LEED for Homes Rating System

market rate  affordable  multi-family
The top 25% of new homes based on performance and environmental responsibility

Mainstream production and custom builders

TARGET MARKET

REGULATIONS

DEGREE OF GREEN

70%

MARKET SHIFT

lawbreakers

market leaders

innovators & risk takers

5% 20% 5%
Design and construction practices that meet specified standards reducing the negative impact of buildings on their occupants and on the environment.

LEED for Homes categories

- Innovation and Design (ID)
- Sustainable Sites (SS)
- Location and Linkages (LL)
- Water Efficiency (WE)
- Energy and Atmosphere (EA)
- Awareness and Education (AE)
- Materials and Resources (MR)
- Indoor Environmental Quality (IEQ)
LEED® for Homes Program
Pilot Rating System

for Homes

US Green Building Council

Version 1.11a
January 2007

www.usgbc.org/leed/homes
# LEED for Homes

## Project Checklist or Scorecard

**Builder Name:**

**Home Address (Street/City/State):**

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<th>Input Values</th>
<th>Minimum No. of Points Required:</th>
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<td>No. of Bedrooms:</td>
<td>Certified: 45</td>
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<td>Floor Area (SF):</td>
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## Detailed information on the measures below are provided in the companion document "LEED for Homes Rating System" |

### Innovation and Design Process (ID)

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<td>Preliminary Rating</td>
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<td>Design Charette</td>
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<td>2.1</td>
<td>Quality Management for Durability</td>
<td>Quality Management; Pre-Construction</td>
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<td>2.2</td>
<td>Wet Room Measures</td>
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<td>Innovative / Regional Design</td>
<td>Provide Description and Justification for Specific Measure</td>
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<td>Preferred Locations</td>
<td>Selected an Edge Development Site</td>
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<td>Selected an Infill Site</td>
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<td>Community Resources</td>
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<td>OR</td>
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<td>OR</td>
<td>&lt;1/4 mile of Outstanding Community Resources / Public Transportation</td>
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<td>6.1</td>
<td>Access to Open Space</td>
<td>&lt;1/2 mile of Publicly Accessible Green Spaces</td>
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<td>Site Stewardship</td>
<td>Erosion Controls (During Construction)</td>
<td>Prerequisite</td>
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<td>7.2</td>
<td>Minimize Disturbed Area of Site</td>
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<td>Landscaping</td>
<td>No Invasive Plants</td>
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<td>Basic Landscaping Design</td>
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<td>Turf</td>
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<td>7.6</td>
<td>Drought Tolerant Plants</td>
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<td>8.1</td>
<td>Shading of Hardscapes</td>
<td>Locate and Plant Trees to Shade Hardscapes</td>
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<td>8.2</td>
<td>Surface Water Management</td>
<td>Maintain Permeable Material &gt;= 65% of Lot (If Lot &gt;= 1/4 acre)</td>
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<td>Design and Install Permanent Erosion Controls</td>
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<td>Non-Toxic Pest Control</td>
<td>Select Insect and Pest Control Alternatives from List</td>
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<td>Compact Development</td>
<td>Average Housing Density &lt;= 7 Units / Acre</td>
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<td>Average Housing Density &lt;= 10 Units / Acre</td>
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<td>Average Housing Density &lt;= 20 Units / Acre</td>
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<td>Water Reuse</td>
<td>Rainwater Harvesting System</td>
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<td>Grey Water Re-Use System</td>
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<td>Selected High Efficiency Measures from List</td>
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<td>10.5</td>
<td>OR</td>
<td>Install Landscape Designed by Licensed or Certified Professional</td>
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<td>Indoor Water Use</td>
<td>High Efficiency Fixtures (Toilets, Showers, and Faucets)</td>
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<td>Very High Efficiency Fixtures (Toilets, Showers, and Faucets)</td>
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# Project Checklist (cont'd)

## Energy and Atmosphere (EA)

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<td>ENERGY STAR Home</td>
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<td>Exceeds ENERGY STAR for Homes, (1 Pt / 2 HERS Index Pts)</td>
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<td>Water Heating</td>
<td>Improved Hot Water Distribution System</td>
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<td>Pipe Insulation</td>
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<td>11</td>
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<td>Refrigerant Management</td>
<td>Minimize Ozone Depletion and Global Warming Contributions</td>
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Sub-Total (or Sub-Total from Addendum A - Prescriptive EA Credits) | 14 |

## Materials and Resources (MR)

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<td>Material Efficient Framing</td>
<td>Overall Waste Factor for Framing Order Shall be No More than 10%.</td>
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<td>Advanced Framing Techniques</td>
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<td>Structurally Insulated Panels</td>
<td>MR 1.2</td>
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<td>Environmentally Preferable Products</td>
<td>Tropical Woods, if Used, Must be FSC</td>
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<td>Select Environmentally Preferable Products from List</td>
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<td>Waste Management</td>
<td>Document Overall Rate of Diversion</td>
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<td>Reduce Waste Sent to Landfill by 26% to 100%</td>
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Sub-Total | 20 |

## Indoor Environmental Quality (IEQ)

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<td>Combustion Venting</td>
<td>Space Heating &amp; DHW Equip w/ Closed/Power-Exhaust</td>
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<td>Install High Performance Fireplace</td>
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<td>Moisture Control</td>
<td>Analyze Moisture Loads AND Install Central System (if Needed)</td>
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<td>Outdoor Air Ventilation</td>
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<td>Third-Party Testing of Outdoor Air Flow Rate into Home</td>
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<td>Timer / Automatic Controls for Bathroom Exhaust Fans</td>
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<td>Third-Party Testing of Supply Air Flow into Each Room in Home</td>
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<td>Prequisite</td>
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<td>OR</td>
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<td>OR</td>
<td>x£ 13 MERV Filters, w/ Adequate System Air Flow</td>
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<td>Seal-Off Ducts During Construction</td>
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<td>Permanent Walk-Out Mats OR Shoe Storage OR Central Vacuum</td>
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<td>Flush Home Continuously for 1 Week with Windows Open</td>
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<td>Radon Protection</td>
<td>Install Radon Resistant Construction if Home is in EPA Zone 1</td>
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<td>Prequisite</td>
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<td>Install Radon Resistant Construction if Home is not in EPA Zone 1</td>
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<td>IEQ 1</td>
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<td>Garage Pollutant Protection</td>
<td>No Air Handling Equipment OR Return Ducts in Garage</td>
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<td>Prequisite</td>
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<td>Tight Seal Shared Surfaces between Garage and Home</td>
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<td>OR</td>
<td>Detached Garage or No Garage</td>
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Sub-Total | 130 |

## Awareness and Education (AE)

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<td>1.1</td>
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<td>Education for Homeowner</td>
<td>Basic Occupant’s Manual and Walkthrough of LEED Home</td>
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<td>1.2</td>
<td></td>
<td>and/or Tenants</td>
<td>Comprehensive Occupant’s Manual and Multiple Walkthroughs / Trainings</td>
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<td>Public Awareness of LEED Home</td>
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<td>2.1</td>
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<td>Education for Building Mgrs</td>
<td>Basic Building Manager’s Manual and Walkthrough of LEED Home</td>
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Sub-Total | 130 |

## Project Totals (pre-certification estimates) | 130 |
How the Credit Structure Works

Credit #2: Landscaping

Intent

*Design and install landscape features that minimize demand for water and synthetic chemicals*

Requirements

*Mandatory Measures*

2.1

*Optional Measures*

2.2

2.3

Verification / Submittals

Synergies and Tradeoffs

Additional Information
### Exhibit 8
Summary of Prerequisite (Mandatory) and Credits (Optional) Point Requirements for the LEED for Homes Program

<table>
<thead>
<tr>
<th>Resource Category</th>
<th>No. of Prerequisite (Mandatory) Measures</th>
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<td>Location and Linkages</td>
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<td>Sustainable Sites</td>
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<td><strong>18</strong></td>
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Size Matters

1950 3.37 people per household - 297 s.f. per person
1970 3.14 people per household - 478 s.f. per person
2000 2.62 people per household - 840 s.f. per person

Sources: US Census Bureau, National Association of Home Builders
LEED for Homes Size Adjuster

Project Checklist

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<thead>
<tr>
<th>Input Values:</th>
<th>Minimum No. of Points Required:</th>
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<td>No of Bedrooms: 4</td>
<td>Certified: 45</td>
</tr>
<tr>
<td>Floor Area (SF): 2400</td>
<td></td>
</tr>
</tbody>
</table>

Builder Name: 

Home Address (Street/City/State):
Exhibit 10
Threshold Adjustment Table
(Point Range: -10 to +10)

<table>
<thead>
<tr>
<th>Maximum home size ( \text{( ft^2 )} ) by number of bedrooms</th>
<th>Adjustment (Points to Add to Award Thresholds*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Bedrooms</td>
<td>1 Bedroom</td>
</tr>
<tr>
<td>420</td>
<td>510</td>
</tr>
<tr>
<td>450</td>
<td>540</td>
</tr>
<tr>
<td>470</td>
<td>570</td>
</tr>
<tr>
<td>500</td>
<td>600</td>
</tr>
<tr>
<td>520</td>
<td>630</td>
</tr>
<tr>
<td>550</td>
<td>670</td>
</tr>
<tr>
<td>580</td>
<td>700</td>
</tr>
<tr>
<td>610</td>
<td>740</td>
</tr>
<tr>
<td>650</td>
<td>780</td>
</tr>
<tr>
<td>680</td>
<td>830</td>
</tr>
<tr>
<td>720</td>
<td>870</td>
</tr>
</tbody>
</table>

*Note: As an example, an Adjustment of -5 means that the threshold for a “Certified” LEED Home is 40 points (rather than the 45 points for an averaged sized home). Similarly, Silver would require a minimum of 55 points rather than 60 points; Gold would require a minimum of 70; and Platinum would require a minimum of 85 points.

For larger homes, or homes with more bedrooms, see below.
Discussion of Credits

Innovation and Design
Locations & Linkages
Sustainable Sites
Water Efficiency
Energy and Atmosphere
Material & Resources
Indoor Environmental Quality
Awareness and Education
ID Credits

Overview

- Four prerequisite measures
- 9 points possible

Special Features

- To be used for innovative approaches to:
  - Exceed existing credits
  - Adopt new strategies / technologies not included in the rating system
- Special process for verification (same as CIRs)
- USGBC will maintain a database of ID credits
### Exhibit ID2-A
**Durability Evaluation**

<table>
<thead>
<tr>
<th>Issue Type</th>
<th>Degree of Risk (l/m/h)</th>
<th>Protection Systems</th>
<th>Related Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterior water</td>
<td></td>
<td>Bulk water: Weatherlap drainage plane; design vapor profile with designated drying potential. Capillary action: include capillary breaks.</td>
<td></td>
</tr>
<tr>
<td>Interior water / &quot;wet&quot; rooms</td>
<td></td>
<td>Room-specific strategies</td>
<td>IEQ</td>
</tr>
<tr>
<td>Air infiltration</td>
<td></td>
<td>Air barrier</td>
<td>IEQ</td>
</tr>
<tr>
<td>Interstitial condensation</td>
<td></td>
<td>Vapor profile that prevents interstitial condensation</td>
<td>IEQ, EA</td>
</tr>
<tr>
<td>Heat loss</td>
<td></td>
<td>Thermal barrier</td>
<td>EA</td>
</tr>
<tr>
<td>Ultraviolet radiation</td>
<td></td>
<td>Site storage of UV-sensitive materials and strategy for priming and finishing in one week or less</td>
<td></td>
</tr>
<tr>
<td>Pests</td>
<td></td>
<td>Insect and rodent protection systems</td>
<td>SS5</td>
</tr>
<tr>
<td>Natural disaster (Hurricane, tornado, earthquake, flood, wildfire, etc.) Types:</td>
<td></td>
<td>See Resources sheet for specific guidance.</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Overview

- Parallel paths
  - Credit 1 (On-Hold), OR
  - Credit 2 thru 6
- No prerequisite measures
- 10 points possible

Special Features

- LL 3 Protect against sprawl
- LL 5 Minimize transportation needs
The average U.S. citizen uses ten times the chemical fertilizer and pesticides on a lawn than the average farmer does on crops.

Source: the reporter, Fall 2003
SS Credits

Overview
- 2 prerequisite measures
- 21 points possible
- 5 points required

Special Features
- Compact development recognized and awarded
- SS 2 Landscaping
- SS 4 Surface water management
The Meadow on the Hylebos
Low Impact Development Demonstration Project
Water Efficiency (WE)

Per-capita water consumption is rising twice as fast as world population. At least 300 million people live in regions that already have severe water shortages; by 2025, the number could be 3 billion.

Source: PLANetWIRE

2.5 billion gallons of water are used every day to irrigate the world's golf courses.

Source: Time Magazine
Overview

- No prerequisite measure
- 15 points possible
- 3 points required

Special Features

- WE 1 Rainwater & grey water systems
- WE 2 High efficiency irrigation systems
- WE 3 Indoor uses (lavatory, showers, toilets)
Test rig (top left), bulk & extruded media (top right), packaged media (bottom left), dropping media (bottom right).
Energy and Atmosphere (EA)

If the global growth rate of energy use continues unchecked, the rate of worldwide energy consumption will double by 2035 and triple by 2055.

Source: WSSD
Overview

- Parallel paths
  - Credit 1 or
  - Credit 2 thru 10 (except 7.1)
- 6 prerequisite measures
- 38 points possible

Special Features

- EA 1 Baseline of ENERGY STAR labeled home
- EA 2 Pre-drywall inspection required
- EA 8 ENERGY STAR Advanced Lighting Package (ALP)
- EA 9 ENERGY STAR labeled appliances
- EA 10 Renewable electric generation
- EA 11 Residential refrigerant management
Future Proof for Future Comfort
Load Reduction

Cost

Energy Savings

System Intensive Building

Envelope Intensive Building

20% 30% 40% 50% 60%
End-Use Breakdown: Average NW New 1850 SF Single Family Loads

WSEC Base Case

- Space Heat: 58%
- Water Heat: 24%
- Lighting: 6%
- Appliances & Plugs: 12%

Best Practices Case (55% Load Reduction)

- Space Heat: 49%
- Water Heat: 16%
- Lighting: 6%
- Appliances & Plugs: 29%
End-Use Breakdown: Low Load Multi Family

WSEC Base Case:
- Appliances & Plugs: 39%
- Water Heat: 30%
- Lighting: 12%
- Space Heat: 19%

5 Star Built Green (32% Load Reduction):
- Appliances & Plugs: 47%
- Water Heat: 31%
- Lighting: 16%
- Space Heat: 6%
Figure C-5: Base case Pacific Northwest resource mix
Carbon footprint of fuels

CO$_2$ Emissions (lbs per kWh)

- Coal (Typical): 2.3 lbs/kWh
- Natural Gas Combined cycle combustion turbine: 0.8 lbs/kWh
- Wind Hydro Conservation: 0 lbs/kWh
- AFUE 90 Gas Furnace: 0.44 lbs/kWh
- COP 2 Heat Pump (using gas-based electricity): 0.4 lbs/kWh

Source (kWh generated) vs Site Use (kWh delivered into house)
Solar: Active vs. Passive

Thermomax Collector Efficiencies in Seattle
Window height as a fraction of wall height |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
</tr>
</tbody>
</table>

Window width as a fraction of wall width |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/3</td>
<td>2/3</td>
</tr>
</tbody>
</table>

Average interior air velocity as a percentage of the exterior wind velocity range = wind 45° to perpendicular to opening:

- Single opening: 12-14%, 13-17%, 16-23%
- Two openings in the same wall: 22%, 23%
- Two openings in adjacent walls: 37-45%, 37-45%, 40-51%
- Two openings in opposite walls: 35-42%, 37-51%, 47-65%
Materials and Resources (MR)

“Two-Thirds of World’s Resources Have Been Used-Up”

Source: UK National Academy of Sciences, backed by 1,360 scientists from 95 countries.
Overview

- 3 prerequisite measures
- 14 points possible
- 2 points required

Special Features

- MR 1 Material efficient framing
- MR 2 Environmentally Preferable Products (EPPs)
- MR 3 Construction waste
<table>
<thead>
<tr>
<th>Assembly</th>
<th>Component</th>
<th>EPP Specifications (see Note 2)</th>
<th>Product Specification Types (see Note 1)</th>
<th>Emission Specifications</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterior wall</td>
<td>framing</td>
<td>FSC-certified</td>
<td>carpet &amp; pad: comply with Carpet and Rug Institute's Green Label Plus program</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Exterior wall</td>
<td>siding or masonry</td>
<td>recycled content or FSC-certified</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Floor</td>
<td>flooring</td>
<td>linoleum, cork, bamboo, FSC-certified or reclaimed wood, sealed concrete, recycled-content flooring, or combination in 45% of home's floor area.</td>
<td>BONUS .5 pt for 90% of home</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Floor</td>
<td>framing</td>
<td>FSC-certified</td>
<td>BONUS .5 pt for NO carpet in home</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Foundation</td>
<td>aggregate</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Foundation</td>
<td>cement</td>
<td>fly ash or slag as replacement for, not addition to, cement content (min. 30%)</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Interior wall</td>
<td>framing</td>
<td>FSC-certified</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Interior walls AND ceilings</td>
<td>gypsum board</td>
<td>recycled content</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>decking or patio material</td>
<td>recycled content or FSC-certified</td>
<td>wood and/or agrifiber products with no added urea-formaldehyde resins</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>cabinets</td>
<td>recovered, recycled content, or FSC-certified</td>
<td>wood and/or agrifiber products with no added urea-formaldehyde resins</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>counters</td>
<td>recycled content</td>
<td>wood and/or agrifiber products with no added urea-formaldehyde resins</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>doors (not incl. garage)</td>
<td>recycled content or FSC-certified</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>trim</td>
<td>recovered, recycled content, or FSC-certified</td>
<td>wood and/or agrifiber products with no added urea-formaldehyde resins</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>adhesives &amp; sealants</td>
<td></td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>windows</td>
<td>recycled content or FSC-certified</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Roof</td>
<td>framing</td>
<td>FSC-certified</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Roof</td>
<td>roofing</td>
<td>recycled content or vegetated (min. 200 sf)</td>
<td>comply with State of California, DHS, “Practice for Testing of VOCs from Building Materials Using Small Chambers”: <a href="http://www.dhs.ca.gov/ehly/IAQ/VOCs/Practice.htm">www.dhs.ca.gov/ehly/IAQ/VOCs/Practice.htm</a></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Roof AND floor AND wall</td>
<td>insulation</td>
<td>recycled content (min. 20%)</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Roof, floor, wall (2 of 3)</td>
<td>sheathing</td>
<td>recycled content or FSC-certified</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Delivery or Disposal?
Indoor Environmental Quality (IEQ)

In the U.S., the number of asthma sufferers grew by 75 percent between 1980 and 1994.

Source: Grist Magazine
Indoor Environmental Quality

Overview

- Parallel paths
  - Credit 1 \textit{OR}
  - Credit 2 thru 10
- 7 prerequisite measures
- 20 points possible

Special Features

- IEQ 2  Combustion venting
- IEQ 4  Outdoor air ventilation
- IEQ 5  Local exhaust
- IEQ 7  Supply air filtration
- IEQ 8  Contaminant control
- IEQ 10  Garage pollution protection
Ventilation: 15 CFM per person + 0.01 CFM per sq. ft.
   OR
Prescriptive sizing table
   OR
(Refer to ASHRAE 62.2)

Equipment: Fans rated at < 1.5 sones

Controls: Accessible, labeled and operate ≥ 8 hours/day
Overview

- 1 mandatory measure
- 1 point possible

Special Features

- HA 1.1 Owner’s manual & walkthrough
- HA 1.2 Same + 3 hours training
Verification Process
Verification Process

**Step 1: Preliminary Rating (by rater)**

1.1 Detailed plan review of a builder's home design;

1.2 Performance testing of a typical example of builder's homes;

1.3 Identify additional measures that may be needed; and

1.4 Preliminary LEED for Homes score / rating.
Verification Process

Step 2: Final Rating (by rater)

2.1 Pre-drywall inspection;
2.2 Final inspection and performance testing;
2.3 Completion of project documentation file (including: checklist, performance test reports, and accountability form); and
2.4 Final LEED for Homes scoring / rating.
Verification Process (cont’d)

Step 3: Certification (by Provider)

3.1 Review of project documentation file that was prepared by the rater

3.2 Completion of LEED for Homes rating

3.3 Presentation of LEED for Homes certificate to builder / homeowner.

3.4 Send notification of rating to USGBC
### Verification Process (cont’d)

<table>
<thead>
<tr>
<th>Category</th>
<th>Credit</th>
<th>Resp.</th>
<th>Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>List of Special Measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Performance Testing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>1.</td>
<td>ENERGY STAR Home</td>
<td>Rater</td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Envelope Air Leakage</td>
<td>Rater</td>
</tr>
<tr>
<td></td>
<td>5.</td>
<td>Duct Leakage</td>
<td>Rater</td>
</tr>
<tr>
<td></td>
<td>6.</td>
<td>Refrigerant Charge</td>
<td>HVAC</td>
</tr>
<tr>
<td>IEQ</td>
<td>4.3.</td>
<td>Outdoor Air Flow Test</td>
<td>Rater</td>
</tr>
<tr>
<td></td>
<td>5.3</td>
<td>Exhaust Air Flow Test</td>
<td>Rater</td>
</tr>
<tr>
<td></td>
<td>6.2</td>
<td>Supply Air Flow Test</td>
<td>Rater</td>
</tr>
<tr>
<td></td>
<td>8.3</td>
<td>Contaminant Testing</td>
<td>3rd-Party</td>
</tr>
<tr>
<td><strong>Special Inspections</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>2.1 / 2.2</td>
<td>Insulation</td>
<td>Raater</td>
</tr>
<tr>
<td>Materials</td>
<td>4.2</td>
<td>Durability</td>
<td>Rater</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homowner Awareness</td>
<td>Basic Walkthrough / Training</td>
<td>Builder</td>
<td>✗</td>
</tr>
<tr>
<td></td>
<td>Comprehensive Walkthrough / Training</td>
<td>Builder</td>
<td>✗</td>
</tr>
</tbody>
</table>
Accountability Form

(Version 1.7, August 12, 2005)

All declarations and affirmations made in this accountability form are made to USGBC solely for the purpose of assisting USGBC in determining whether LEED Certification is merited. No such declaration or affirmation can be construed as a warranty or guarantee of the performance of the building.

Instructions
This form is to be completed by the person / organization responsible for the design and/or implementation of one or more of the LEED for Homes credits below. A separate form shall be completed by each design professional responsible for one or more credits.

Step 1. Review the requirements for the credits in the LEED for Home Rating system for which you are responsible.
Step 2. Complete the General Information section of this form.
Step 3. Skip the Overall Performance Data section of the form (to be completed by Provider/Rater).
Step 4. In the Areas of Accountability section, check boxes to indicate the LEED for Homes credits for which you have the primary design/implementation responsibility.
Step 5. Complete the Official Certification section at the bottom of the form.
Step 6. Maintain a project documentation file to assist in the event of an audit of your credit(s) or of this project by the USGBC.

General Information

Builder Name: ___________________________
Subdivision Name: _________________________
House Address: ___________________________
Provider’s Name: _________________________
Rater’s Name: _____________________________
Sampling Protocol Used: (Y / N)

Overall Performance Data

LEED Score: ________________________ / 100 Points
LEED Rating Achieved: __________________________ (Certified, Silver, Gold, Platinum)
HERS Score Achieved: ________________________ / 100 Points

Areas of Accountability

Location & Leaksage

- Location & Leaksage
- Site Selection
- 5.1 Average Housing Density >/= 7 Units / Acre
- 5.2 Average Housing Density >/= 10 Units / Acre
- 5.3 Average Housing Density >/= 20 Units / Acre

Water Efficiency

- Water Efficiency
- 1.1 Water Reuse; Rainwater Harvesting
- 1.2 Water Reuse; Grey Water Reuse
- 2.2 Irrigation System; High Efficiency Measures

Materials and Resources

- Materials and Resources
- 2.1 Basic Landscaping Design
- 2.4 Minimize Landscape Water Demand
- 3.1 Humidity Control System
- 3.2 Outside Air Ventilation; Meets ASHRAE/Std 62.2
- 3.3 Local Exhaust; Meets ASHRAE/Std 62.2
- 3.4 Supply Air Distribution; ACCA Manual D
- 5.1 Radon Protection; Install System, Not EPA Zone 1
- 5.2 Radon Protection; Install System, EPA Zone 1
- 6.1 HVAC Meets ENERGY STAR for HVAC
- 6.2 Insulation; Above Code
- 6.3 Renewable Electric Generation System
- 7.1 Residential Refrigerant Management

Energy and Atmosphere

- Energy and Atmosphere
- 2.3 Insulation; Above Code
- 3.1 HVAC Meets ENERGY STAR for HVAC
- 3.2 Insulation; Above Code
- 3.3 Renewable Electric Generation System
- 4.1 HVAC Meets ENERGY STAR for HVAC
- 4.2 Insulation; Above Code
- 4.3 Renewable Electric Generation System
- 5.1 Radon Protection; Install System, Not EPA Zone 1
- 5.2 Radon Protection; Install System, EPA Zone 1
- 6.1 HVAC Meets ENERGY STAR for HVAC
- 6.2 Insulation; Above Code
- 6.3 Renewable Electric Generation System
- 7.1 Residential Refrigerant Management

Innovation and Design Process

- Innovation and Design Process
- 9.1 Radon Protection; Install System, EPA Zone 1
- 9.2 Radon Protection; Install System, Not EPA Zone 1
- 10.1 HVAC Meets ENERGY STAR for HVAC
- 10.2 Insulation; Above Code
- 10.3 Renewable Electric Generation System
- 11.1 Residential Refrigerant Management

Homeowner Awareness

- Homeowner Awareness
- 1.1 Basic Owner’s Manual & Walkthrough
- 1.2 Comprehensive Manual & Multiple Walkthroughs
- 1.3 Provide Description and Justification
- 1.4 Provide Description and Justification
- 2.1 Basic Owner’s Manual & Walkthrough
- 2.2 Comprehensive Manual & Multiple Walkthroughs
- 2.3 Provide Description and Justification
- 2.4 Provide Description and Justification

Official Certification (To be Completed After Final LEED for Homes Rating)

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.).

Responsible Party
Printed Name: ___________________________
Project Role / Title: _______________________
Organization / Company: _______________________
Signature: ___________________________

Date: __________

Overall Performance Data

This form is to be completed by the person / organization responsible for the design and/or implementation of one or more of the LEED for Homes credits below. A separate form shall be completed by each design professional responsible for one or more credits.

Step 1. Review the requirements for the credits in the LEED for Home Rating system for which you are responsible.
Step 2. Complete the General Information section of this form.
Step 3. Skip the Overall Performance Data section of the form (to be completed by Provider/Rater).
Step 4. In the Areas of Accountability section, check boxes to indicate the LEED for Homes credits for which you have the primary design/implementation responsibility.
Step 5. Complete the Official Certification section at the bottom of the form.
Step 6. Maintain a project documentation file to assist in the event of an audit of your credit(s) or of this project by the USGBC.
Key Lessons Learned in Pilot

- Importance of Integrated Design Process
- Importance of “Green” Building Science
- Improvements in the Rating System
Importance of Integrated Design Process

#1: Project Goals
#2: Project Team
#3: Integrated Design
#4: Quality Assurance Procedures
#1: Project Performance Goals

- Simple
- Compelling
- Shared (Included in Specifications)
- Measurable (Inspected / Tested)
- Contractually Tied to Payment
#2: Project Team

- A Clear, Singular Vision
- Identify Challenges
- Find Appropriate Expertise
- Regular Meetings
- Everyone Must Be On-Board
  - No Whiners!
#3: Integrated Design

- Are Goals Clear?
- Include key contractors in process early
- Is the team communicating effectively?
- What systems interact? What Challenges Need to be Addressed?
- Review design and changes (against goals and priorities)
Integrated Design Example
Energy Efficient Home

Energy efficient envelope and HVAC systems

Vented crawlspaces, conditioned attics, and interstitial water management

Build tight, ventilate right, and heat recovery

Exterior water management

Benefits:
Healthy
Comfort
Durable
Energy Efficient

Combustion
venting / safety, and radon

Local exhaust, And humidity control

Energy
Moisture
IEQ
Integrated Design Example: Green Products and Practices

**Energy**
- ENERGY STAR windows, appliances and lighting
- Efficient fireplace
- Central vacuum and Improved air filters

**Water**
- Low flow faucets, showers and toilets
- Landscaping and rainwater harvesting

**Materials**
- Recycled, salvaged, and locally sourced products; Reduced construction waste

**Site**
- Select compact, infill site close to community resources
- Design smaller home size

**IEQ**
- Benefits:
  - Healthy
  - Comfort
  - Durable
  - Energy Efficient
  - Env. Responsible
#4: Quality Assurance Process

- Clearly communicate standards and expectations
- Show trades what is wanted
- Ask for input on better approaches
- Check and stop work/correct early
- Verify and recognize success
- Avoid end-of-pipe quality control
PLEASANT HILL HOME
FREEPORT, MAINE

45% more energy efficient
66% lower heating bills
Exceptional indoor air quality

LEED® Facts
Pleasant Hill Home
Freeport, ME

LEED for Homes
Certification awarded May 12, 2008
Silver 51%
Sustainable Sites 10.6/14
Water Efficiency 1/12
Indoor Environmental Quality 10/14
Materials & Resources 6.6/24
Locations and Linkages 3/10
Energy & Atmosphere 15.6/29
Homeowner Awareness 1/1
Innovation & Design 4/4

*Out of a possible 100 points
The Living Building Challenge

Project Overview

It is time to move beyond Platinum to the level of the Living Building.

Imagine buildings that are built to operate as elegantly and efficiently as a flower.

Imagine a building that is informed by the eco-region’s characteristics and

- that generates all of its own energy with renewable resources,
- that captures and treats all of its water on site
- that uses resources efficiently, and for maximum beauty

The Cascadia Region Green Building Council (Cascadia) is issuing a challenge to all building owners, architects, engineers and design professionals to build in a way that will provide all of us and our children with a sustainable future.
No Credits, Just Prerequisites!
Prerequisite One – Responsible Site Selection

You may not build on the following locations;

- Within 50-feet of Wetlands\(^4\)
- On or adjacent to Sensitive Ecological Habitats\(^5\) such as Primary Dunes\(^6\), Old Growth Forest\(^7\), virgin prairie\(^8\).
- Prime farmland\(^9\)
- Within the 100 year flood plain\(^10\)

Prerequisite Two – Limits to Growth

Projects may only be built on previously developed sites, either greyfield or brownfield.\(^11\)

Prerequisite Three - Habitat Exchange

For each acre of development, an equal amount of land must be set aside as part of a habitat exchange\(^2\).
Prerequisite Four – Net Zero Energy\textsuperscript{13}

100 percent of the building’s energy needs supplied by on-site renewable energy\textsuperscript{14} on a net annual basis.
Prerequisite Five – Materials Red List\textsuperscript{17}

The project cannot contain any of the following red list materials or chemicals.

- No added formaldehyde
- Halogenated Flame Retardants\textsuperscript{18}
- PVC\textsuperscript{19}
- Mercury\textsuperscript{20}
- CFC’s
- HCFC’s

- Neoprene (chloroprene)
- Cadmium
- Chlorinated Polyethylene and Chlorosulfonated Polyethylene\textsuperscript{21}
- Wood treatments containing Creosote, Arsenic or Pentachlorophenol
- Polyurethane
- Lead\textsuperscript{22}
- Phthalates
Materials

Prerequisite Six – Construction Carbon Footprint
The project must account for the embodied carbon footprint of its construction through a one-time carbon offset tied to the building’s square footage and general construction type.

Prerequisite Seven – Responsible Industry
All wood must be FSC certified or from salvaged sources.

Prerequisite Eight – Appropriate Materials/Services Radius
Materials and Services must adhere to the following list:

<table>
<thead>
<tr>
<th>MATERIAL OR SERVICE</th>
<th>MAXIMUM DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideas</td>
<td>12,429.91 miles</td>
</tr>
<tr>
<td>Renewable Energy Technologies</td>
<td>7000 miles</td>
</tr>
<tr>
<td>Consultant Travel</td>
<td>1500 miles</td>
</tr>
<tr>
<td>Lightweight Materials</td>
<td>1000 miles</td>
</tr>
<tr>
<td>Medium Weight Materials</td>
<td>500 miles</td>
</tr>
<tr>
<td>Heavy Materials</td>
<td>250 miles</td>
</tr>
</tbody>
</table>
Prerequisite Nine – Leadership in Construction Waste

*Construction Waste must be diverted from landfills\(^{30}\) to the following levels*

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>MINIMUM Diverted/Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>95%</td>
</tr>
<tr>
<td>Paper and Cardboard</td>
<td>95%</td>
</tr>
<tr>
<td>Soil, and biomass</td>
<td>100%</td>
</tr>
<tr>
<td>Rigid Foam, carpet &amp; insulation</td>
<td>90%</td>
</tr>
<tr>
<td>All others – combined weighted average(^{31})</td>
<td>80%</td>
</tr>
<tr>
<td>Asphalt</td>
<td></td>
</tr>
<tr>
<td>Concrete and concrete blocks</td>
<td></td>
</tr>
<tr>
<td>Brick, tile and masonry materials</td>
<td></td>
</tr>
<tr>
<td>Untreated lumber</td>
<td></td>
</tr>
<tr>
<td>Plywood, OSB and particle board</td>
<td></td>
</tr>
<tr>
<td>Gypsum wallboard scrap</td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td></td>
</tr>
<tr>
<td>Plumbing fixtures</td>
<td></td>
</tr>
<tr>
<td>Windows</td>
<td></td>
</tr>
<tr>
<td>Doors</td>
<td></td>
</tr>
<tr>
<td>Cabinets</td>
<td></td>
</tr>
<tr>
<td>Architectural fixtures</td>
<td></td>
</tr>
<tr>
<td>Millwork, paneling and similar</td>
<td></td>
</tr>
<tr>
<td>Electric fixtures, motors, switch gear and similar</td>
<td></td>
</tr>
<tr>
<td>HVAC equipment, duct work, control systems, switches</td>
<td></td>
</tr>
</tbody>
</table>
Pre-requisites

Prerequisite Ten – Net Zero Water
100 percent of occupants’ water use must come from captured precipitation\textsuperscript{32} or reused water that is appropriately purified without the use of chemicals\textsuperscript{33}.

Prerequisite Eleven – Sustainable Water Discharge
100 percent of storm water and building water discharge must be handled on-site.
Indoor Environmental Quality

Prerequisites

Prerequisite Twelve – A Civilized Work Environment
Every occupiable space must have operable windows\textsuperscript{34} that provide access to fresh air and daylight\textsuperscript{35}.

Prerequisite Thirteen – Healthy Air/Source Control
All buildings must meet the following criteria:

- Entryways must have an external dirt track-in system and an internal one contained within a separate entry space.\textsuperscript{36}
- All kitchens and bathrooms must be separately ventilated.
- All copy rooms, janitorial closets and chemical storage spaces must be separately ventilated.
- All interior finishes, paints and adhesives must comply with SCAQMD 2007/2008 standards\textsuperscript{37}. All other interior materials such as flooring and case works must comply with California Standard 01350 for IAO emissions\textsuperscript{38}.
- The building must be a non-smoking facility\textsuperscript{39}

Prerequisite Fourteen – Healthy Air – Ventilation
The building must be designed to deliver air change rates in compliance with California Title 24 requirements.
Prerequisites
Prerequisite Fifteen - Beauty and Spirit

The project must contain design features intended solely for human delight and the celebration of culture, spirit and place appropriate to the function of the building.

Prerequisite Sixteen - Inspiration and Education

Educational materials about the performance and operation of the project must be made available to the public in order to inspire and educate. Non-sensitive areas of the building must be held open to the public at least one day per year, to facilitate direct contact with a truly sustainable building.