet that could later be converted to a third bedroom on the second floor. The attic had a pull-down stair and room for much storage and a heat recovery ventilation unit (HRV). The full basement would have a conditioned mechanical room, a laundry area, a bulkhead exit, and more room for storage or future growth.

The footprint was 24 x 26 feet, or 624 square feet per floor. It is pretty small by today's standards. In fact, it is less than half of the typical home built in 2006. This would be a critical component of the LEED certification. Building a home that is smaller than the national average is one of the criteria for collecting points in the rating system.

Not only was she willing to go smaller, but she also felt strongly that she didn't need some of the other features of a typical home, such as an attached garage, air conditioning, and an irrigation system. These too are features that must be addressed in the LEED certification process. Attached garages can lead to indoor air quality issues, air conditioning uses much energy and must be efficient, and irrigation uses much water. Margie eliminated these concerns right at the onset by choosing to forego them.

"Much time was spent gathering and reviewing information into the sustainable building procedures and sustainable material selections."

Once we had the interior layout set, we began adding features to the exterior profile to achieve the Georgian style she sought. We incorporated large overhangs in the soffits, which also lessens solar heat gain in the summer months, built-out trim to allow for a rain screen behind the siding, a simple rear entry, and a more formal covered front entry with multiple layers of moldings. She took pictures of details she liked on houses she had seen, and we tried to simulate some of those looks through our own design process.

We carefully evaluated different framing options for the house. Margie was interested in looking into Structural Insulated Panels (SIPs) for framing. The panels are two layers of oriented strand boards (OSB) laminated to a core of expanded polystyrene (EPS) insulation. These panels provide an effective thermal resistance through increased R values of the panels (R 24 for a 6-inch wall), reduced air leakage due to its closed cavity design and sealing of all seams, and long-term structural integrity. The panels are manufactured in a factory setting and are installed much more quickly than traditional stick framing, with substantially less job site waste. Our LEED/ENERGY STAR provider, Conservation Services Group of Westborough, was very enthusiastic about the SIPs option and ran the two framing scenarios through their energy-modeling software. The SIPs' design was more energy

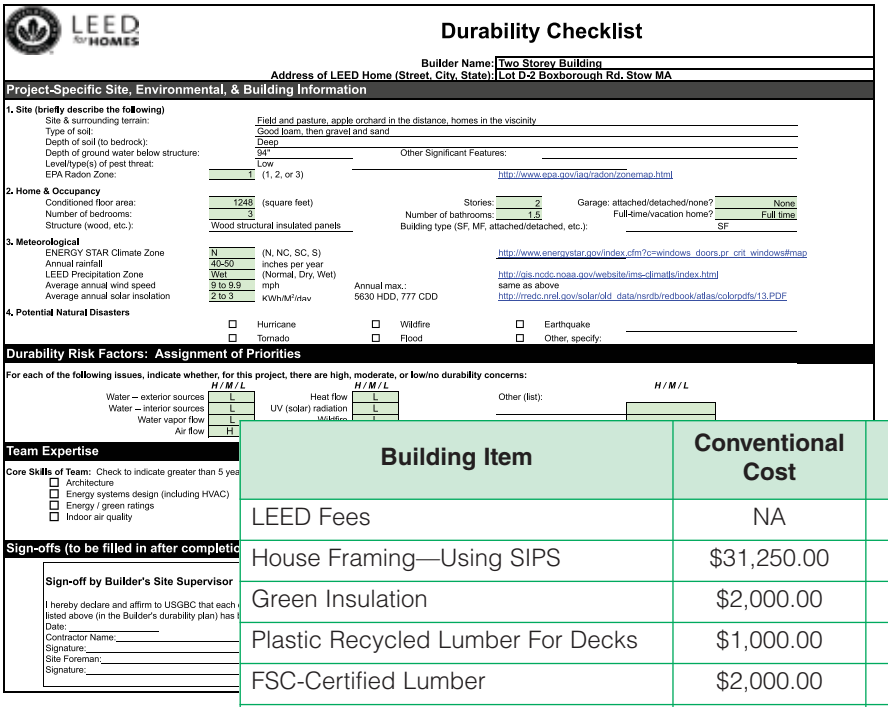
efficient under the model, but not substantially so. Margie's ultimate decision to go with SIPs was primarily based on the reduced job site waste, despite the extra cost to go this route (27 percent, see below).

Once the design concept was formulated, we sent it to Panel Pros of Keene, New Hampshire. After a review of several Structural Insulated Panel (SIPs) manufacturers, we had selected Panel Pros as our SIP partner. In addition to producing our frame, they did all of the structure engineering necessary to transform our design into plans that could be built out of their product. This also allowed us to avoid the use of an architect at a substantial additional cost. We would use 6-inch thick panels for the walls and 8-inch thick panels for the roof.

Having finalized the design, we moved on to educating ourselves about the LEED rating system and the process by which it would be implemented. The LEED certification process was started by our meeting with Conservation Services Group, Inc., the local consulting and review nonprofit partner for the LEED program and a review of LEED guidelines. A Project Checklist was filled out to determine categories in the development process for inclusion in the program rating system. This checklist includes eight categories: Location and Linkages, Sustainable Sites, Water Efficiency, Indoor Environmental Quality, Materials and Resources, Energy and Atmosphere, Homeowner Awareness, and Innovation and Design Process. The builder must also fill out a detailed Durability Checklist to determine building practices that will work toward the program goals.

Milestone	Start	Finish
Initial Meetings with Homeowner and Builder	Fall 2005	
Meetings with CSG, Partners	December 2005	April 2006
LEED Research & Home Design	Fall 2005	Summer 2006
Break Ground	March 2006	
Actual Construction of House	April 2006	October 2006
LEED Certification Timeframe	October 2006	February 2007

Our home was to be built in a relatively rural area, so some of the checklist items that relate to more urban construction were not applicable. We could not achieve points for compact housing density or even being close to existing municipal sewer and water. We were sited within one-half mile of green spaces, and we did minimize the disturbed area of the site, despite having to put in a septic system and well. We installed fencing clearly demarking "no disturb areas." We did not touch over 66 percent of the site.



LEED for HOMES

Durability Checklist

Builder Name: Two Storey Building
Address of LEED Home (Street, City, State): Lot D-2 Boxborough Rd. Stow MA

Project-Specific Site, Environmental, & Building Information

1. Site (briefly describe the following)
Site & surrounding terrain: Field and pasture, apple orchard in the distance, homes in the viscinity
Type of soil: Good loam, then gravel and sand
Depth of soil (to bedrock): Deep
Depth of ground water below structure: 94" Other Significant Features:
Level/type(s) of pest threat: Low
EPA Radon Zone: 1 (1, 2, or 3) http://www.epa.gov/iaq/radon/zonemap.html

2. Home & Occupancy
Conditioned floor area: 1248 (square feet) Stories: 2 Garage: attached/detached/none? None
Number of bedrooms: 3 Number of bathrooms: 1.5 Full-time/vacation home? Full time
Structure (wood, etc.): Wood structural insulated panels Building type (SF, MF, attached/detached, etc.): SF

3. Meteorological
ENERGY STAR Climate Zone N (N, NC, SC, S) http://www.energystar.gov/index.cfm?c=windows_doors.pr_crit_windows#map
Annual rainfall 40-50 inches per year
LEED Precipitation Zone Wet (Normal, Dry, Wet) http://gis.ncdc.noaa.gov/website/ims-climatls/index.html
Average annual wind speed 9 to 9.9 mph Annual max.: same as above
Average annual solar insolation 2 to 3 KWh/M²/day 5630 HDD, 777 CDD http://rredc.nrel.gov/solar/old_data/nsrdb/redbook/atlas/colorpdfs/13.PDF

4. Potential Natural Disasters
☐ Hurricane ☐ Wildfire ☐ Earthquake
☐ Tornado ☐ Flood ☐ Other, specify:

Durability Risk Factors: Assignment of Priorities

For each of the following issues, indicate whether, for this project, there are high, moderate, or low/no durability concerns:

	H/M/L		H/M/L		H/M/L
Water – exterior sources	L	Heat flow	L	Other (list):	
Water – interior sources	L	UV (solar) radiation	L		
Water vapor flow	L	Wildfire	L		
Air flow	H				

Team Expertise

Core Skills of Team: Check to indicate greater than 5 yea
☐ Architecture
☐ Energy systems design (including HVAC)
☐ Energy / green ratings
☐ Indoor air quality

Sign-offs (to be filled in after completic

Sign-off by Builder's Site Supervisor

I hereby declare and affirm to USGBC that each
listed above (in the Builder's durability plan) has
Date:
Contractor Name:
Signature:
Site Foreman:
Signature:

US Green Building Council

Building Item	Conventional Cost	Green Cost	Difference	% Diff.
LEED Fees	NA	$2,025.00	$2,025.00	100%
House Framing—Using SIPS	$31,250.00	$42,740.48	$11,490.48	27%
Green Insulation	$2,000.00	$2,200.00	$200.00	9%
Plastic Recycled Lumber For Decks	$1,000.00	$2,196.84	$1,196.84	54%
FSC-Certified Lumber	$2,000.00	$2,835.00	$835.00	29%
Radiant Heat versus Baseboard	$6,000.00	$8,380.00	$2,380.00	28%
Locally Harvested Pine Flooring	$3,100.00	$3,587.52	$487.52	14%
Waste Removal	$1,300.00	$1,096.35	($203.65)	16%
Homeowner Paid				
Item Totals	$46,650.00	$65,061.19	$18,411.19	28%
Total Budget Increase				5.7%
Homeowner Paid				
Project Mgmt Time for LEED Process	NA	$6,500.00	$6,500.00	100%
Based on estimate of 100 additional hours				

Project Checklist

LEED for HOMES

Builder Name: Doug Storey, Two Storey Building
Address (Street/City/State): 89 Spectacle Hill Road, Bolton, MA

Maximum Points [1]

	Dry	Normal	Wet

Detailed information on the measures in the checklist below are provided in the companion document "LEED for Homes Rating System"

Yes	?	No					OR	10	
				1	LEED-ND Neighborhood		LL2-5	10	
			↘	2	**Site Selection**	Avoid Environmentally Sensitive Sites and Farmland	LL1	2	
				3.1	**Infrastructure**	Site within 1/2 Mile of Existing Water, Sewer, and Roads	LL1	1	
				3.2		Select an Infill Site	LL1	1	
				4.1	**Community Resources**	Within 1/4 mile of Basic Community Resources / Public Transportation	LL1	1	
				4.2	***OR***	Within 1/4 Mile of Extensive Community Resources / Public Transportation	LL1	2	
1				4.3	***AND/OR***	Within 1/2 Mile of Green Spaces	LL1	1	
			↘	5.1	**Compact Development**	Average Housing Density >/= 7 Units / Acre	LL1	1	
			↘	5.2	***OR***	Average Housing Density >/= 10 Units / Acre	LL1	2	
			↘	5.3	***OR***	Average Housing Density >/= 20 Units / Acre	LL1	3	
1				Sub-Total					

Yes	?	No							
					Sustainable Sites (SS)			14	
Y				1.1	**Site Stewardship**	Minimize Disturbed Area of Site (If Site > 1/3 Acre)		Mandatory	
Y				1.2		Erosion Controls (During Construction)		Mandatory	
Y			↘	2.1	**Landscaping**	Basic Landscaping Design		Mandatory	
1				2.2		Apply 3 to 4 Inches of Mulch Around Plants		1	
1				2.3		Limit Turf	5	3	1
1			↘	2.4		Minimize Landscape Water Demand	3	2	
				3	**Shading of Hardscapes**	Locate and Plant Trees to Shade Hardscapes		1	
Y				4.1	**Surface Water Management**	Install Permeable Material for at Least 65% of Lot (If Lot >/= 1/4 acre)		Mandatory	
5				4.2		Use Permeable Paving Materials	1	3	5
			↘	4.3		Design and Install Permanent Erosion Controls	1	2	
1.5				5	**Non-Toxic Pest Control**	Select Insect and Pest Control Alternatives from List		2	
9.5				Sub-Total					

Yes	?	No							
					Water Efficiency (WE)			12	
			↘	1.1	**Water Reuse**	Rainwater Harvesting System		1	
			↘	1.2		Grey Water Re-Use System		1	
Y				2.1	**Irrigation System**	Main Shutoff Valve, Sub-Meter, and Third-Party Inspection		Mandatory	
			↘	2.2		Select High Efficiency Measures from List	5	3	
				2.3		Rain Sensing Controls		1	
1				3.1	**Indoor Water Use**	High Efficiency Fixtures (Toilets, Showers, and Faucets)		3	
				3.2	***OR***	Very High Efficiency Fixtures (Toilets, Showers, and Faucets)		6	
1				Sub-Total					

Yes	?	No					OR	14	
				1	**ENERGY STAR with IAP**	Meets ENERGY STAR w/ Indoor Air Package (IAP)	**IE2-10**	10	
Y				2.1	**Combustion Venting**	Space Heating and DHW Equip w/ Closed/Power-Exhaust; & CO Monitor	**IE1**	Mandatory	
Y				2.2		Fireplaces w/ Outside Air Supply and Closed Combustion	**IE1**	Mandatory	
			↘	3	**Humidity Control**	Analyze Moisture Loads AND Install Central System (where Needed)	**IE1**	1	
Y			↘	4.1	**Outdoor Air Ventilation**	Meets ASHRAE Std 62.2	**IE1**	Mandatory	
2				4.2		Dedicated Outdoor Air System (w/ Heat Recovery)	**IE1**	2	
1				4.3		Third-Party Testing of Outdoor Air Flow Rate into Home		1	
Y			↘	5.1	**Local Exhaust**	Meets ASHRAE Std 62.2	**IE1**	Mandatory	
1				5.2		Timer / Automatic Controls for Bathroom Exhaust Fans	**IE1**	1	
1				5.3		Third-Party Testing of Exhaust Air Flow Rate Out of Home		1	
Y			↘	6.1	**Supply Air Distribution**	Meets ACCA Manual D	**IE1**	Mandatory	
2				6.2		Third-Party Testing of Supply Air Flow into Each Room in Home		2	
Y				7.1	**Supply Air Filtering**	>/= 8 MERV Filters, w/ Adequate System Air Flow	**IE1**	Mandatory	
				7.2		>/= 10 MERV Filters, w/ Adequate System Air Flow		1	
				7.3	***OR***	>/= 12 MERV Filters, w/ Adequate System Air Flow		2	
Y				8.1	**Contaminant Control**	Seal-Off Ducts During Construction	**IE1**	Mandatory	
				8.2		Permanent Walk-Off Mats *OR* Central Vacuum		1	
			↘	8.3		Third-Party Testing of Particulates and VOCs before Occupancy		1	
Y			↘	9.1	**Radon Protection**	Install Radon Mitigation System if Home is Located in EPA Region 1	**IE1**	Mandatory	
			↘	9.2		Install Ground Contaminant Mitigation System (Outside of EPA Region 1)	**IE1**	1	
Y				10.1	**Vehicle Emissions Protection**	No Air Handling Equipment OR Return Ducts in Garage	**IE1**	Mandatory	
Y				10.2		Tightly Seal Shared Surfaces between Garage and Home	**IE1**	Mandatory	
1				10.3		Exhaust Fan in Garage OR No Garage in Contact with Home	**IE1**	1	
8				Sub-Total					

Yes	?	No							
					Materials and Resources (MR)			24	
3			↘	1	**Home Size**	Home that is Smaller than National Average		10	
Y				2.1	**Material Efficient Framing**	Overall waste factor for framing order shall be no more than 10%.		Mandatory	
1.5				2.2		Advanced Framing Techniques		2	
2.0				3	**Local Sources**	Materials Extracted / Manufactured / Produced within 500 Miles		3	
Y			↘	4.1	**Durability Plan**	Detailed Durability Plan; (Pre-Construction)		Mandatory	
5			↘	4.2		Third-Party Verification of Implementation of Durability Plan	1	3	5
Y				5.1	**Environmentally Preferable**	Tropical Hardwoods, if used, must be FSC		Mandatory	
4				5.2	**Products**	Select Environmentally Preferable Products from List		4	
Y			↘	6.1	**Waste Management**	Max of 2.5 Lbs Per Square Foot of Construction Waste Sent to Landfill		Mandatory	
1.5			↘	6.2		0.5 Pts for Each Additional 0.5 Lbs Per Square Foot Reduction		2	
17				Sub-Total					

Yes	?	No					OR	29	
Y				1.1	**ENERGY STAR Home**	Meets ENERGY STAR for Homes with Third-Party Testing		Mandatory	
12.5				1.2		Exceeds ENERGY STAR for Homes, 2 Pts Per HERS Point > HERS 86	**EA2-7**	16	
Y				2.1	**Insulation**	Third-Party Inspection of Insulation Installation, At Least HERS Grade II	**EA1**	Mandatory	
				2.2		Third-Party Inspection of Insulation Installation, At Least HERS Grade I	**EA1**	1	
			↘	2.3	***OR***	Above Code Insulation; At Least 5% > Local Code Per REScheck	**EA1**	1	
Y				3.1	**Air Infiltration**	Third-Party Envelope Air Leakage Tested </= 0.35 ACH	**EA1**	Mandatory	
				3.2		Third-Party Envelope Air Leakage Tested </= 0.25 ACH	**EA1**	1	
				3.3	***OR***	Third-Party Envelope Air Leakage Tested </= 0.15 ACH	**EA1**	2	
Y				4.1	**Windows**	Windows Meet ENERGY STAR for Windows (See Table)	**EA1**	Mandatory	
				4.2		Windows Exceed ENERGY STAR for Windows by >/= 10% (See Table)	**EA1**	1	
				4.3	***OR***	Windows Exceed ENERGY STAR for Windows by >/= 20% (See Table)	**EA1**	2	
Y				5.1	**Duct Tightness**	Third-Party Duct Leakage Tested </= 5.0 CFM25 / 100 SF to Outside	**EA1**	Mandatory	
				5		Third-Party Duct Leakage Tested </= 3.0 CFM25 / 100 SF to Outside	**EA1**	1	
				5.3	***OR***	Third-Party Duct Leakage Tested </= 1.0 CFM25 / 100 SF to Outside	**EA1**	2	
Y			↘	6.1	**Space Heating and Cooling**	Meets ENERGY STAR for HVAC w/ Manual J & refrigerant charge test	**EA1**	Mandatory	
				6.2		Exceeds ENERGY STAR for HVAC by >/= 10%, w/ Manual J	**EA1**	1	
				6.3	***OR***	Exceeds ENERGY STAR for HVAC by >/= 20%, w/ Manual J	**EA1**	3	
				7.1	**Water Heating**	Improved Hot Water Distribution System		3	
				7.2		Improved Water Heating Equipment	**EA1**	3	
				8.1	**Lighting**	Energy Efficient Fixtures and Controls		1	
			↘	8.2	***OR***	ENERGY STAR Advanced Lighting Package		3	
2				9.1	**Appliances**	Select Appliances from List		2	
				9.2		Very Efficient Clothes Washer (MEF > 1.8, *AND* WF< 5.5)		1	
			↘	10	**Renewable Energy**	Renewable Electric Generation System (1 Point / 10% Annual Load Reduction)		6	
1			↘	11	**Refrigerant Management**	Minimize Ozone Depletion and Global Warming Contributions		1	
15.5				Sub-Total					

Yes	?	No							
					Homeowner Awareness (HA)			1	
Y			↘	1.1	**Homeowner Education**	Basic Owner's Manual and Walkthrough of LEED Home		Mandatory	
1			↘	1.2		Comprehensive Owner's Manual and Multiple Walkthroughs / Trainings		1	
1				Sub-Total					

Yes	?	No							
					Innovation and Design Process (ID)			4	
		X	↘	1.1	**Innovative Design**	Use of SIPs		1	
		X	↘	1.2		radiant heating		1	
		X	↘	1.3		rain screen cladding system		1	
			↘	1.4		Provide Description and Justification for Specific Measure		1	
0				Sub-Total					
53.0	0	0			**Project Totals** [1] **(pre-certification estimates)**			108	

Notes:
1. **Certified** 30-49 points **Silver** 50-69 points **Gold** 70-89 points **Platinum** 90-108 points
2. "Points" are shown for 3 precipitation zones: Dry (< 20 inches / year); Normal (20-40 inches / year); and Wet (> 40 inches / year)

By affixing my signature below, the undersigned does hereby declare and affirm to the USGBC that the LEED for Homes requirements, as specified in the LEED for Homes Rating System, have been met for the indicated credits and will, if audited, provide the necessary supporting documents (drawings, calculations, etc.).

Rater's Name _____ Company _____
Signature _____ Date _____

By affixing my signature below, the undersigned does hereby declare and affirm to the USGBC that the LEED for Homes requirements, as specified in the LEED for Homes Rating System, have been met for the indicated credits and will, if audited, provide the necessary supporting documents (drawings, calculations, etc.).

Provider's Name _____ Company _____
Signature _____ Date _____

Landscaping requires limiting turf and water demand. Our site was a former apple orchard, and we decided to leave the wild field grass, install a permeable gravel driveway with no pavement, and not install any sprinkler systems. We also would install a rainwater barrel for harvesting precipitation for any necessary irrigation.

We also received points for our indoor air quality. This would include automatic timer controls for the bathroom exhaust fans, and outdoor air ventilation and supply air distribution with an HRV system. A radon protection system was a mandatory element of the LEED certification for our region.

Siding would be installed over a rain screen by running vertical strapping underneath and allowing for water drainage through weep holes in the bottom.

Windows and doors would have superior U values and added Low E coatings on the Argon gas-filled double-pane glass. The windows were ENERGY STAR labeled.

Margie had asked to include in our contract that ENERGY STAR-labeled items would be selected whenever they were an option. As a result, we installed ENERGY STAR thermostats, ceiling fans, dishwasher, refrigerator, clothes washer, and compact fluorescent light bulbs.

We also would install a high-efficiency (94 percent) Buderus propane boiler for the heating system using an under-floor radiant heat distribution throughout the house, and programmable thermostats. The radiant heat industry claims this system is 25 percent more efficient than typical heating systems. A super-insulated super storage tank would supply the hot water.

Water conservation was addressed through the purchase of ultra low-flow toilets (1.1 and 1.4 gpf), an aerator on the bathroom faucet, and a low-flow showerhead (1.5 gpm).

Material selections were critical to the process. We would use materials that are Forest Stewardship Council (FSC) certified (all interior millwork) and locally produced white pine flooring, 100 percent recycled plastic lumber for the deck and porch (made of HDPE [high-density polyethylene] from recycled milk cartons), cellulose and formaldehyde-free insulations, and low-VOC (Volatile Organic Compounds) paints and finishes. The counters came from recycled bowling land material that had been stored in a barn for years and resemble maple butcher block when finished.

One of the biggest challenges facing the builder







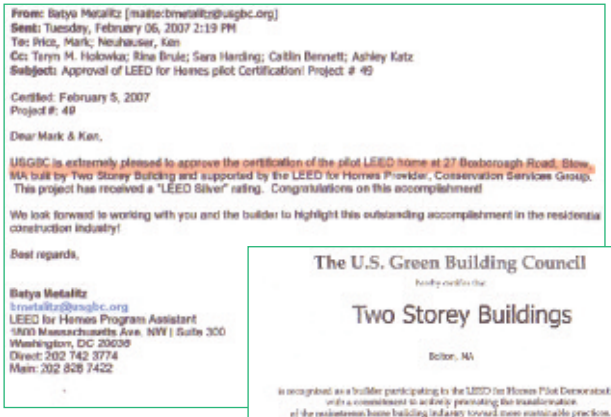

was a requirement that the waste from this project that was to be sent to a landfill not exceed three pounds per square foot of building space. This is less than half of the amount generated in a typical new house construction project. Through careful research, the Institution Recycling Network (IRN) of Concord, New Hampshire was identified as the recycling and waste removal partner for this project. Also, all subcontractors were required to recycle their applicable waste. We held planning meetings and printed recycling signage that was posted on the job site. We set up labeled recycling bins on site. We separated cardboard, metal, gypsum, wood, and other waste. The detailed waste-reduction report compiled by IRN showed that 94 percent of the construction waste on this project was recycled, including 100 percent of the gypsum waste.

Cost consideration is a hot topic in "green" building. Significant systems, such as geothermal heating and photovoltaic power, cost considerably more initially and offer a payback in energy savings over their lifetimes. Our project did not incorporate either of these systems, as the budget would not allow it, although we did consider and research photovoltaic systems and solar hot water generation, both for domestic hot water and space heating.

We did make some material selections that had added costs. I tracked the cost of the major additional costs and compared them to conventional costs. I determined the added cost was 5.7 percent more on the total cost of the home, including the LEED certification fees. I think most homeowners will gladly pay 5 to 10 percent more for a better product. It does cost more, but it doesn't have to be an inordinate amount.

We actually built the house in our normal six-month time frame, but it took several months on the front end for planning, and several more on the back end for the approvals to come through from the rating consultants.

From the builder's perspective, this



From: Batya Metalitz [mailto:bmetalitz@usgbc.org]
Sent: Tuesday, February 06, 2007 2:19 PM
To: Price, Mark; Neuhauser, Ken
Cc: Taryn M. Holowka; Rina Brule; Sara Harding; Caitlin Bennett; Ashley Katz
Subject: Approval of LEED for Homes pilot Certification! Project # 49

Certified: February 5, 2007
Project #: 49

Dear Mark & Ken,

USGBC is extremely pleased to approve the certification of the pilot LEED home at 27 Boxborough Road, Stow, MA built by Two Storey Building and supported by the LEED for Homes Provider, Conservation Services Group. This project has received a "LEED Silver" rating. Congratulations on this accomplishment!

We look forward to working with you and the builder to highlight this outstanding accomplishment in the residential construction industry!

Best regards,

Batya Metalitz
bmetalitz@usgbc.org
LEED for Homes Program Assistant
1800 Massachusetts Ave. NW | Suite 300
Washington, DC 20036
Direct: 202 742 3774
Main: 202 828 7422

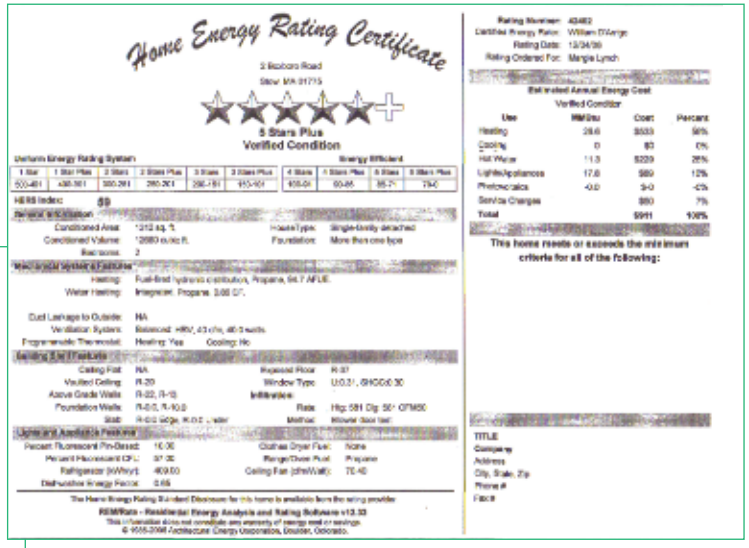
The U.S. Green Building Council

Two Storey Buildings

Bolton, MA

LEED

2006



Home Energy Rating Certificate

5 Stars Plus
Verified Condition

HERS Index: 59

This home meets or exceeds the mid-insert criteria for all of the following:

TITLE

was a rewarding and enlightening learning experience. Much time was spent gathering and reviewing information into the sustainable building procedures and sustainable material selections. Also, many of our subcontracting partners embraced this new approach.

Two Storey Building grew tremendously through the process of completing this LEED-certified home. This project has resulted in some new standard procedures for our company on all future projects. It was certified LEED Silver, the first home so certified in Massachusetts, and ENERGY STAR 5 plus with a HERS Index of 59. Margie reports that she uses approximately 175 kilowatt hours of electricity per month and an average of 34 gallons of propane per month over the course of the year. These amounts are significantly lower than the average home.

It was one of the first residential LEED-certified projects in Massachusetts, and our final checklist showed that we achieved the following points in the rating system:

- Building within one-half mile of green spaces.
- Limiting turf and water demand.

3. Permeable paving materials and installing erosion controls.

- Non-toxic pest control measures.
- High-efficiency fixtures, including low-flow toilets and water-restricting devices.
- Including a heat-recovery ventilation system and automatic timers on the bathroom exhaust fans.
- Third-party testing of indoor air quality.
- No garage in contact with the home.
- Home that is smaller than national average.
- Advanced framing techniques.
- Waste reduction.
- Utilizing materials produced within 500 miles of the site.
- Third-party verification of the durability plan.
- Use of FSC-certified, reused, and
- ENERGY STAR home rating below national averages.
- ENERGY STAR appliances.
- No ozone depletion from AC sources.
- Comprehensive owner's manual, walkthrough, and training on systems.

We achieved LEED Silver with 53 points, and we did it at a reasonable cost. It did cost more, but not an exorbitant amount. While many "green" building practices do cost more in the short run, many will also more than pay for themselves over time as a result of higher energy efficiency. We built the home in a normal time frame, although the rating process did take a while longer. Our customer, Margie Lynch, has the home she wanted, built using sustainable practices, and at a reasonable cost.

Most importantly, we partnered together, builder and homeowner, to do our part to build better, utilize the latest and best building technologies and practices, and create a healthy home environment that is sensitive to its impact on our community and our world. We enjoyed the process and learned to be a better builder along the way. That is what I call a win-win! **UHD**

The Author

Doug Storey is the Managing Partner of Two Storey Building, a custom builder from Bolton, Massachusetts. Two Storey Building constructs custom homes and fine remodeling projects in the greater metropolitan Boston area. Doug Storey is a member of the NAHB; the Builder's Association of Greater Boston (BAGB), the Custom Building and Remodeling Council, and the Sustainable Building Committee of BAGB and has been published in *Journal Of Light Construction* and *Remodeling Magazine*, among other publications. He is a member of the Bolton Planning Board and a founder of the Bolton Affordable Housing Partnership. Doug can be reached at 617 438 0313 or destorey@comcast.net / www.twostoreybuilding.com.