LEED® for Homes Rating System

January 2008

Corrections, Clarifications & Exemplary Performance Rulings LEED for Homes, Version 2008

This document includes corrections, clarifications, and new exemplary performance rulings since publication of the LEED for Homes Rating System, Version 2008. Most of the rulings below are the result of formal Credit Interpretation Requests that have been processed. In these cases, the ruling number is given in parentheses.

All rulings below that were published in the January 2009 Errata & Clarifications document are applicable and enforceable for all projects registered after January 15, 2009.

All rulings below that were published in the January 2010 Errata & Clarifications document are applicable and enforceable for all projects registered after January 1, 2010.

All text in red is new as of April 1, 2013. Any new rulings identified as "Clarifications" should be applied and enforced for all LEED for Homes projects. Any new rulings identified as "Interpretations" or "Corrections" must be applied and enforced for projects registered after the publication of this Errata & Clarification document.

See Appendix A for an abbreviated list of rulings, organized by release date.

Rating System Errata

- Pg. XV, Exhibit 4 – Under the "Adjustment to award thresholds" column, the second to last row should be "+9", not "+-9"
- Pg. XV – the equation in Exhibit 5 should be changed from: "2850 + [250*(number of bedrooms) – 5)]" to "2850 + [250*(number of bedrooms – 5)]"
- Pg. 31 – note, 3rd sentence should be changed from "Ponds can be counted as open space if they border a walking or bicycle path" to "Areas around ponds can be counted as open space if they have usable, accessible recreational space such as walking or bicycle paths."
- Pg. 37 – in the equation for Step 2, ETL should be ET_L
- Pg. 39 – gray concrete must have an SRI of 29 or greater to be awarded credit.
- Pg. 40: The language "at least 70% of the built environment" should be replaced with "at least 70% of the buildable land". On p. 41, the heading for Table 9 is correct.
- Pg. 54 – box for EA 8 should include "Prerequisite: EA 8.1"
- Pg. 54: box for EA 11 should state, "Prerequisite: EA 11.1", not "Prerequisite: EA 2.1"
- Pg. 70, Table 20 – change "Solar water heaters (backup)" to "Solar water heaters"
- Pg. 80, Table 24 – within "Floor: Flooring" component, the Low-Emissions requirement should be changed from "Hard flooring: additional ½ point for 100% hard surface flooring" to "Hard flooring automatic: ½ point for 90% hard surface flooring"
- Pg. 81: In Figure 6, the Example Notice to Wood Products Suppliers should read: "Notice to Vendors: [The company] prefers to purchase wood products that are certified according to the guidelines of the Forest Stewardship Council (FSC). [The company] also prefers not to use any tropical wood or wood products. If any tropical wood or wood products are supplied, they *must*

be FSC certified. Please provide the country of manufacture of each product you expect to supply to us. Also please provide a list of FSC-certified products you can supply."

- Pg. 81, Table 25 – change first column heading from "Component" to "Types of Paints and Coatings"
- Pg. 81, Table 25 – within first column, first row should be changed from "Architectural paints, coatings, and primers, applied to interior walls and ceilings" to "Architectural paints, coatings, and primers, applied to interior elements"
- Pg. 82: In Table 26, the entry for ceramic tile adhesive is missing. The requirement for ceramic tile adhesives (from LEED-NC) is 65 g/L.
- Pg. 83 – requirement in MR 3.2, part (a), second sentence should be changed from "Generate… per square foot of conditioned floor area" to "Generate… per square foot of building floor area."
- Pg. 84, Table 27 – values in column 2 should be: 100%; 87.5%; 75%; 62.5%; 50%; 37.5%; 25%; and 12.5%. Values in column 3 should be: 0%; 12.5%; 25%; 37.5%; 50%; 62.5%; 75%; and 87.5%.
- Pg. 85 – left column, sixth box should be "EQ 8.2", not "EA 8.2".
- Pg. 86, Table 28 – first column, fourth row should be changed from "Energy & Atmosphere 6.1" to "Energy & Atmosphere 6.1(a) and 11.1"
- Pg. 86, Table 28 – third column, fourth row should be changed from "… achieves prerequisites EA 6.1(a) and 6.1(c) to "… achieves prerequisites EA 6.1 (a) and EA 11.1.
- Pg. 87 – under "Conducting a Back-Draft Potential Test", equation should be changed from "delta P = (Q/C) 1/n" to "delta P = $(Q/C)^{1/n}$"
- Pg. 95: Under B. Nonducted HVAC Systems, there should be an "OR" between 7.2 and 7.3.
- Pg. 111: The Glossary definition of Infiltration Degree-Days is incorrect. Although heating degree-days and cooling degree-days may be a reasonable proxy for IDDs, it is not correct. The true definition of IDDs is provided in ASHRAE Standard 119-1988 (RA 2004) and it requires a rigorous calculation to determine.

General

Clarification: As a response to growing international interest in residential green building and LEED for Homes, USGBC has launched an international pilot. Project teams outside the United States and Canada may now apply to participate in the international pilot. If selected, project teams will need to coordinate with USGBC and an approved LEED for Homes Green Rater on meeting the program, verification and certification submittal requirements of the LEED for Homes rating system. This process will include determining Alternative Compliance Pathways (ACPs). For more information on the International Pilot and the process for certification please visit usgbc.org. Canadian projects should pursue LEED Canada for Homes, offered by the CAGBC. Any project located in Canada that registered with LEED for Homes prior to the release of LEED Canada for Homes can be certified under LEED for Homes.

Clarification: For multi-family buildings, it is unacceptable to have significantly disparate benefits for different units. A credit or prerequisite is not met if less than 100% of the units satisfy the requirements. For example, PV may only be credited if it serves all of the units / occupants. (EA 10-10)

Home Size Adjuster (HSA)

Clarification: For group homes (e.g., dormitories, assisted living facilities, if a building has 9 units or fewer, treat the building as a single-family home (i.e., include all conditioned space). For group housing situations with more than 10 units, the building should be treated as a multi-family building. In this case, only the living space within the individual dwelling units should be counted in the home size adjuster. (HSA 02)

Interpretation: When determining the square footage of the home for the HSA, include all directly conditioned space within the thermal boundary, calculated to the exterior wall. Include all normal living spaces and service areas (e.g., garages, utility rooms, closets, entries, crawl spaces, attics, basements) that are within the thermal boundary and meet ANSI Z765 requirements for ceiling height EXCEPT those that are separated from primary living spaces by insulated, weatherstripped doors AND are neither directly heated nor cooled. In the rare case of mild climates where normal living spaces in the home are neither heated nor cooled, include all spaces that are reasonably expected to be used as living areas or are normal adjuncts to living areas, such as closets, utility rooms, entries, etc. *Enforced for all projects registered after January 1, 2010.*

Clarification: Unique residential projects that do not meet the intent of a single family home but are also not being built like a multifamily building, such as fraternity houses and assisted living facilities, may submit a CIR and will be ruled on a case by case basis. Rulings will ensure the HSA is not over-penalizing or over-rewarding projects. Possible rulings include but are not limited to: allowing projects to add common space into the average unit size and then using the multifamily HSA and allowing projects to use a HSA of 0.

Innovative Design Process (ID)

ID 1.2 – Integrated Project Team

Clarification: The "project team" does not include the Provider and/or green rater. For part (a), the credit should be changed to "Include team members, not including the builder or Green Rater, whose capabilities include…"

Clarification: For part (c), if a project is on hold or inactive, monthly meetings are not required. (ID 01-03)

ID 1.3 – Professional Credentialed with Respect to LEED for Homes

Clarification: ID 1.3 may only be awarded on the following conditions: 1) the person with the credential must be a principal member of the project team, and not a member of the verification team (e.g., not the Green Rater for the project); 2) the person with the credential must play an ongoing role on the project team, including participation in meetings, etc.; 3) the credential must

be earned prior to the project's preliminary rating. There are currently no credentials or levels of experience that are considered equivalent to LEED AP Homes. (ID 01-06)

ID 2.1 – Durability Planning

Clarification: For part (c), the use of paper-faced backerboard that meets ASTM mold-resistant standards is acceptable for exposed walls and behind fiberglass surrounds. It is not acceptable for use behind tile. (ID 02-17)

Clarification: For part (c), the use of nonpaper-faced backerboard only applies to walls near tubs, showers, and spas. It is not required on ceilings or bathroom walls not near the tub, shower, or spa. (ID 02-16)

ID 3 – Innovative or Regional Design

Clarification: Exemplary performance credit is not available for process or education related credits (e.g., ID 1.2-1.4; AE credits).

Locations and Linkages (LL)

LL 1 – LEED for Neighborhood Development

Clarification: Projects do not need to complete LEED-ND certification before earning this point, but the requirements of Stage 2 must be met. (LL 01-02)

LL 2 – Site Selection

Clarification: Part (a) cannot met by raising a home off the ground. (LL 02-15)

Clarification: If there are existing built features within 100 ft that will not be disturbed, these are exempted from LL 2 part (c). If there are existing built features within 100 ft that will be disturbed, the project does not meet LL 2 part (c) and credit LL 2 cannot be earned. (LL 02-11)

LL 3.1 / 3.2 – Edge Development / Infill

Clarification: Where the term “borders previously developed land” is used, the adjacent land must have development that is at least 5 years old. (LL 03-08)

Clarification: Where the term “borders previously developed land” is used, the land itself must be developed. Being located adjacent to a lot with development located on it is not sufficient unless the development is immediately adjacent to the LEED project. (LL 03-09)

Clarification: If the home is located in a new development, then the term “development site” includes all of the new home sites in that new development, not just the one building site that is to be certified.

Clarification: If a project borders a body of water, this border should not be included in the calculation – i.e. it should not be a credit or penalty. (LL 03-07).

Clarification: If a project borders a park or is a corner lot, the adjacent park or roadway shall be treated as non-existent (i.e., assessment is to be based on the land on the other side of the park, or the land on the other side of one of the roadways).

Interpretation: LL 3.3 may only be awarded if 75% of the total buildable land for the project was previously developed. This applies to single-family and multi-family projects. If the LEED home is built on the footprint of a previously existing structure, but this footprint comprises less than 75% of the total buildable land, LL 3.3 should not be awarded. *Enforced for all projects registered after January 1, 2010.* (LL 03-11)

Clarification: A home that is part of a new development (e.g. <5 years old) may be awarded any LL credits, including LL 3.1 and LL 3.2, if the development meets the requirements of the Rating System. Not all homes in the development must be pursuing LEED certification. (LL 03-10)

LL 4 - Infrastructure

Clarification: Having a septic system is not a substitute for being located within ½ mile of sewer service. However, a project can earn this credit even if the project is not actually connected to the existing water or sewer service, only located with ½ mile of service. (LL 03-02)

LL 5 – Community Resources / Transit

Clarification: If the number of transit rides varies throughout the year (e.g., the project is built in a seasonal resort or on an academic campus), the average rides per weekday should be used. (LL 05-01).

Clarification: Multiple transit stops can only be counted if they are for different transit lines. For example, a single bus that stops just north of the home, in front of the home, and just south of the home should only be counted as one stop. If the bus passes by 10 times per weekday, 10 rides should be counted, not 30. (LL 05-03)

Interpretation: The distance requirements must be calculated based on walking distances, not "as the bird flies". For example, if a resource is within ½ mile on a map, but requires >½ mile of walking because of highways or other obstructions, the resource should not be counted. *Enforced for all projects registered after January 15, 2009.*

Exemplary Performance: Projects can earn 1 ID point if they are within ½ mile of transit services that offer 250 or more transit rides per weekday. (LL 05-02)

Exemplary Performance: Projects can earn 1 ID point if they are within ½ mile walking distance of 28 community resources. As per the Rating System, projects may not take credit for more than 2 of the same type of community resource. (LL 05-05)

LL 6 – Access to Open Space

Interpretation: The distance requirements must be calculated based on walking distances, not "as the bird flies". For example, if a community-based open space is within ½ mile on a map, but

requires >½ mile of walking because of highways or other obstructions, it cannot be counted. *Enforced for all projects registered after January 1, 2010.* (LL 06-04)

Sustainable Sites (SS)

SS 1.2 – Minimize Disturbed Area of Site

Correction: In part (b), the term "buildable lot area" should be replaced with "lot area, not including area that is legally protected from disturbance." Setbacks from the road are generally not buildable, but should still be preserved, if possible. *Enforced for all projects registered after January 15, 2009.*

Clarification: Part (a) and (b) apply only to sites that are not previously developed or "disturbed". Undeveloped sites with substantial amounts of garbage and/or invasive weeds should be treated as previously disturbed sites.

SS 2.2 – Landscaping

Interpretation: The Glossary definition of "Conventional Turf" refers to "considerable watering, mowing, and/or fertilizers." The intent is that any turfgrass that requires routine watering, mowing, or fertilizers should be considered conventional for the purposes of SS 2.3. Even turf identified as drought-tolerant may qualify as "conventional" for the purposes of SS 2.3. Further guidance on differentiating grasses for LEED for Homes is forthcoming from USGBC. *Enforced for all projects registered after January 1, 2010.*

Interpretation: For SS 2.5, if a grass has almost no mowing requirements (i.e., does not need to be mowed more than once or twice a year) and has no fertilizer / chemical requirements, the species may be treated as a groundcover in the calculation, which means a species factor (Ks) between 0.2 and 0.7 may be chosen. For all other cases, a species factor (Ks) between 0.6 and 0.8 must be chosen. *Enforced for all projects registered after January 1, 2010.*

Clarification: Projects that have no space for landscaping (e.g. buildings constructed to the edge of the lot line) may only earn points in SS 2.2-2.5, SS 3 (a), and WE 2.1-2.3 if a vegetated roof is installed and the vegetation meets the credit requirements. No points are available for SS 4.1 or 4.2.

Interpretation: Credits in the SS & WE categories may only be awarded if there is permanent designed landscape. The soil or "ground" does not need to be native or pre-existing, and may be located over a podium or as part of a vegetated roof, but vegetation in planters cannot be used to meet the credit requirements. *Enforced for all projects registered after January 1, 2010.*

Clarification: Projects that choose or are unable to install landscaping (e.g. production builders, projects finishing during winter) may be certified on the following conditions: 1) a landscaping plan must be developed and provided to the homeowner that includes no invasive plants; (2) information or references about native and drought-tolerant plants must be provided to the

homeowner; and 3) no points may be awarded in SS 2, SS 3 (a), SS 4.2 (b), or SS 5 (d). Half-credit may be granted for SS 4.1, but only if all final hardscapes are installed, including driveways, walkways, patios, etc. No credit may be awarded for SS 4.3 unless infiltration features are installed. (SS Gen-24; SS 04-36)

Interpretation: For projects that choose or are only able to install 50% of the designed landscaping, points are available in the following way (credit requirements must be met in order for points to be awarded): *Enforced for all projects registered after January 1, 2010.* (SS Gen-25)

- SS 3 – half credit is available, but all hardscapes must be installed and the hardscapes must meet the requirements through shading of installed vegetation or SRI values;
- SS 4.1 - Half credit available. All final hardscapes must be installed, including driveways, walkways, patios, etc.
- SS 4.2 - Full credit available, if all relevant erosion control measures are installed.
- SS 4.3 - Full credit available, if all relevant stormwater controls are installed.
- WE 1 – Full credit is available. In the case of WE 1.1 for outdoor applications, the project team must submit a calculation demonstrating that the installed landscaping will need at least as much water as what will be collected for re-use.
- WE 2.1 and WE 2.2 – Half credit available, based on irrigation measures installed to serve installed landscaping.

Clarification: Landscaping does not have to be fully established prior to certification; if the lot is seeded and mulched, the project can earn credit as appropriate in SS 2.2-2.5. (SS 02-38)

Clarification: For areas with non-vegetated natural groundcover (e.g., bare mulch, pinestraw): If ≥ 50% of the designed landscaped is non-vegetated groundcover, the project must follow the prescriptive pathway. Non-vegetated natural groundcover can be used to earn SS 2.3 if the landscape professional considers it final, but it cannot earn credit under SS 2.4 or any credits under WE 2. If < 50% of the designed landscape is non-vegetated natural groundcover, projects may use the performance pathway, and exclude these areas from the calculation. (SS 02-34)

Clarification: Plants that are used in rain gardens may be excluded from the calculations (i.e. not counted for or against the project) in SS 2.4 and SS 2.5 if the plants meet the following conditions: they are not served by an irrigation system, AND they appear on a list of rain garden appropriate plants published by a local or regional 3rd party source (e.g., agricultural extension office, botanical garden). (SS 02-40)

Clarification: For SS 2.5, a project with no irrigation system cannot earn points automatically. Please see the guidance document for the outdoor water use calculation that relates to this credit. *The calculator was updated in November, 2009.* (SS 02-30; SS 02-43)

Exemplary Performance: For projects earning credit in SS 2.5, 1 ID point may be awarded if the requirements of SS 2.2, parts (b), (c), and (d) are met. (SS 02-29)

Clarification: Areas with synthetic turf should be treated like a hardscape. If the synthetic turf is permeable and includes a porous subbase, it may be counted under SS 4.1 (b). (SS 02-39)

SS 3 – Local Heat Island Effect

Correction: Gray concrete (part ii) is not an acceptable approach to earning this credit unless it is demonstrated to have an SRI of at least 29. *Enforced for all projects registered after January 15, 2009.* (SS 03-04)

Clarification: For multi-home developments, common roads should not be included in this calculation. (SS 03-13)

Clarification: Additional methods for earning the credit: parking that is a) beneath the home; b) under a vegetated deck; c) lower levels of a multi-level garage; or d) the top level of a multi-level garage that meets the credit requirements. (SS 03-07, SS 03-10)

Clarification: SS 3 applies to both existing and new hardscapes. Common roads serving multiple homes should not be included in the calculations for SS 3.

Clarification: SS 3 may be awarded if shading is provided by existing trees on the property (SS 03-17)

Exemplary Performance: Projects can earn ½ ID point if 100% of the sidewalks, patios, and driveways meet the credit requirements. (SS 03-08)

SS 4.1 – Permeable Lot

Correction: The calculation for this credit should include all buildable land, not "built environment". *Enforced for all projects registered after January 1, 2010.* (SS 04-19)

Interpretation: Non-vegetated natural groundcover (e.g., bare mulch, pine straw) can be used to earn credit SS 4.1, but it must meet the requirements under SS 4.1 part (b). *Enforced for all projects registered after January 1, 2010.* (SS 02-34)

Clarification: To be treated as permeable under SS 4.1, gravel areas must comply with part (b) of the credit, which includes a porous sub-base. This applies to all gravel areas, including those where the soil below is not expected to be compacted. (SS 04-35)

Clarification: Part (c) cannot be satisfied by vegetation unless the vegetated elements are designed by a landscape professional or equivalent to accommodate the additional water running off the impermeable surfaces being served. Any designed elements should be able to handle water from a 2-year, 24-hour design storm. (SS 04-24; SS 04-37)

SS 4.2 – Permanent Erosion Controls

Clarification: For part (b), trees installed should be mature enough to have a caliper (trunk thickness) of at least 1.5 inches. Also, it is acceptable to use ten 2-gallon shrubs, six 3-gallon shrubs, or five 4-gallon shrubs rather than four 5-gallon shrubs per 500 sf. (SS 04-18; SS 04-28)

SS 5 – Nontoxic Pest Control

Clarification: For part (a), this requirement only applies to wood that is part of the built structure; it does not apply to material stored on-site during construction.

Clarification: For part (a), there should be at least 12" of air separating the ground from wood; small rocks are considered to be "soil" for the purposes of the credit. (SS 05-26; SS 05-28)

Interpretation: A project with a non-cellulosic structure can meet part (a) if all wood, including siding, trim, etc. meet the credit requirements. *Enforced for all projects registered after January 1, 2010.* (SS 05-20)

Clarification: For part (c), this requirement applies to all exterior elements, including the façade and exterior framing over foundations. (SS 05-21)

Clarification: For part (d), all structures that connect to the home without a gap (e.g., porches, steps) must be at least 24" from mature plant parts. (SS 05-16)

Clarification: Part (d) may only be earned if all vegetation is 24" away from the home, including grass and groundcover. (SS 05-27)

Clarification: For part (e-i), all borate treatment is required at least three feet above the foundation, even if the foundation is raised or extended above grade. (SS 05-25)

SS 6 – Compact Development

Clarification: Buildable land should not include setbacks defined by law as excluded from residential development. Buildable land should include setbacks defined only in developer or covenants or HOA agreements.

Water Efficiency (WE)

WE 1.1 – Rainwater Harvesting System

Clarification: Partial credit (1 point) can be awarded if a system is installed that only collects water from 25-50% of the roof area, but a storage tank must be installed to collect water for a 1-inch rain event falling on 50% of the roof area. (WE 01-01b)

WE 2.1 – High Efficiency Irrigation System

Clarification: If a project earns points in SS 2.5, additional points for irrigation system improvements may only be earned in WE 2.3. No points may be earned in WE 2.1 or WE 2.2.

Exemplary Performance: Projects with only landscaping beds (i.e., no turf) that are served only by low-volume and point source irrigation (e.g., drip) can earn 0.5 point of exemplary performance credit, to be counted in ID 3. (WE 02-21)

WE 2.3 – Reduce Overall Irrigation Demand by at Least 45%

Exemplary Performance: Projects can earn ID points for achieving a reduction in estimated outdoor water use of 65% or more. A reduction of 65% or more is awarded 1 ID point; 70% or

more is awarded 2 ID points; 75% or more is awarded 3 ID points; 80% or more is awarded 4 ID points. (WE 02-18). These exemplary points can only be awarded under ID credit 3.

WE 3 – Indoor Water Use

Clarification: Part (c) cannot be earned through the use of toilet tank bags. (WE 03-16)

Clarification: For part (c), the flow rate of dual-flush toilets can be calculated using the following formula (high and low volumes must be verified): (WE 03-15)

Avg. volume = [(high volume flush) + 2* (low volume flush)] ÷ 3

Clarification: Flow restrictors are an acceptable strategy to earn WE 3, if the flow-restrictors are hardware that cannot easily be removed. For toilets, flush valve conversion devices and toilet tank bags cannot be used to earn credit under WE 3. (WE 03-19; WE 03-16; WE 03-20)

Clarification: Average or weighted flow rates (i.e. in the case of dual-flush toilets) must be calculated to the hundredths place. For example, if the average flow rate for toilets is 1.13 gal/flush, this cannot be rounded down to 1.10. (WE 03-18)

Energy and Atmosphere (EA)

Regional Builder Option Packages (e.g. Hawaii, Pacific Northwest)

Clarification: If a project is meeting a regional Builder Option Package (BOP) but not meeting the prerequisites in the prescriptive approach (i.e. EA 2 – 10), the regional BOP can be used to satisfy EA 1.1. (An example of a regional BOP is the Pacific Northwest BOP.) In the case of a project that only minimally complies with a regional BOP, the project may only earn EA points for meeting the requirements of EA 7.1, 7.2, and 11.2. (EA 0-14; EA 04-10; EA 07-21).

EA 1.1 – Performance of Energy Star for Homes

Clarification: The performance requirements of Energy Star for Homes 2006 are published on the EPA website and include: 1) HERS Index of 80 or lower in climate zones 6-8 or HERS Index of 85 or lower in climate zones 1-5; 2) completed Thermal Bypass Inspection Checklist, including slab-edge insulation in climate zones 4+; 3) duct leakage of less than 6 CFM to outdoors per 100 sq. ft.; 4) at least one Energy Star qualified product (heating or cooling equipment; windows; 5 or more labeled light fixtures, appliances, or ventilation fans); 5) indoor and outdoor coils must be matched, in accordance with AHRI standards; 6) adaptive recovery for any programmable thermostats installed in homes with a heat pump; and 7) maximum oversizing limit for air conditioners and heat pumps is 15%, with the exception of heat pumps in Climate Zones 5-8, where maximum oversizing is 25%). (EA 01-25)

Clarification: EA 1.1 includes the requirement to meet the performance requirements of ENERGY STAR for Homes 2006. For example, in Florida homes must meet a HERS Index of 85; credit is awarded for a lower HERS Index in EA 1.2. (EA 01-23)

Clarification: Energy Star for Homes does not allow projects to meet the minimum HERS Index with renewable power systems. However, solar thermal domestic hot water systems may be used to meet the minimum HERS Index requirement. (EA 01-36)

Clarification: It is acceptable to create a HERS Index for the worst-case home in the building, or the worst-case home among multiple attached single-family homes. The EPA guidelines should be used, including the worst-case among the units for exposed wall area, window-to-floor area ratio. Performance tests (e.g. blower door test, duct blaster test) must be completed on every home (except where sampling is applicable), and the HERS Index must include the worst-case performance test results from among all homes included in the batch. (EA 01-38)

Clarification: According to the EPA, homes with uninsulated walls may meet the performance requirements of ENERGY STAR for Homes. There is no explicit requirement in the Thermal Bypass Checklist (TBC) that walls must be insulated; TBC requirements relate to air barrier details in walls where insulation does exist. Note that the slab edge insulation requirement in the current TBC would still apply to slab-on-grade construction in Climate Zones 4 and higher. (EA 02-12)

Clarification: A Manual J (or equivalent) calculation is required for each unit in multi-family or multi-home projects. It may be possible to re-use a Manual J calculation, but only if the units have the same or very similar design (including size, orientation, exposure, and energy-efficiency measures) such that they would be expected to have the same loads.

Clarification: Although Manual J & D calculations are not required for ductless projects, calculations must be performed to determine the room-by-room loads based on specific features of the home and to determine how to size the distribution system to satisfy these loads. In the case where individual heating and cooling units are used in each room (e.g. radiant floor heating, mini-splits), the distribution requirement may be satisfied by performing the load calculations and then following manufacturer's guidance to meet these loads.

EA 2.1 – Basic Insulation

Clarification: For part (b) in historic homes, gut-rehab homes, or other cases where part of an exterior wall cavity is inaccessible, LEED for Homes follows the guidance provided by EPA in Note 1 of the TBC: "verification of measures in the thermal bypass inspection checklist (TBC) are subject to the judgment and discretion of the energy rater." If an energy rater is satisfied that the methodology and results of infrared testing on a project meet the TBC requirements, this is acceptable. Similarly, if the home energy rater is satisfied that a specific approach to blown-in insulation meets the TBC requirements on a project, this is acceptable. (EA 02-06; EA 02-14)

Clarification: According to the EPA, the slab-edge insulation requirement in the TBC only applies to slab-on-grade floors with a floor surface less than 12" below grade. Basements are typically exempted under this definition, except for walkout basements. However, EPA also allows up to 25% of the slab edge to be uninsulated. (EA 02-19)

EA 6.1 – Good HVAC Design and Installation

Update: To meet EA 6.1(c), programmable thermostats are no longer required to be ENERGY STAR labeled.

Clarification: The note indicates that homes with no air-conditioning must follow the performance approach (e.g. EA 1). Homes with no heating must also follow the performance approach, and may not use the prescriptive pathway.

Clarification: Part (b) requires that the HVAC equipment meet or exceed the performance specifications in the ENERGY STAR national BOP. This includes the following requirements not mentioned in the Rating System: 1) homes with heat pumps and programmable thermostats must have adaptive recovery; 2) "Indoor and outdoor coils shall be matched in accordance with ARI standards"; and 3) "Maximum oversizing limit for air conditioners and heat pumps is 15% - with the exception of heat pumps in Climate Zones 5 - 8, where the maximum oversizing limit is 25%." (EA 06-21; EA 06-29; EA 06-30)

Clarification: A Manual J (or equivalent) calculation is required for each unit in multi-family or multi-home projects. It may be possible to re-use a Manual J calculation, but only if the units have the same or very similar design (including size, orientation, exposure, and energy-efficiency measures) such that they would be expected to have the same loads.

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EA 7.1 – Efficient Hot Water Distribution

Clarification: Partial credit (1 point) is awarded if a project meets part (a) – structured plumbing system - sections i, iii, and iv. (EA 07-20)

Clarification: Pot-fillers can be left out of this equation if they are *not* located above a sink or drain. (EA 07-14)

Clarification: For EA 7.1, determine ceiling height by measuring the floor-to-floor distance. (EA 07-22b)

Interpretation: No additional branch length should be allowed for homes with a basement, and a basement should not be considered an additional story for EA 7.1. *Enforced for all projects registered after January 1, 2010.* (EA 07-32)

Clarification: Part (a) can be met using multiple loops that extend from a single water heater. EA 7.1 (b) and (c) can be met with multiple water heaters. (EA 07-27; EA 07-28)

Clarification: For parts (a-iii), (b-iii), and (c-i), calculate the length of installed pipe from the circulation loop, manifold, or water heater to the furthest fixture. Any 3/8" diameter piping

should be counted at half the length of ½" diameter pipe when calculating maximum branch length; check local code for compliance. (EA 07-29)

Clarification: For part (c-i) in a multi-story home, the maximum allowable branch length differs for each story. Branches to 1st floor fixtures may not exceed 20 feet; branches to 2nd story fixtures may not exceed 20 feet + 1x the story height; branches to 3rd story fixtures may not exceed 20 feet + 2x the story height; etc. (EA 07-23)

Clarification: For part (a-iv), motion sensors are an acceptable alternative to push button controls as long as the motion sensor is designed to activate the demand-controlled pump and there is a time delay after the initial trigger to shut off the pump. The sensor should be installed in a way that the pump is only activated if someone is very close to the faucet or shower.

Interpretation: Basements should not be considered an additional story for EA 7.1 No additional branch length should be allowed for basements. *Enforced for all projects registered after January 1, 2010.* (EA 07-32)

EA 7.2 – Pipe Insulation

Clarification: In order to earn this point, all hot water pipes not used for direct space heating (e.g. radiative floor heating) must meet the requirements of the credit, including sub-slab hot water pipes. (EA 07-16)

EA 8.3 – Advanced Lighting Package

Correction: The second part of the credit, "Install Energy Star labeled lamps in 80% of the fixtures" ought to be "At least 80% of all lamps in the home must be Energy Star labeled." This may affect the requirement of the credit where fixtures include multiple lamps. *Enforced for all projects registered after January 15, 2009.*

Exemplary Performance: Projects can earn 1 ID point for the use of 90% ENERGY STAR fixtures (i.e. not just lamps) and 100% ENERGY STAR ceiling fans. (EA 08-18)

Interpretation: According to EPA, in multi-family buildings the Advanced Lighting Package only applies to in-unit spaces, not corridor or outdoor public lighting. *Enforced for all projects registered after January 1, 2010.* (EA 08-22)

EA 11.1 – Refrigerant Charge Test

Clarification: Split systems, even those that are pre-charged, must have a refrigerant charge test to satisfy EA 11.1. This prerequisite is only waived for ground-source heat pumps that are pre-charged and sealed. (EA 11-04; EA 11-05)

Materials and Resources (MR)

MR 1.2 / 1.3 – Detailed Framing Documents / Cut List & Lumber Order

Clarification: Projects with a precut framing package (e.g. kit homes) are awarded MR 1.2 and MR 1.3 automatically. Modular homes or any projects earning MR 1.5 cannot earn MR 1.2 or MR 1.3. (MR 01-41)

Clarification: This credit can be earned by projects with non-wood frames if the requirements are met for the relevant structural material. (MR 01-39)

Clarification: For gut-rehab projects, if 90% of the interior and exterior framing for the final LEED home (i.e., not the original home) is salvaged or maintained, both MR 1.2 and MR 1.3 should be awarded automatically. (MR 01-42)

MR 1.4 – Framing Efficiencies

Clarification: The requirements of this credit only apply to exterior framing.

Clarification: If the requirements are met in only 50% of the walls (by area), half credit can be awarded. (MR 01-29)

MR 1.5 – Off-Site Fabrication

Clarification: This credit should only be awarded if the walls, roof, and floor are all fabricated off-site. A combination of panelized walls, roof trusses, and floor trusses satisfies this credit. If only the walls are panelized, 2 points should be awarded under MR 1.4. (MR 01-40)

Clarification: This credit can be awarded to homes with pre-cut SIPs in the walls, roof, and floor. If SIPs are cut on-site, or only used in walls and/or roof, no points should be awarded for this credit; points may be awarded in MR 1.4 instead. (MR 01-37)

Clarification: This credit can be awarded to homes with concrete panelized wall systems if they are formed and poured off-site. (MR 01-36)

Exemplary Performance: Projects that earn MR 1.5 may not be awarded credit for MR 1.2 or MR 1.3. Projects that earn MR 1.5 can earn exemplary performance for incorporating advanced framing strategies into panelized or modular construction. Projects may be awarded as many as 2 points in ID 3 for the following: (MR 01-47)

- Open-web floor trusses – ½ point
- Stud spacing greater than 16” o.c. – ½ point
- Two of the following – ½ point; all four of the following – 1 point:
    - Ceiling joist spacing greater than 16” o.c.
    - Floor joist spacing greater than 16” o.c.
    - Roof rafter spacing greater than 16” o.c.
    - 2 of the following: size headers for actual loads; user ladder blocking or drywall clips; use 2-stud corners

MR 2.1 – FSC Certified Tropical Wood

Interpretation: Finished products that are verified with any of the FSC designations (e.g., FSC Pure, FSC Mixed Source, FSC Mixed Credit, FSC Recycled) can be considered "FSC certified" for this prerequisite. This is not the case if only part of the finished product is verified with one of the FSC designations. *Enforced for all projects registered after January 1, 2010.* (MR 02-117; MR 05-15)

Clarification: FSC Chain of Custody must be intact until the point of purchase by the project team. Project team contractors and subcontractors do not need to have Chain of Custody. (MR 02-121)

MR 2.2 – Environmentally Preferable Materials

Clarification: For part (a), the following product types also qualify: (MR 02-65; MR 02-58; MR 02-64; MR 02-63; MR 02-73; MR 02-39; MR 02-103):

Assembly	Component	EPP specification (0.5 point per component)
Foundation	Aggregate	Recycled content of 25% post-consumer (no credit for post-industrial recycled content)
Interior wall	Framing	Finger-joist studs
Interior wall AND ceilings	Gypsum	Recycled content of 10% post-consumer OR 95% post-industrial
Other	Cabinets	Bamboo w/ no added urea-formaldehyde resins
Other	Perimeter fencing *(new)*	Recycled content, reclaimed, or FSC-certified
Other	DHW supply piping *(new)*	Polypropylene or PEX
Other	Driveway *(new)*	Reclaimed, recycled, FSC-certified, or 30% flyash/slag

Interpretation: Products that are verified as FSC Pure, FSC Mixed Credit, FSC Mixed Source, or FSC Mixed NN% may be treated as "FSC certified". Products that are verified as FSC Recycled or FSC Recycled credit earn EPP credit as recycled-content materials. This is not the case if only part of the finished product is verified with one of the FSC designations. *Enforced for all projects registered after January 1, 2010.* (MR 02-117; MR 05-15)

Clarification: For the component "Other: Trim" – this only refers to interior trim, not exterior trim. (MR 02-57)

Clarification: For the component "Floor: Flooring", wool carpet is an acceptable alternative to meet the EPP specification. (MR 02-120)

Interpretation: For the component "Floor: Flooring", a project can earn credit for low-emissions flooring if a) at least 90% of the flooring is CRI Green Label Plus carpet with CRI Green Label pad, OR b) at least 90% of the flooring is hard surface flooring, OR c) at least 90% of the flooring is a combination of CRI Green Label Plus carpet (with Green Label pad) and hard surface flooring. *Enforced for all projects registered after January 1, 2010.* (MR 02-72; MR 02-119)

Clarification: For the component "Roof and Floor and Wall: Insulation" – this only refers to cavity insulation, not rigid sheathing insulation. It does apply to integrated cavity insulation, such as in SIPs and ICFs. (MR 02-59).

Clarification: For the component "Interior Walls and Ceilings and Millwork: Paints and Coatings", points may only be awarded if all of the paints and coatings used in the interior of the home meet the requirements. Pre-finished surfaces should be assumed to satisfy the emissions specification. (MR 02-84)

Clarification: For part (a), Cradle-to-Cradle (C2C) certification is an acceptable alternative for any component. Credit cannot be granted for being C2C certified and also meeting the existing criteria (e.g. recycled-content, reclaimed, FSC).

Clarification: For part (c), 90% of a given product must have its entire lifecycle within 500 miles to be awarded credit. For example, even the petroleum in insulation products must be verified as being sourced from within 500 miles of the project.

Clarification: Both ICFs and SIPs should be treated as two different components – framing and insulation. If the requirements for either or both components are met, points should be awarded accordingly. (MR 03-04)

Clarification: Garage floors (for both conditioned and unconditioned garages) should not be included in the calculation for EPP, low-emissions, or local flooring. (MR 02-101)

Clarification: The component "decking or patio material" should be re-labeled as "Decking AND patio". If both decking and patio exist on site, at least 90% of the material in both must meet EPP requirements for EPP credit, or local for local credit. For this component, materials containing 30% fly-ash/slag as a substitute for cement qualify for EPP credit. This credit can still be awarded for projects with only a deck or a patio, as long as the requirements are met. (MR 02-103)

Exemplary Performance: The following product types qualify for exemplary performance credit for 1 point total (i.e., 0.5 point in MR 2.2, 0.5 point in ID 3) (MR 02-96; MR 02-97)

Assembly	Component	Requirement for credit in MR 2.2 (1/2 pt each)	Requirement for Exemplary Performance (1/2 pt each)
Foundation	Cement	30% flyash / slag	50% flyash/slag
Exterior wall	Framing/ wall structure	30% flyash / slag	50% flyash/slag
Roof, floor,	Sheathing	Recycled content, FSC-	Recycled content, FSC-

wall		certified, or reclaimed material in 2 of 3 (roof/floor/wall)	certified, or reclaimed material in 3 of 3 (roof/floor/wall)

MR 3.2 – Construction Waste Reduction

Clarification: Acceptable strategies for waste diversion include: (MR 03-13; MR 03-24)

- Recycling
- Third-party scrap reuse
- On-site grinding of engineered lumber, untreated cellulosic material, and gypsum for use as a soil amendment

Clarification: Strategies that cannot be counted as diversion include: (MR 03-13; MR 03-21)

- Scrap reuse by the builder
- Burying unground material on-site
- Packing unused material into wall cavities
- Grinding treated / finished wood as soil amendment
- Incineration, even waste-to-energy applications

Indoor Environmental Quality (EQ)

EQ 1 – ENERGY STAR with Indoor Air Package

Update: LEED for Homes will treat certification under Indoor airPLUS (the USEPA's replacement for Indoor Air Package) as equivalent to certification under the Indoor Air Package: EQ 1 earned with Indoor airPLUS is worth 13 points. Projects registered after June 23, 2009 must use Indoor airPLUS to earn EQ 1. (EQ 01-03)

EQ 2.1 – Basic Combustion Venting Measures

Clarification: Part (c) is satisfied if the fireplace has a solid glass enclosure.

Clarification: In multi-family buildings, CO monitors must be installed in each unit, on each floor (if individual units have multiple floors).

EQ 2.2 – Enhanced Combustion Venting Measures

Clarification: Projects with masonry wood-burning fireplaces can earn 1 point for either meeting the requirements for a masonry heater OR passing the backdraft potential test. These projects must meet the requirements for a masonry heater AND pass the backdraft potential test to earn 2 points. (EQ 02-23)

EQ 3 – Moisture Load Control

Clarification: Dehumidification equipment is not required to maintain RH <60% for every hour of the year; projects are granted some discretion. When determining latent loads to include, use ASHRAE Fundamentals or a comparable standard. Loads should include outdoor loads from ventilation and air leakage, as well as indoor loads from showers, cooking, etc. (EQ 03-06).

EQ 4.1 – Basic Ventilation

Correction: EQ 4.1 references ASHRAE Std. 62.2-2007, but the exemption in part (a) references infiltration degree days, which are not included in Std. 62.2-2007. The only exemptions allowed within LEED for Homes are those listed in ASHRAE Std. 62.2-2007. Homes with fewer than 4,500 infiltration degree days *are no longer exempt from the ventilation requirements*. The exemptions listed in ASHRAE Std. 62.2-2007 are the following: *Enforced for all projects registered after January 1, 2010.* (EQ 04-23)

a) buildings in zone 3B or 3C of the IECC 2004/2007 Climate Zone Map;
b) buildings with no mechanical cooling that are located in zone 1 or 2 of the IECC 2004/2007 Climate Zone Map; and
c) buildings that are thermally conditioned for human occupancy for less than 876 hours per year.

Clarification: For part (c), ASHRAE Std 62.2, section 4.4 provides guidance on how to calculate ventilation rates for systems that operate intermittently. Please review the standard; a system that operates infrequently must compensate with a larger fan flow rate. (EQ 04-27)

Clarification: For part (d) – passive ventilation - Green Raters must verify some evidence (e.g., model results, calculations, or on-site test results) that the design will yield air flows equivalent to those required by ASHRAE Std. 62.2. Design features are not sufficient. Operable windows and natural infiltration is not sufficient, because the air flows in Std. 62.2 already assume natural infiltration rates. If passive ventilation is used, the project team should submit its strategy to the EQ TASC for research and information purposes. (EQ 04-26)

EQ 5.1 – Basic Local Exhaust

Clarification: Part (d) is waived for bathrooms with an ERV or HRV. (EQ 05-11)

Clarification: As written, ASHRAE Standard 62.2 (and LEED for Homes) requires local exhaust in the kitchen that meets the following: If the fan capacity produces fewer than 5 kitchen ACH, the exhaust must be provided by a range hood and meet the 100 CFM requirement in Std. 62.2; If the fan capacity produces greater than 5 kitchen ACH, the exhaust may be a non-range hood, but must be located in the kitchen. (EQ 05-16)

EQ 5.2 – Enhanced Local Exhaust

Clarification: This credit can be awarded if the requirements are met for all bathrooms with showers, bathtubs, or spas (i.e. half-baths are excluded). (EQ 05-12)

Interpretation: For EQ 5.2, timers should be set to operate exhaust fans for at least 20 minutes after showering. *Enforced for all projects registered after January 1, 2010.* (EQ 05-13)

EQ 6.1 – Room-by-Room Load Calculations

Clarification: For ductless systems, a Manual D calculation is not required but some calculations are required for room-by-room loads based on specific features of the home and calculations are required to demonstrate that the loads are met based on the distribution system installed (e.g. hot water piping).

Clarification: If the Total Equivalent Length cannot be verified, it's acceptable to verify an equivalent calculation for the friction coeffecient or pressure drop over the ductwork. TEL is one way to estimate pressure drop over ductwork, but there are other methods.

EQ 7 – Air Filtering

Clarification: Mini-split systems and PTAC units are not ducted, but they must meet the requirements of EQ 7.1. Section B only applies to homes with hydronic systems.

Clarification: The air filter requirement is waived for HRV and ERV systems. If a home includes a forced-air AHU and an HRV or ERV, the AHU must still meet the prerequisite in EQ 7.1. (EQ 07-08)

Clarification: For EQ 7.1, air filters meeting the minimum MERV requirement are required on both air-handling equipment and mechanical supply ventilation systems. (EQ 07-15)

Clarification: Projects with a mechanical supply ventilation system that is separate from the AHU (i.e. outdoor air does not come through the AHU) can earn EQ 7.2 and 7.3 if only the mechanical ventilation system meets the credit requirements. The AHU still must meet the requirements of EQ 7.1. (EQ 07-16)

Clarification: Non-ducted HVAC systems such as PTACs and mini-splits are exempt from EQ 7.1 per the requirements of ASHRAE Standard 62.2-2007, section 6.7. The LEED Steering Committee approved this clarification on 9/10/09, reversing a previous ruling. (EQ 07-13)

EQ 8.1 – Indoor Contaminant Control During Construction

Clarification: This credit should not be awarded automatically to projects with nonducted systems. Projects with nonducted systems must submit a CIR to earn this point; within the CIR, the project must demonstrate an effort to reduce construction pollutant exposure to occupants. Examples include covering radiators or mini-split air handler units during construction, and implementing a thorough cleaning program of all equipment. (EQ 08-11)

EQ 8.2 – Indoor Contaminant Control

Clarification: For part (a), walk-off mats must be at least 4 feet long in the primary direction of travel. (EQ 08-23)

EQ 9 – Radon Protection

Clarification: The requirements for radon protection are automatically satisfied if the home is elevated by at least 2 ft. with open air space between the home and ground. An open-air garage under a multi-family building is an acceptable alternative. (EQ 09-13; EQ 09-07)

Interpretation: Radon-resistant new construction includes five components: 1) gas-permeable layer; 2) heavy-gauge plastic sheeting; 3) sealing and caulking of all penetrations through the concrete slab; 4) vent pipe that exhausts gases to the outside through side wall or roof; and 5) electrical outlet near vent piping. It is not acceptable to cap the exhaust pipe inside the home. *This ruling adds to a previous ruling published in the January 15, 2009 Errata & Clarifications document; new aspects of the ruling must be enforced for all projects registered after January 1, 2010.* (EQ 09-11; EQ 09-16)

Clarification: Gut-rehab projects must do one of the following (EQ 09-06):

1. Meet the requirements in ASTME-2121, which includes: install passive radon-resistant infrastructure, including piping through slab that connects to exterior through sidewall or roof. In this case, the area under the slab must be tested for connectivity, to ensure the piping accommodates the entire sub-slab area. Depending on sub-slab connectivity, multiple source pipes may be needed. In this case, a post-construction test is still strongly recommended.

2. Conduct radon testing. If the test shows minimal radon risks, no further action is required. If the test shows an unacceptable radon risk, an active radon mitigation system is required. See EQ 09-15 for details about how to conduct the testing. USGBC follows the EPA recommendations on radon testing. See www.epa.gov/radon/pubs/citguide.html for details.

Clarification: For projects in Canada, the prerequisite is to have the home tested for radon OR install radon resistant new construction. If the project installs an active sub-slab or sub-membrane depressurization system, 1 point can be awarded under EQ 9.2. (EQ 09-08)

EQ 10.1 – No HVAC in Garage

Clarification: Multi-family buildings must meet the requirements in EQ 10-09a. Where a diagnostic test showing minimal air flow is not possible, the project team must still fully air seal the AHU closet but verification of the air sealing can be conducted visually by the Green Rater.

Clarification: An air handler unit may be not be located in a mechanical closet or room that only opens into the garage unless the following are met: 1) the mechanical closet that holds the AHU is fully isolated from the garage; 2) the mechanical closet is directly connected to the living space or outdoors; 3) the doors to the mechanical closet are sealed and gasketed; 4) the doors to the mechanical closet are either self-closing OR tied to a trigger that prevents the AHU from operating when the doors are open OR clear signage is posted to keep the doors closed at all times and the homeowner or building manager is trained on the importance of keeping garage air out of the mechanical closet; and 5) a 3rd party has verified (using a blower door test) that the mechanical closet has less than 2 Pa of connection to the garage when the house is depressurized to 50 Pa.

Clarification: If a project has two completely separate HVAC systems (i.e. no shared ductwork, no shared AHU, etc.), one for the garage and one for the home, then it is okay to have the HVAC system that only accommodates the garage located in the garage itself.

EQ 10.2 – Minimize Pollutants from Garage

Correction: Part a-iii – to paint garage walls and ceilings - is not required by any project as a condition for earning EQ 10.2. *Enforced for all projects registered after January 1, 2010.* (EQ 10-13)

Awareness & Education (AE)

AE 1.1 - Basic Operations Training

Clarification: It is acceptable to provide the O&M manual in a digital format (e.g. cd or dvd), but tenants should be able to request and receive a printed copy if they are unable to access or read the information in digital format. (AE 01-07)

AE 1.2 – Enhanced Training

Correction: AE 1.2 may only be awarded for training the actual homebuyer or occupant. AE 1.2 may be awarded even if a homebuyer has not yet been identified, but the project team must have a planned training program and it must focus on the actual homebuyer and not just prospective homebuyers. *Enforced for all projects registered after January 1, 2010.*(AE 01-09)

AE 1.3 – Public Awareness

Exemplary Performance: No exemplary performance is available. (AE 01-01)

AE 2 – Education of Building Manager

Clarification: This credit can be awarded to multi-home, single-family developments, but only if there are permanent staff involved with ongoing operations and maintenance.

Clarification: This credit cannot be earned by single-family projects. If someone other than the tenant or occupant is responsible for operation and maintenance of the home, that responsible party should be trained as per the requirements of AE 1.1, and credit can be awarded in AE 1.2, not AE 2. (AE 02-01)

Appendix A:
Updates, Corrections, and Interpretations,
Organized by Release Date:

Published April 1, 2013, enforced for all projects registered after 4/1/2013:

General

Clarification: As a response to growing international interest in residential green building and LEED for Homes, USGBC has launched an international pilot. Project teams outside the United States and Canada may now apply to participate in the international pilot. If selected, project teams will need to coordinate with USGBC and an approved LEED for Homes Green Rater on meeting the program, verification and certification submittal requirements of the LEED for Homes rating system. This process will include determining Alternative Compliance Pathways (ACPs). For more information on the International Pilot and the process for certification please visit usgbc.org. Canadian projects should pursue LEED Canada for Homes, offered by the CAGBC. Any project located in Canada that registered with LEED for Homes prior to the release of LEED Canada for Homes can be certified under LEED for Homes.

Home Size Adjuster (HSA)

Clarification: Unique residential projects that do not meet the intent of a single family home but are also not being built like a multifamily building, such as fraternity houses and assisted living facilities, may submit a CIR and will be ruled on a case by case basis. Rulings will ensure the HSA is not over-penalizing or over-rewarding projects. Possible rulings include but are not limited to: allowing projects to add common space into the average unit size and then using the multifamily HSA and allowing projects to use a HSA of 0.

EQ 10.1 – No HVAC in Garage

Clarification: Multi-family buildings must meet the requirements in EQ 10-09a. Where a diagnostic test showing minimal air flow is not possible, the project team must still fully air seal the AHU closet but verification of the air sealing can be conducted visually by the Green Rater.

Clarification: An air handler unit may be not be located in a mechanical closet or room that only opens into the garage unless the following are met: 1) the mechanical closet that holds the AHU is fully isolated from the garage; 2) the mechanical closet is directly connected to the living space or outdoors; 3) the doors to the mechanical closet are sealed and gasketed; 4) the doors to the mechanical closet are either self-closing OR tied to a trigger that prevents the AHU from operating when the doors are open OR clear signage is posted to keep the doors closed at all times and the homeowner or building manager is trained on the importance of keeping garage air out of the mechanical closet; and 5) a 3rd party has verified (using a blower door test) that the mechanical closet has less than 2 Pa of connection to the garage when the house is depressurized to 50 Pa.

Clarification: If a project has two completely separate HVAC systems (i.e. no shared ductwork, no shared AHU, etc.), one for the garage and one for the home, then it is okay to have the HVAC system that only accommodates the garage located in the garage itself.

Published January 1, 2010, enforced for all projects registered after 1/1/2010:

Home Size Adjuster (HSA)

Interpretation: When determining the square footage of the home for the HSA, include all directly conditioned space within the thermal boundary, calculated to the exterior wall. Include all normal living spaces and service areas (e.g., garages, utility rooms, closets, entries, crawl spaces, attics, basements) that are within the thermal boundary and meet ANSI Z765 requirements for ceiling height EXCEPT those that are separated from primary living spaces by insulated, weatherstripped doors AND are neither directly heated nor cooled. In the rare case of mild climates where normal living spaces in the home are neither heated nor cooled, include all spaces that are reasonably expected to be used as living areas or are normal adjuncts to living areas, such as closets, utility rooms, entries, etc. *Enforced for all projects registered after January 1, 2010.*

LL 3.1 / 3.2 – Edge Development / Infill

Interpretation: LL 3.3 may only be awarded if 75% of the total buildable land for the project was previously developed. This applies to single-family and multi-family projects. If the LEED home is built on the footprint of a previously existing structure, but this footprint comprises less than 75% of the total buildable land, LL 3.3 should not be awarded. *Enforced for all projects registered after January 1, 2010.* (LL 03-11)

LL 6 – Access to Open Space

Interpretation: The distance requirements must be calculated based on walking distances, not "as the bird flies". For example, if a community-based open space is within ½ mile on a map, but requires >½ mile of walking because of highways or other obstructions, it cannot be counted. *Enforced for all projects registered after January 1, 2010.* (LL 06-04)

SS 2.2 – Landscaping

Interpretation: The Glossary definition of "Conventional Turf" refers to "considerable watering, mowing, and/or fertilizers." The intent is that any turfgrass that requires routine watering, mowing, or fertilizers should be considered conventional for the purposes of SS 2.3. Even turf identified as drought-tolerant may qualify as "conventional" for the purposes of SS 2.3. Further guidance on differentiating grasses for LEED for Homes is forthcoming from USGBC. *Enforced for all projects registered after January 1, 2010.*

Interpretation: For SS 2.5, if a grass has almost no mowing requirements (i.e., does not need to be mowed more than once or twice a year) and has no fertilizer / chemical requirements, the species may be treated as a groundcover in the calculation, which means a species factor (Ks) between 0.2 and 0.7 may be chosen. For all other cases, a species factor (Ks) between 0.6 and 0.8 must be chosen. *Enforced for all projects registered after January 1, 2010.*

Interpretation: Credits in the SS & WE categories may only be awarded if there is permanent designed landscape. The soil or "ground" does not need to be native or pre-existing, and may be

located over a podium or as part of a vegetated roof, but vegetation in planters cannot be used to meet the credit requirements. *Enforced for all projects registered after January 1, 2010.*

Interpretation: For projects that choose or are only able to install 50% of the designed landscaping, points are available in the following way (credit requirements must be met in order for points to be awarded): *Enforced for all projects registered after January 1, 2010.* (SS Gen-25)

- SS 3 – half credit is available, but all hardscapes must be installed and the hardscapes must meet the requirements through shading of installed vegetation or SRI values;
- SS 4.1 - Half credit available. All final hardscapes must be installed, including driveways, walkways, patios, etc.
- SS 4.2 - Full credit available, if all relevant erosion control measures are installed.
- SS 4.3 - Full credit available, if all relevant stormwater controls are installed.
- WE 1 – Full credit is available. In the case of WE 1.1 for outdoor applications, the project team must submit a calculation demonstrating that the installed landscaping will need at least as much water as what will be collected for re-use.
- WE 2.1 and WE 2.2 – Half credit available, based on irrigation measures installed to serve installed landscaping.

SS 4.1 – Permeable Lot

Correction: The calculation for this credit should include all buildable land, not "built environment". *Enforced for all projects registered after January 1, 2010.* (SS 04-19)

Interpretation: Non-vegetated natural groundcover (e.g., bare mulch, pine straw) can be used to earn credit SS 4.1, but it must meet the requirements under SS 4.1 part (b). *Enforced for all projects registered after January 1, 2010.* (SS 02-34)

SS 5 – Nontoxic Pest Control

Interpretation: A project with a non-cellulosic structure can meet part (a) if all wood, including siding, trim, etc. meet the credit requirements. *Enforced for all projects registered after January 1, 2010.* (SS 05-20)

EA 6.1 – Good HVAC Design and Installation

Update: To meet EA 6.1(c), programmable thermostats are no longer required to be ENERGY STAR labeled.

EA 7.1 – Efficient Hot Water Distribution

Interpretation: No additional branch length should be allowed for homes with a basement, and a basement should not be considered an additional story for EA 7.1. *Enforced for all projects registered after January 1, 2010.* (EA 07-32)

Interpretation: Basements should not be considered an additional story for EA 7.1 No additional branch length should be allowed for basements. *Enforced for all projects registered after January 1, 2010.* (EA 07-32)

EA 8.3 – Advanced Lighting Package

Interpretation: According to EPA, in multi-family buildings the Advanced Lighting Package only applies to in-unit spaces, not corridor or outdoor public lighting. *Enforced for all projects registered after January 1, 2010.* (EA 08-22)\

MR 1.5 – Off-Site Fabrication

Exemplary Performance: Projects that earn MR 1.5 may not be awarded credit for MR 1.2 or MR 1.3. Projects that earn MR 1.5 can earn exemplary performance for incorporating advanced framing strategies into panelized or modular construction. Projects may be awarded as many as 2 points in ID 3 for the following: (MR 01-47)

- Open-web floor trusses – ½ point
- Stud spacing greater than 16" o.c. – ½ point
- Two of the following – ½ point; all four of the following – 1 point:
    - Ceiling joist spacing greater than 16" o.c.
    - Floor joist spacing greater than 16" o.c.
    - Roof rafter spacing greater than 16" o.c.
    - 2 of the following: size headers for actual loads; user ladder blocking or drywall clips; use 2-stud corners

MR 2.1 – FSC Certified Tropical Wood

Interpretation: Finished products that are verified with any of the FSC designations (e.g., FSC Pure, FSC Mixed Source, FSC Mixed Credit, FSC Recycled) can be considered "FSC certified" for this prerequisite. This is not the case if only part of the finished product is verified with one of the FSC designations. *Enforced for all projects registered after January 1, 2010.* (MR 02-117; MR 05-15)

MR 2.2 – Environmentally Preferable Materials

Interpretation: Products that are verified as FSC Pure, FSC Mixed Credit, FSC Mixed Source, or FSC Mixed NN% may be treated as "FSC certified". Products that are verified as FSC Recycled or FSC Recycled credit earn EPP credit as recycled-content materials. This is not the case if only part of the finished product is verified with one of the FSC designations. *Enforced for all projects registered after January 1, 2010.* (MR 02-117; MR 05-15)

Interpretation: For the component "Floor: Flooring", a project can earn credit for low-emissions flooring if a) at least 90% of the flooring is CRI Green Label Plus carpet with CRI Green Label pad, OR b) at least 90% of the flooring is hard surface flooring, OR c) at least 90% of the flooring is a combination of CRI Green Label Plus carpet (with Green Label pad) and hard surface flooring. *Enforced for all projects registered after January 1, 2010.* (MR 02-72; MR 02-119)

EQ 1 – ENERGY STAR with Indoor Air Package

Update: LEED for Homes will treat certification under Indoor airPLUS (the USEPA's replacement for Indoor Air Package) as equivalent to certification under the Indoor Air Package: EQ 1 earned with Indoor airPLUS is worth 13 points. Projects registered after June 23, 2009 must use Indoor airPLUS to earn EQ 1. (EQ 01-03)

EQ 4.1 – Basic Ventilation

Correction: EQ 4.1 references ASHRAE Std. 62.2-2007, but the exemption in part (a) references infiltration degree days, which are not included in Std. 62.2-2007. The only exemptions allowed within LEED for Homes are those listed in ASHRAE Std. 62.2-2007. Homes with fewer than 4,500 infiltration degree days *are no longer exempt from the ventilation requirements*. The exemptions listed in ASHRAE Std. 62.2-2007 are the following: *Enforced for all projects registered after January 1, 2010.* (EQ 04-23)

a) buildings in zone 3B or 3C of the IECC 2004/2007 Climate Zone Map;
b) buildings with no mechanical cooling that are located in zone 1 or 2 of the IECC 2004/2007 Climate Zone Map; and
c) buildings that are thermally conditioned for human occupancy for less than 876 hours per year.

EQ 5.2 – Enhanced Local Exhaust

Interpretation: For EQ 5.2, timers should be set to operate exhaust fans for at least 20 minutes after showering. *Enforced for all projects registered after January 1, 2010.* (EQ 05-13)

EQ 9 – Radon Protection

Interpretation: Radon-resistant new construction includes five components: 1) gas-permeable layer; 2) heavy-gauge plastic sheeting; 3) sealing and caulking of all penetrations through the concrete slab; 4) vent pipe that exhausts gases to the outside through side wall or roof; and 5) electrical outlet near vent piping. It is not acceptable to cap the exhaust pipe inside the home. *This ruling adds to a previous ruling published in the January 15, 2009 Errata & Clarifications document; new aspects of the ruling must be enforced for all projects registered after January 1, 2010.* (EQ 09-11; EQ 09-16)

EQ 10.2 – Minimize Pollutants from Garage

Correction: Part a-iii – to paint garage walls and ceilings - is not required by any project as a condition for earning EQ 10.2. *Enforced for all projects registered after January 1, 2010.* (EQ 10-13)

AE 1.2 – Enhanced Training

Correction: AE 1.2 may only be awarded for training the actual homebuyer or occupant. AE 1.2 may be awarded even if a homebuyer has not yet been identified, but the project team must have a planned training program and it must focus on the actual homebuyer and not just prospective homebuyers. *Enforced for all projects registered after January 1, 2010.*(AE 01-09)

Published January 15, 2009, enforced for all projects registered after 1/15/2009:

LL 5 – Community Resources / Transit

Interpretation: The distance requirements must be calculated based on walking distances, not "as the bird flies". For example, if a resource is within ½ mile on a map, but requires >½ mile of walking because of highways or other obstructions, the resource should not be counted. *Enforced for all projects registered after January 15, 2009.*

SS 3 – Local Heat Island Effect

Correction: Gray concrete (part ii) is not an acceptable approach to earning this credit unless it is demonstrated to have an SRI of at least 29. *Enforced for all projects registered after January 15, 2009.* (SS 03-04)

EA 8.3 – Advanced Lighting Package

Correction: The second part of the credit, "Install Energy Star labeled lamps in 80% of the fixtures" ought to be "At least 80% of all lamps in the home must be Energy Star labeled." This may affect the requirement of the credit where fixtures include multiple lamps. *Enforced for all projects registered after January 15, 2009.*

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Please note that the builder (or primary project manager) is solely responsible for choosing LEED for Homes features that are appropriate for the home and for their proper installation. USGBC and its representatives are responsible only for verifying the completion of LEED for Homes requirements as set forth in the LEED for Homes Rating System; such verification in no way constitutes a warranty as to the appropriateness of the selected LEED for Homes measures or the quality of implementation.

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Overview of LEED for Homes

LEED for Homes is an initiative designed to promote the transformation of the mainstream homebuilding industry toward more sustainable practices. LEED for Homes is targeting the top 25% of new homes with best practice environmental features. LEED for Homes is a collaborative initiative that actively works with all sectors of the homebuilding industry.

By recognizing sustainable design and construction in homes nationwide, LEED for Homes helps home builders differentiate their homes as some of the best homes in their markets, using a recognized national brand. Furthermore, homebuyers can more readily identify third-party verified green homes.

While there are already a number of local or regional green homebuilding programs, LEED for Homes is attempting to provide national consistency in defining the features of a green home and to enable builders anywhere in the country to obtain a green rating on their homes. LEED for Homes represents a consensus standard for green homebuilding developed and refined by a diverse cadre of national experts and experienced green builders. The LEED for Homes Rating System is part of the comprehensive suite of LEED assessment tools offered by USGBC to promote sustainable design, construction, and operations practices in buildings nationwide.

The LEED for Homes Rating System measures the overall performance of a home in eight categories:

1. **Innovation & Design Process (ID).** Special design methods, unique regional credits, measures not currently addressed in the Rating System, and exemplary performance levels.
2. **Location & Linkages (LL).** The placement of homes in socially and environmentally responsible ways in relation to the larger community.
3. **Sustainable Sites (SS).** The use of the entire property so as to minimize the project's impact on the site.
4. **Water Efficiency (WE).** Water-efficient practices, both indoor and outdoor.
5. **Energy & Atmosphere (EA).** Energy efficiency, particularly in the building envelope and heating and cooling design.
6. **Materials & Resources (MR).** Efficient utilization of materials, selection of environmentally preferable materials, and minimization of waste during construction.
7. **Indoor Environmental Quality (EQ).** Improvement of indoor air quality by reducing the creation of and exposure to pollutants.
8. **Awareness & Education (AE).** The education of homeowner, tenant, and/or building manager about the operation and maintenance of the green features of a LEED home.

The LEED for Homes Rating System works by requiring a minimum level of performance through prerequisites, and rewarding improved performance in each of the above categories. The level of performance is indicated by four performance tiers – Certified, Silver, Gold and Platinum – according to the number of points earned (Exhibit 1).

Exhibit 1
LEED for Homes Certification Levels

LEED for Homes Certification Levels	*Number of LEED for Homes points Required*
Certified	45-59
Silver	60-74
Gold	75-89
Platinum	90-136
Total available points	136

The number of points for each certification level is adjusted for smaller-than-average and larger-than-average homes using a mechanism called the Home Size Adjustment.

The Rating System guarantees minimum levels of sustainable practice through 18 prerequisites in the eight credit categories. At the same time, projects enjoy flexibility with the wide variety of credits available to achieve certification. Credit Interpretation Requests (CIRs) are also available to projects that seek clarification or special consideration on specific credits.

How to Participate in LEED for Homes

The strength of the LEED for Homes program is its third-party verification through LEED for Homes Providers and Green Raters.

LEED for Homes Providers are local and regional organizations chosen by USGBC to provide certification services to LEED for Homes projects in their local or regional markets. A Provider is selected based on its demonstrated abilities to manage a team of Green Raters. A Provider is under contract to USGBC to perform the following specific services:

- recruitment and registration of projects for LEED for Homes;
- coordination and oversight of Green Raters;
- certification of LEED homes;
- quality assurance for the certifications; and
- coordination with USGBC and local USGBC chapters.

A Green Rater is an individual who works as a part of the LEED for Homes Provider team (and may be in-house staff or a subcontractor) to perform field inspections and performance testing. Green Raters may work closely with the individual project teams to assist the design and construction professionals in meeting their sustainability goals.

Green designers and consultants are also critical members of a project team. One of the primary lessons learned in the pilot is that the success of a green homebuilding project is tied to how effectively the green measures are integrated into the home's design and how well the subcontractors understand how to properly install these green measures.

Although the Providers offer verification and certification services for LEED for Homes projects, many builders may need additional support to effectively integrate additional green measures into their home designs, and to ensure that these designs are appropriately constructed by each subcontractor. In recognition of the vital role of these other stakeholders, USGBC is developing an advanced training course for green home designers and consultants. USGBC expects to offer this course beginning in 2008.

The LEED for Homes Pilot has been open for participation in locations served by our 12 pilot LEED for Homes Providers. In the short-term, not every project will have local access to a Provider. However, in the coming year, USGBC plans to establish at least one Provider in each state. USGBC intends to establish Green Raters in all markets as quickly as possible. Home builders outside the current service areas may contact the nearest LEED for Homes Provider to discuss participation. An updated list of Providers is maintained on the USGBC web site at www.usgbc.org/leed/homes.

Four Steps to Participate

There are five basic steps for participating in LEED for Homes:

1. Contact a LEED for Homes Provider and join the program.
2. Identify a project team.
3. Build the home to the stated goals.
4. Certify the project as a LEED home
5. Market and sell the LEED home.

Step 1: Contact a LEED for Homes Provider and join the program

Every participating builder or project manager starts by selecting a LEED for Homes Provider and registering for participation in LEED for Homes. A Provider can offer orientation and up-front technical assistance to builders, although some builders – particularly those with experience in green homebuilding – may not need these services.

Once the builder (or project manager) and the Provider have agreed to work in partnership on the project, both the builder and each project is registered with USGBC.

Step 2: Identify a project team

After registering, the project team that will plan, design and build the home should be identified. The team should include professionals with both knowledge and experience in the eight LEED for Homes credit categories. These professionals work together to develop the project goals, identify potential challenges, and determine how best to contribute to the success of the project.

The project team starts by articulating the sustainability goals of the project and determining the specific strategies and systems integration required to meet them.

The LEED for Homes Provider or Green Rater will assist the project team with a preliminary rating of the home. This preliminary rating, a detailed review of the home's current design, determines its current scores in the LEED for Homes Rating System. As part of this design review, the following steps should be completed:

- performance testing of a typical example of builder's home design;
- completion of preliminary project checklist (including suggested additional measures that may be needed to achieve a LEED rating); and
- a preliminary estimate of the LEED for Homes score and certification level.

Depending on the preliminary score, the project team may identify additional green measures to be pursued.

To appropriately introduce green measures into the home design, an integrated design approach should be followed. Each change may introduce both expected and unexpected challenges. With an integrated design process, all project team members are given an opportunity to evaluate potential challenges and offer solutions. Design charrettes are often used on large projects to bring together stakeholders with strong interests in the potential impacts of a given project.

Also, it may be beneficial to bring in consultants who specialize in aspects of green homebuilding that are critical to the specific project.

Step 3: Build the home

LEED for Homes is intended to provide project teams with guidance on both green design and green construction practices. Green homebuilding often requires that the trades learn new ways of doing things. Subcontractors who are new to green construction practices may need to be trained in the different installation practices for certain measures. The builder is encouraged to work with consultants who specialize in training trades.

The Green Rater is expected to conduct on-site performance tests and visual inspections of various measures in the home. These tests and inspections are essential to maintaining the rigor and integrity of the program. Typically, two on-site inspections are required for each project; one is conducted during construction of the home, usually just prior to drywall installation, and one is conducted upon completion of the home.

The Provider and Green Rater work with the construction team and trades to schedule and complete the inspections. During the construction process, the builder can contact the Green Rater if questions, problems, or changes arise. The Green Rater may need to rescore the project if major changes are made during construction.

Step 4: Certify the home

The certification process for the completed new home involves two components. First is the field inspection and performance testing. The Green Rater conducts a final inspection of the green measures on the project's LEED for Homes checklist and conducts the required performance tests (Exhibit 2). After conducting these inspections and performance tests, the Green Rater completes the project documentation package, which includes the following:

- completed and signed LEED for Homes checklist;
- completed and signed Accountability Forms;
- completed and signed Durability Risk Evaluation Form and durability inspection checklist.

The Green Rater submits this package to the LEED for Homes Provider for review and approval.

Exhibit 2
Performance Tests

Performance Tests		Responsible Party	Type of Measure	
Category			Prerequisite	Credit
EA	Envelope Leakage	Rater	X	
	Duct Leakage	Rater	X	
	HVAC Refrigerant Charge	HVAC	X	
EQ	Outdoor Air Flow	Rater		X
	Local Exhaust	Rater		X
	Supply Air Flow	Rater		X

The second component is certification by the LEED for Homes Provider. The Provider reviews the project documentation package submitted by the Green Rater. If it is satisfactory and the home is certified, the Provider notifies the project team and USGBC. USGBC then sends out the official notification and LEED for Homes certificate.

Step 5: Market and sell the LEED home

Builders registered with LEED for Homes may market their LEED certified homes with USGBC-approved press releases, signage, and collateral pieces that highlight the LEED brand. Please contact USGBC for more information.

Some projects may be driven by the homebuyer, in which case this step is not relevant.

Overview of the Rating System

Basic Structure of the Rating System

The LEED for Homes Rating System has 35 topic areas, each with a unique intent or goal. Under the requirements section of each topic area, specific measures are identified that may be included in the home. Typically, these measures are structured as follows:

1.1 Good Practice: usually a prerequisite (i.e., mandatory measure)

1.2 Better Practice: usually worth 1 point

1.3 Best Practice: usually worth 2 points

Prerequisites: Mandatory Measures

Prerequisites are mandatory measures and must be completed during the design of construction phase. There are 18 prerequisite measures in LEED for Homes:

Innovation & Design Process (ID)
- 1.1 Preliminary Rating
- 2.1 Durability Planning
- 2.2 Durability Management

Sustainable Sites (SS)
- 1.1 Erosion Controls (During Construction)
- 2.1 No Invasive Plants

Energy & Atmosphere (EA)
- 1.1 Performance of ENERGY STAR for Homes
- 11.1 Refrigerant Charge Test

Materials & Resources (MR)
- 1.1 Framing Order Waste Factor Limit
- 2.1 FSC-Certified Tropical Woods
- 3.1 Construction Waste Management Planning

Indoor Environmental Quality (EQ)
- 2.1 Basic Combustion Venting Measures
- 4.1 Basic Outdoor Air Ventilation
- 5.1 Basic Local Exhaust
- 6.1 Room by Room Load Calculations
- 7.1 Good Filters
- 9.1 Radon-Resistant Construction in High Radon Risk Areas
- 10.1 No HVAC in Garage

Awareness & Education (AE)
- 1.1 Basic Operations Training

Credits: Optional Measures

The 67 credits in the Rating System are optional measures. However, a minimum number of points must be earned in some of the credit categories. The credit categories with minimum point requirements are listed in Exhibit 3 and highlighted in gray bars in the LEED for Homes checklist.

Exhibit 3
Prerequisites and Minimum Point Requirements

Credit category	*Prerequisites (mandatory) measures*	*Minimum point requirements*	*Maximum points available*
Innovation & Design Process (ID)	3	0	11
Location & Linkages (LL)	0	0	10
Sustainable Sites (SS)	2	5	22
Water Efficiency (WE)	0	3	15
Energy & Atmosphere (EA)	2	0	38
Materials & Resources (MR)	3	2	16
Indoor Environmental Quality (EQ)	7	6	21
Awareness & Education (AE)	1	0	3
Total	18	18	136

Special Features of the Rating System

The LEED for Homes Rating System is a set of industry best practices that will help to guide a builder in constructing better homes. The actual performance of the finished home relates directly to the process that the builder and project team use to design and construct the LEED home. The Rating System identifies specific measures that may be incorporated into the design of a home.

In fact, a high-performance home has the following attributes:

- design strategies that result in improved resource efficiency;
- selection of environmentally responsible and high-performance materials, equipment, and systems; and
- construction practices that ensure that each of the measures above is installed properly.

A builder should pay close attention all three attributes to ensure a high-quality outcome. One of the early lessons learned in the Pilot is that it is critical to incorporate LEED measures into the home's design at the earliest phase of design. Failure to do so may result in many unexpected challenges, including delays and mistakes.

With the basic intent to promote good design, the LEED for Homes Rating System includes the following design-related features.

Innovation & Design Process category at the front of the Rating System. The Innovation and Design Process category was brought to the front of the LEED for Homes Rating System to highlight the importance of design in a LEED home. Two measures, Integrated Design Process and Durability Planning, are vital parts of the design process.

Integrated Design Process credit. The Integrated Design Process (ID 1) topic area requires the builder to participate in a builder orientation and encourages the builder to include the entire design and construction team in regular project meetings. Establishing measurable goals up front and effectively integrating green measures into a home's design will help ensure that the project goals are met.

Durability Planning prerequisite. The Durability Planning (ID 2.1) prerequisite requires that the project team address durability explicitly in the home design by assessing durability risk factors and identifying and incorporating specific measures into the home's design to address each factor.

Other Design-Related Credits. As explained above, many measures in the Rating System have a substantial design component. These measures are very difficult for the Green Rater to visually verify in the field. Credits that have a significant design component are designated with the " " symbol in the checklist. The professional who is responsible for each such measure must sign an Accountability Form (see below) to confirm that it has been completed according to the requirements of the Rating System.

Credit Interpretations and Innovative Design Requests

The measures in the LEED for Homes Rating System are worth a total of 136 possible points. Aside from the requirements stated for each credit, there are two alternative methods of acquiring points:

Credit Interpretation Requests (CIRs)*.* If a project team identifies an alternative way of achieving the intent of an existing LEED credit, the team can request permission to meet the intent of the credit using an approach that is different from the stated requirements.

Innovative Design Requests (IDRs). An innovative design credit is a way of earning extra LEED points outside the established credit categories. These credits are counted in ID 3.1-3.4. There are three ways to earn ID points:

- Implement technologies or strategies that are not included in the Rating System but offer substantial environmental benefits.
- Implement a regionally appropriate green technology or strategy that is not already addressed in the Rating System, for use within a defined region.
- Demonstrate "exemplary performance" by substantially exceeding the requirements in a LEED for Homes credit. Exemplary performance guidelines for various credits are included in the LEED for Homes Reference Guide.

For both kinds of requests (CIRs and IDRs), the project team must submit a formal request to USGBC through the Provider. No points are awarded until USGBC has

reviewed and approved the request. Both requests are handled according to the following process:

1. Formal request. The Provider submits a project team's request to USGBC. The request or proposal should be structed like a LEED credit; that is, it should include a title, intent, rationale, requirements, and documentation or verification requirements.
2. Preliminary response. After reviewing the Credit Interpretation or Innovative Design Request, USGBC responds to the Provider by indicating that the proposed approach is (a) appropriate and eligible to earn points, (b) ineligible to earn points, or (c) appropriate and likely to earn the desired points with some indicated modifications, such as additional documentation or a higher performance threshold. In case (c), the USGBC ruling is preliminary, subject to the receipt of the indicated modifications from the Provider.
3. Final rating. At the time of the final rating, the Provider can include the credit interpretation or innovative design credit in the final scoring for that LEED home.

Both CIRs and IDRs should be submitted during the preliminary rating, and may be submitted only by the Provider on behalf of the project team.

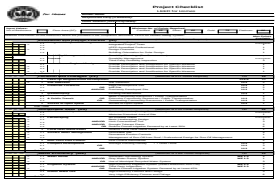
Accountability Forms

Many of the measures in the LEED for Homes Rating System have a substantial design component. These measures are very difficult for the Green Rater to visually verify in the field. If the Green Rater is to fully understand how these measures were installed, it would require a great deal of the Rater's time to retrace the design steps.

An Accountability Form is intended to shift the responsibility for the verification from the Green Rater to the design professional responsible for a specific LEED for Homes measure. The form is to be signed by the responsible party (e.g., the builder, engineer, architect, landscape professional) who actually completed the design. With this form, he or she formally attests to the completion of the measure and compliance with the requirements.

Credits that require an Accountability Form signature are noted on the LEED for Homes checklist by the " " symbol.

LEED for Homes Checklist



Project Checklist (cont'd)

HERS Index Value Achieved:

IECC Climate Zone:

EA 1.2 Pts Achieved: 0.0

Y / Pts	No	N/A							
				Energy and Atmosphere (EA)		(Minimum of 0 EA Points Required)	OR	**38**
				1.1	**Optimize Energy Performance**	Meets Performance Requirements of ENERGY STAR for Homes		Prerequisite
				1.2		Exceptional Energy Performance	**EA 2-10**	34
				7.1	**Water Heating**	Efficient Distribution System		2
				7.2		Pipe Insulation		1
				11.1	**Refrigerant Management**	Refrigerant Charge Test		Prerequisite
				11.2		Appropriate HVAC Refrigerant		1
				Sub-Total (or Sub-Total from Adendum A - Prescriptive EA Credits)				
Y / Pts	No	N/A		**Materials and Resources (MR)**		(Minimum of 2 MR Points Required)		**16**
				1.1	**Material Efficient Framing**	Framing Order Waste Factor Limit		Prerequisite
				1.2		Detailed Framing Documents	**MR 1.5**	1
				1.3		Detailed Cut List and Lumber Order	**MR 1.5**	1
				1.4	***AND/OR***	Framing Efficiencies (See List of Advanced Framing Techniques)	**MR 1.5**	3
				1.5	***OR***	Off-Site Fabrication		4
				2.1	**Environmentally Preferable**	FSC Certified Tropical Woods		Prerequisite
				2.2	**Products**	Environmentally Preferable Products (See Table)		8
				3.1	**Waste Management**	Construction Waste Management Planning		Prerequisite
				3.2		Construction Waste Reduction		3
				Sub-Total				
Y / Pts	No	N/A		**Indoor Environmental Quality (IEQ)**		(Minimum of 6 IEQ Points Required)	OR	**21**
				1	**ENERGY STAR with IAP**	Indoor Air Package (IAP)	**IEQ2-10**	11
				2.1	**Combustion Venting**	Basic Combustion Venting Measures	**IEQ 1**	Prerequisite
				2.2		Enhanced Combustion Venting Measures	**IEQ 1**	2
				3	**Moisture Control**	Moisture Load Control	**IEQ 1**	1
				4.1	**Outdoor Air Ventilation**	Basic Outdoor Air Ventilation	**IEQ 1**	Prerequisite
				4.2		Enhanced Outdoor Air Ventilation		2
				4.3		Third-Party Performance Testing	**IEQ 1**	1
				5.1	**Local Exhaust**	Basic Local Exhaust	**IEQ 1**	Prerequisite
				5.2		Enhanced Local Exhaust		1
				5.3		Third-Party Performance Testing		1
				6.1	**Distribution of Space**	Room by Room Load Calculations	**IEQ 1**	Prerequisite
				6.2	**Heating and Cooling**	Return Air Flow / Room by Room Controls	**IEQ 1**	1
				6.3	**Heating and Cooling**	Third-Party Performance Testing	**IEQ 1**	2
				7.1	**Air Filtering**	Good Filters	**IEQ 1**	Prerequisite
				7.2	***OR***	Better Filters		1
				7.3	***OR***	Best Filters		2
				8.1	**Contaminant Control**	Seal-Off Ducts During Construction	**IEQ 1**	1
				8.2		Indoor Contaminant Control		2
				8.3		Pre-Occupancy Flush	**IEQ 1**	1
				9.1	**Radon Protection**	Radon Resistant Construction in High Risk Areas	**IEQ 1**	Prerequisite
				9.2		Radon Resistant Construction in Moderate Risk Areas	**IEQ 1**	1
				10.1	**Garage Pollutant Protection**	No HVAC in Garage	**IEQ 1**	Prerequisite
				10.2		Minimize Pollutants from Garage	**IEQ 1**	2
				10.3	***AND/OR***	Exhaust Fan in Garage	**IEQ 1**	1
				10.4	***OR***	Detached Garage or No Garage	**IEQ 1**	3
				Sub-Total				
Y / Pts	No	N/A		**Awareness and Education (AE)**		(Minimum of 0 AE Points Required)		**3**
				1.1	**Education for Homeowner**	Basic Operations Training - Occupants Manual and Walkthrough		Prerequisite
				1.2	**and/or Tenants**	Enhance Training		1
				1.3		Public Awareness		1
				2.1	**Education for Building Mgrs**	Basic Building Manager's Manual and Walkthrough		1
				Sub-Total				
				Project Totals (pre-certification estimates)				***136***

for Homes

Project Checklist, Addendum A

Prescriptive Approach for Energy and Atmosphere (EA) Credits

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

Y / Pts	No	N/A		Energy and Atmosphere (EA)		(No Minimum Points Required)	OR	Max Points Available
								38
			2.1	**Insulation**		Basic Insulation	**EA 1**	Prerequisite
			2.2			Enhanced Insulation	**EA 1**	2
			3.1	**Air Infiltration**		Good Envelope (See Spec's)	**EA 1**	Prerequisite
			3.2			Better Envelope (See Spec's)	**EA 1**	2
			3.3		***OR***	Best Envelope (See Spec's)	**EA 1**	3
			4.1	**Windows**		Good Windows (See Table)	**EA 1**	Prerequisite
			4.2			Enhanced Windows (See Table)	**EA 1**	2
			4.3		***OR***	Exceptional Windows (See Table)	**EA 1**	3
			5.1	**Duct Tightness**		Reduced Distribution Losses (See Spec's)	**EA 1**	Prerequisite
			5.2			Greatly Reduced Distribution Losses (See Spec's)	**EA 1**	2
			5.3		***OR***	Minimal Distribution Losses (See Spec's)	**EA 1**	3
			6.1	**Space Heating and Cooling**		Good HVAC Design and Installation (see Table)	**EA 1**	Prerequisite
			6.2			High-Efficiency HVAC (See Table)	**EA 1**	2
			6.3		***OR***	Very High-Efficiency HVAC (See Table)	**EA 1**	4
			7.1	**Water Heating**		Efficient Distribution System		2
			7.2			Pipe Insulation		1
			7.3			Efficient Water Heating Equipment (See Table)	**EA 1**	3
			8.1	**Lighting**		ENERGY STAR Lights	**EA 1**	Prerequisite
			8.2			Improved Lighting	**EA 1**	2
			8.3		***OR***	Advanced Lighting Package	**EA 1**	3
			9.1	**Appliances**		High-Efficiency Appliances	**EA 1**	2
			9.2			Very Efficient Clothes Washer	**EA 1**	1
			10	**Renewable Energy**		Renewable Energy System	**EA 1**	10
			11.1	**Refrigerant Management**		Refrigerant Charge Test		Prerequisite
			11.2			Appropriate HVAC Refrigerants		1
0				Sub-Total				

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.

Responsible Party's Name		Company	
Signature		Date	

By affixing my signature below, the undersigned does hereby declare and affirm to the USGBC that the required inspections and performance testing for the LEED for Homes requirements, as specified in the LEED for Homes Rating System, have been completed, and will provide the project documentation file, if requested.

Rater's Name		Company	
Signature		Date	

By affixing my signature below, the undersigned does hereby declare and affirm to the USGBC that the required inspections and performance testing for the LEED for Homes requirements, as specified in the LEED for Homes Rating System, have been completed, and will provide the project documentation file, if requested.

Provider's Name		Company	
Signature		Date	

Credits
in the LEED for Homes Rating System

Innovation & Design (ID) Process.....25

Location & Linkages (LL) 31

Sustainable Sites (SS) 39

Water Efficiency (WE) 52

Energy & Atmosphere (EA) 61

Materials & Resources (MR) 86

Indoor Environmental Quality (EQ) 96

Awareness & Education (AE) 112

Home Size Adjustment

The Home Size Adjustment compensates for the overarching effect of home size on resource consumption by adjusting the award level point thresholds (for certified, silver, gold, and platinum) based on home size. The adjustments are based on material and energy impacts as described below under *Rationale*. The LEED for Homes Checklist automatically makes this adjustment when the home size and number of bedrooms are entered.

The effect of the adjustment on award thresholds can also be determined by consulting Exhibits 4-6, as described below under “Instructions” below. For multifamily buildings, see “Home Size Adjustment for Multifamily Buildings” that follows.

Instructions

1. Calculate the area of the home in square feet. Follow the calculation method laid out in ANSI Standard Z765, but include all directly conditioned square footage, whether finished or not, that meets building code requirements for living space (e.g., head room, egress, etc.).
2. Determine the number of bedrooms in the home. A “bedroom”, for purposes of this adjustment, is any room or space that could be used or is intended to be used for sleeping purposes and meets local fire and building code requirements. It is advantageous to count as bedrooms all rooms that meet this definition. When in doubt, consider whether the room in question might be used as a bedroom if another member were added to the household (e.g. new baby, nanny, grandparent, exchange student); if the answer is yes, count the room as a bedroom.
3. If there are 5 or fewer bedrooms, find the size of the home in the appropriate column in Exhibit 4. Read across the row to find the number of points to add or subtract. If the home is larger than the size shown in the bottom row of the applicable column, refer to Exhibit 5 to estimate the threshold adjustment, or to Exhibit 6 to calculate the adjustment.
4. If there are 6 or more bedrooms, use Exhibit 5 and/or Exhibit 6 to calculate the adjustment.
5. Add the adjustment to the number of points needed to earn the desired award level (Certified, Silver, Gold, or Platinum). A negative adjustment (for homes that are smaller than average) will lower the threshold for each award level (making it easier to reach); positive adjustments will raise the thresholds.

Definition: A *bedroom*, for purposes of this adjuster, is any room or space that could be used or is intended to be used for sleeping purposes and meets local fire and building code requirements.

Exhibit 4
Threshold Adjustment
(point range: -10 to +10)

Maximum home size (ft^2) by number of bedrooms					*Adjustment to award thresholds**
≤ 1 Bedroom	*2 Bedrooms*	*3 Bedrooms*	*4 Bedrooms*	*5 Bedrooms*	
610	950	1290	1770	1940	-10
640	990	1340	1840	2010	-9
660	1030	1400	1910	2090	-8
680	1070	1450	1990	2180	-7
710	1110	1500	2060	2260	-6
740	1160	1570	2140	2350	-5
770	1200	1630	2230	2440	-4
800	1250	1690	2320	2540	-3
830	1300	1760	2400	2640	-2
860	1350	1830	2500	2740	-1
900	**1400**	**1900**	**2600**	**2850**	**0 ("neutral")**
940	1450	1970	2700	2960	+1
970	1510	2050	2810	3080	+2
1010	1570	2130	2920	3200	+3
1050	1630	2220	3030	3320	+4
1090	1700	2300	3150	3460	+5
1130	1760	2390	3280	3590	+6
1180	1830	2490	3400	3730	+7
1220	1910	2590	3540	3880	+8
1270	1980	2690	3680	4030	+-9
1320	2060	2790	3820	4190	+10
For larger homes, or homes with more bedrooms, see below.					

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.

Exhibit 5
Threshold Adjustment Equation

Threshold adjustment = 18 * *log* (actual home size / neutral home size) / *log* (2)

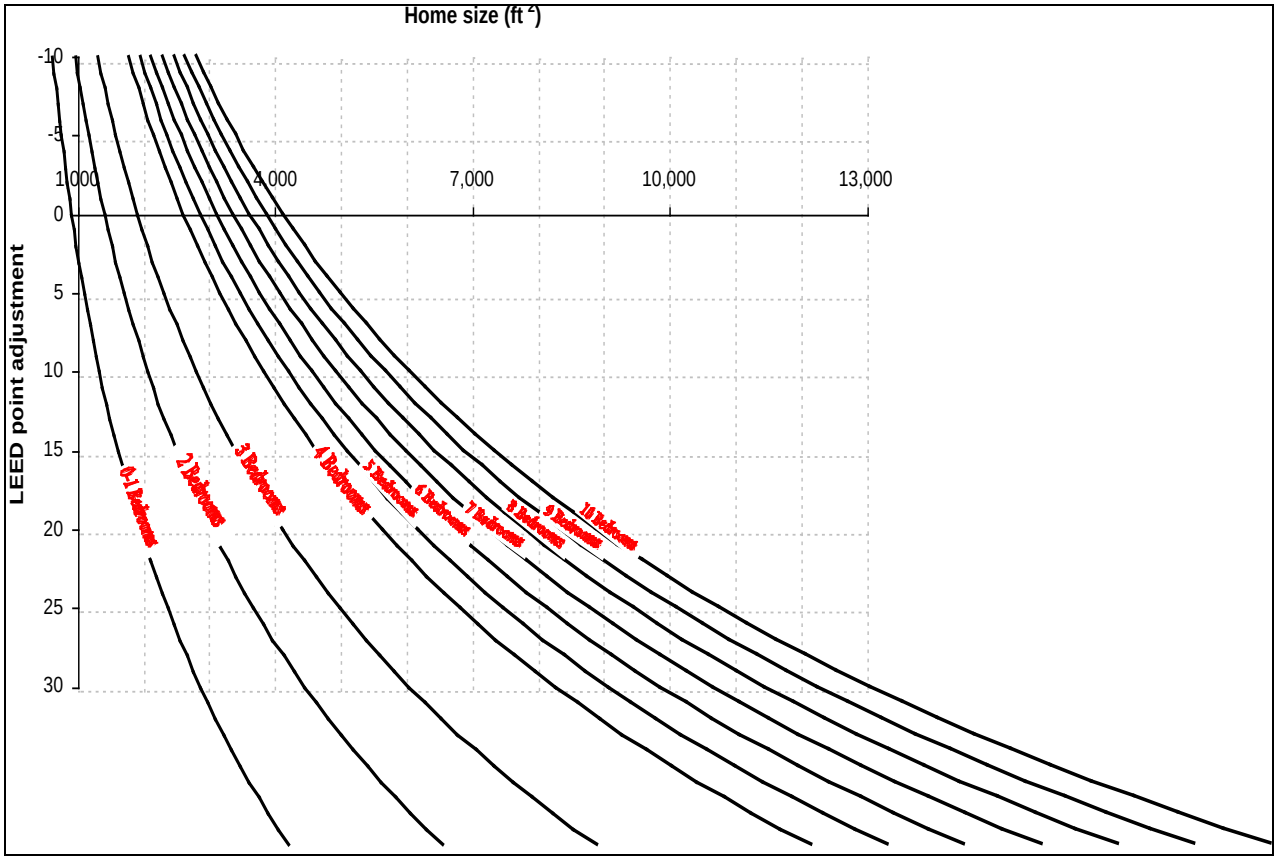
Neutral home size, as used in Exhibit 6, is determined according to the following table:

Bedrooms	***≤1***	***2***	***3***	***4***	***5***	***6 or more***
Neutral home size (ft^2)	900	1,400	1,900	2,600	2,850	250 ft^2 more for each additional bedroom

Note: For homes with more than 5 bedrooms, "neutral home size" is defined as follows:

*2600 + [250 * (number of bedrooms – 5)]*

Exhibit 6
Threshold Adjustment Curves
(point range: -10 and above)



Rationale

All things being otherwise equal, a large home consumes more materials and energy than a small home over its lifecycle (including pre-construction, construction, use, and demolition or deconstruction). The adjustment compensates for these impacts by making it easier or harder to reach each LEED for Homes certification. There is no impact on award thresholds for average-sized homes, whereas thresholds for smaller-than-average homes are lowered and thresholds for larger-than-average homes are raised.

Data published by the U.S. Census Bureau in the *American Housing Survey for 2005* shows a strong correlation between number of bedrooms and number of occupants. Although a home may serve many different households over its lifespan, in general, a home with more bedrooms will serve more people. The adjustment therefore categorizes homes by the number of bedrooms.

The relationship between home size and LEED points is based on estimated energy and materials impacts within the context of the LEED for Homes Rating System. Available published data and informal studies of energy and materials usage in homes reveal two key relationships:

- A 100% increase in home size yields an increase in annual energy usage of 15% to 50%, depending on the design, location, and occupants of the home.
- A 100% increase in home size yields an increase in materials usage of 40% to 90%, depending on the design and location of the home.

These data were simplified and generalized to the assumption that as home size doubles, energy consumption increases by roughly one-quarter and material consumption increases by roughly one-half; combined, these amount to an increase in impact of roughly one-third with each doubling in home size. Thus the point adjustment equates to one-third of the points available in the Materials & Resources and Energy & Atmosphere categories combined for each doubling in home size.

Home Size Adjustment for Multifamily Buildings

For each unit type (0, 1, 2, 3 bedroom, etc.), respectively:

Weighted Average Home Size Adjustment for Building

= [$\sum_{\text{by unit type}}$ (adjustment for unit * number of units of that type in project)] ÷ total number of units in project

where *home size adjustment for unit* is equal to the point adjustment from Exhibit 4 or Exhibit 6 above, based on the average floor area for all units of that type.

Example

1-Bedroom Units

Number of Units:	10
Total Floor Area for 1BR Units:	8,300 SF
Average Area / Unit:	830 SF
Home Size Adjustment (1 bedroom):	-2 points

2-Bedroom Units

Number of Units:	5
Total Floor Area for 2BR Units:	7,250 SF
Average Area / Unit:	1,450 SF
Home Size Adjustment (2 bedrooms):	+1 points

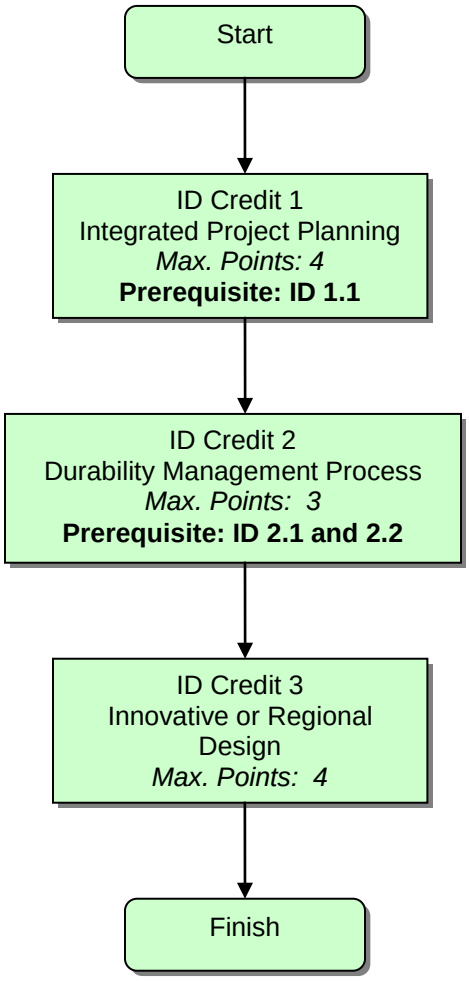
Overall Home Size Adjustment

Weighted Average Home Size Adjustment
= [(1-BR score * 1-BR units) + (2-BR score * 2-BR units)] ÷ total units
= [(-2 * 10) + (+1 * 5)] / 15
= -1

Thus, the LEED for Homes award thresholds for this multifamily building are Certified, 44 points; Silver, 59 points; Gold, 74 points; and Platinum, 89 points.

Innovation & Design Process (ID)

Pathway through the ID Category



ID 1. Integrated Project Planning

Maximum points: 4

Intent

Maximize opportunities for integrated, cost-effective adoption of green design and construction strategies.

Requirements

Prerequisite

1.1 **Preliminary Rating.** As early as practical, conduct a preliminary LEED for Homes meeting, with the participation of the Provider and key members of the project team. As part of the meeting, create an action plan that identifies the following:

- The targeted LEED award level (Certified, Silver, Gold, or Platinum).
- The LEED for Homes credits that have been selected to meet the targeted award level.
- The party accountable for meeting the LEED for Homes requirements for each selected credit.

Credits

1.2 **Integrated Project Team** (1 point). Assemble and involve a project team to meet the three criteria below:

a) Include team members, in addition to the builder and Green Rater, whose capabilities include at least three of the following skill sets:
   - architecture or residential building design;
   - mechanical or energy engineering;
   - building science or performance testing;
   - green building or sustainable design; and
   - civil engineering, landscape architecture, habitat restoration, or land-use planning.

b) Actively involve all team members referenced above in at least three of the following phases of the home design and construction process:
   - conceptual or schematic design;
   - LEED planning;
   - preliminary design;
   - energy and envelope systems analysis or design;
   - design development;
   - final design, working drawings or specifications; and
   - construction.

c) Conduct meetings with the project team at least monthly to review project status, introduce new team members to project goals, discuss problems encountered, formulate solutions, review responsibilities and identify next steps.

1.3 **Professional Credentialed with Respect to LEED for Homes** (1 point). At least one principal member of the project team shall be a professional who is credentialed with respect to LEED for Homes as determined by the U.S. Green Building Council.

1.4 **Design Charrette** (1 point). No later than the design development phase and preferably during schematic design, conduct at least one full-day integrated design workshop with the project team defined in ID 1.2. Use the workshop to integrate green strategies across all aspects of the building design, drawing on the expertise of all participants.

1.5 **Building Orientation for Solar Design** (1 point). Design the home such that all of the following requirements are met:

a) The glazing area on the north- and south-facing walls of the building is at least 50% greater than the sum of the glazing area on the east- and west- facing walls.

b) The east-west axis of the building is within 15 degrees of due east-west.

c) The roof has a minimum of 450 square feet of south-facing area that is oriented appropriately for solar applications.

d) At least 90% of the glazing on the south-facing wall is completely shaded (using shading, overhangs, etc.) at noon on June 21 and unshaded at noon on December 21.

Synergies and Trade-Offs

This credit is intended to promote an integrated, system-oriented approach to green project design and development. The selected green home-building strategies and technologies in the Rating System should each be fully integrated into a home's design.

ID 2. Durability Management Process

Maximum points: 3

Intent

Promote durability and high performance of the building enclosure and its components and systems through appropriate design, materials selection, and construction practices.

Requirements

Note: USGBC and its representatives are responsible only for verifying the completion of LEED for Homes requirements; such verification in no way constitutes a warranty as to the appropriateness of the selected durability measures or the quality of implementation (see Disclaimer, page 2).

Prerequisites

2.1 **Durability Planning**. Prior to construction, the project team shall do the following:

a) Complete the Durability Risk Evaluation Form to identify all moderate- and high-risk durability issues for the building enclosure.

b) Develop specific measures to respond to those issues.

c) Identify and incorporate all the applicable indoor moisture control measures listed in Table 1.

d) Incorporate the measures from 2.1(b) and (c), above, into project documents (drawings, specifications, and/or scopes of work, as appropriate).

e) List all the durability measures and indicate their locations in the project documents in a durability inspection checklist. Include the checklist in project documents for use in verification.

2.2 **Durability Management.** During construction, the builder shall have a quality management process in place to ensure installation of the durability measures. This prerequisite can be satisfied by having the builder inspect and check off each measure in the durability inspection checklist created for 2.1(e), above.

Credits

2.3 **Third-Party Durability Management Verification** (3 points). Have the Green Rater inspect and verify each measure listed in the durability inspection checklist created for 2.1(e), above.

Table 1. Indoor Moisture Control Measures

Location or equipment	*Required moisture control measure*
Tub, showers, and spa areas	Use nonpaper-faced backer board on walls.
Kitchen, bathroom, laundry rooms, and spa areas	Use water-resistant flooring; do not install carpet.
Entryway (within 3 feet of exterior door)	Use water-resistant flooring; do not install carpet.
Tank water heater in or over living space	Install drain and drain pan.
Clothes washer in or over living space	Install drain and drain pan, or install accessible single-throw supply valve.
Conventional clothes dryer	Exhaust directly to outdoors.
Condensing clothes dryer	Install drain and drain pan.

Synergies and Trade-Offs

Many of the credits in the LEED for Homes Rating System can serve as durability strategies and may be used in the creation of a durability inspection checklist. If this is done, the home can still receive LEED points for those credits.

ID 3. Innovative or Regional Design **Maximum points: 4**

Intent

Minimize the environmental impact of the home by incorporating additional green design and construction measures that have tangible and demonstrable benefits beyond those in the LEED for Homes Rating System.

Requirement

Prerequisites

None.

Credits

3.1 **Innovation 1** (1 point). Prepare a written Innovative Design Request, to be submitted by the LEED for Homes Provider to USGBC, explaining the merits of the proposed measure. This point cannot be counted until LEED for Homes has ruled on the request. All written submittals must contain the following:

- the intent of the proposed measure;
- the proposed requirement for compliance;
- the proposed documentation to demonstrate compliance; and
- a description and an estimate of the benefit or impact provided by the proposed measure.

3.2 **Innovation 2** (1 point).

3.3 **Innovation 3** (1 point).

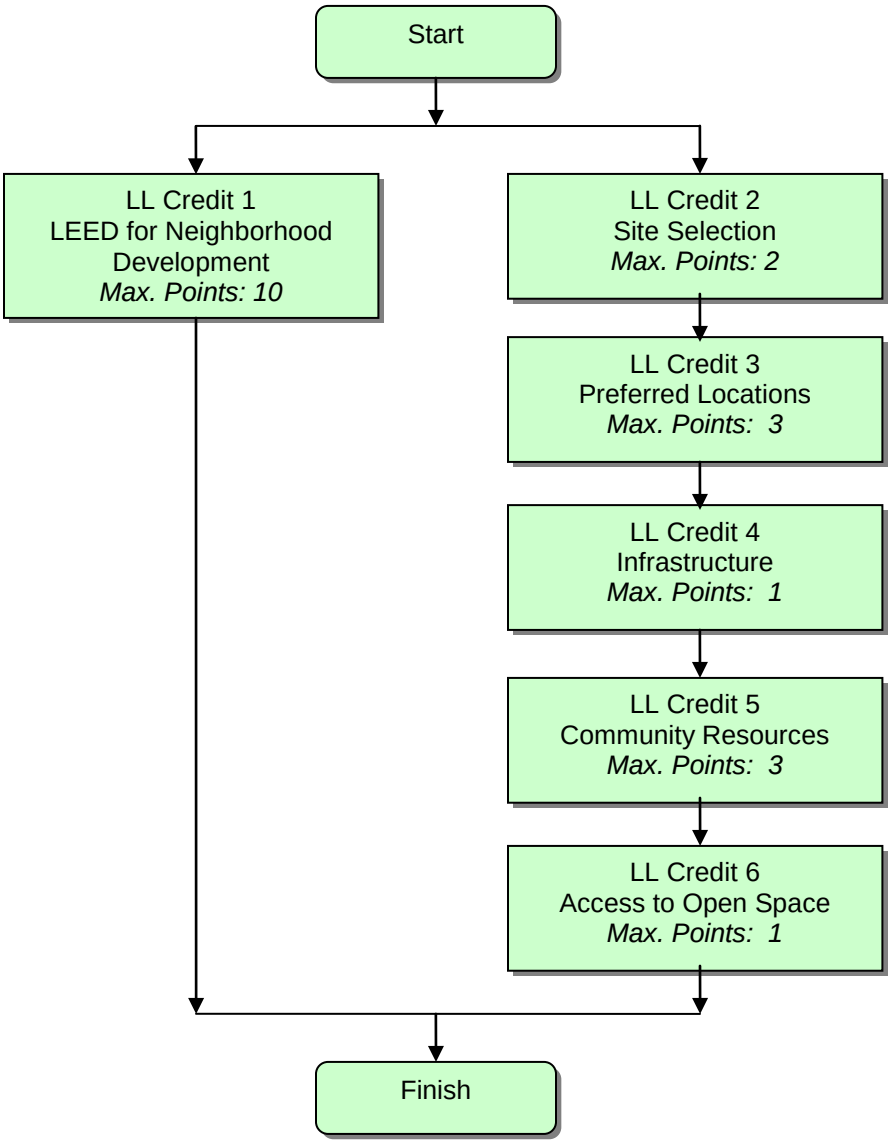
3.4 **Innovation 4** (1 point).

Synergies and Trade-Offs

This credit rewards innovative or regional measures that are not addressed elsewhere in the Rating System. A project can also receive 1 LEED point for exceeding the performance requirements of existing credits.

Location & Linkages (LL)

Optional Pathways through the LL Category



LL 1. LEED for Neighborhood Development

Maximum points: 10

Intent

Minimize the environmental impact of land development practices by building homes in LEED for Neighborhood Development certified developments.

Requirements

Prerequisites

None.

Credits

1 **LEED for Neighborhood Development** (10 points). Complete the requirements of the LEED for Neighborhood Development (LEED-ND) certification program.

Synergies and Trade-Offs

A project receiving points for LL 1 is not eligible for points under LL 2-6, and vice versa.

LL 2. Site Selection

Maximum points: 2

Intent

Avoid development on environmentally sensitive sites.

Requirements

Prerequisites

None.

Credits

2 **Site Selection** (2 points). Do not develop buildings, built structures, roads or parking areas on portions of sites that meet any of the following criteria:

a) Land whose elevation is at or below the 100-year floodplain as defined by FEMA.

b) Land that is specifically identified as habitat for any species on federal or state threatened or endangered lists.

c) Land within 100 feet of any water, including wetlands as defined by U.S. Code of Federal Regulations 40 CFR, Parts 230–233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, *or* land within distances given in applicable state or local regulations, whichever is more stringent. New wetlands constructed as part of stormwater mitigation or other site restoration efforts are exempt from this part of the requirement.

d) Land that prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (park authority projects are exempt).

e) Land that contains “prime soils”, “unique soils”, or “soils of state significance”, as identified in state Natural Resources Conservation Service soil surveys. Verification of soil types should be conducted by the project civil engineer, wetlands engineer, or biologist. If no project team member is qualified to verify this requirement, follow the steps laid out in the LEED for Homes Reference Guide. Sites that are previously developed are exempt from this requirement.

Synergies and Trade-Offs

A project receiving points for LL 1 is not eligible for points under LL 2-6, and vice versa.

LL 3. Preferred Locations

Maximum points: 3

Intent

Encourage the building of LEED homes near or within existing communities.

Requirements

Prerequisites

None.

Credits

3.1 **Edge Development** (1 point). Select a lot such that at least 25% of the perimeter immediately borders previously developed land. In the case of a multihome new development, each home in the development is awarded this point if at least 25% of the development site immediately borders previously developed land.

OR

3.2 **Infill** (2 points). Select a lot such that at least 75% of the perimeter immediately borders previously developed land. In the case of a multihome new development, each home in the development is awarded these points if at least 75% of the development site immediately borders previously developed land.

AND/OR

3.3 **Previously Developed** (1 point). Build on a previously developed lot. In the case of a multihome new development, each home in the development is awarded this point if at least 75% of the development site is built on previously developed land.

Synergies and Trade-Offs

A project receiving points for LL 1 is not eligible for points under LL 2-6, and vice versa.

LL 4. Infrastructure

Maximum points: 1

Intent

Encourage the building of LEED homes in developments that are served by or are near existing infrastructure (i.e., sewers and water supply).

Requirements

Prerequisites

None.

Credits

4 **Existing Infrastructure** (1 point). Select a lot that is within ½ mile of existing water service lines and sewer service lines. In the case of a multihome new development, each home in the development is awarded this point if the center of the development site is within ½ mile of existing water service lines and sewer service lines.

Synergies and Trade-Offs

A project receiving points for LL 1 is not eligible for points under LL 2-6, and vice versa.

LL 5. Community Resources

Maximum points: 3

Intent

Encourage the building of LEED homes in development patterns that allow for walking, biking, or public transit (thereby minimizing dependency on personal automobiles and their associated environmental impacts).

Requirements

Prerequisites

None.

Credits

Note: For new multihome developments, the distances below can be measured from the center of the community as long as the distance from the center of the community to the farthest home does not exceed ¼ mile. Using this approach, whole communities can qualify for this credit. For any homes farther than ¼ mile from the center of the community, distances must be recalculated for each home.

5.1 **Basic Community Resources** (1 point). Select a site that meets one of the following criteria:

a) Located within ¼ mile of four basic community resources (Table 2).

b) Located within ½ mile of seven basic community resources (Table 2).

c) Located within ½ mile of transit services that offer 30 or more transit rides per weekday (combined bus, rail, and ferry).

OR

5.2 **Extensive Community Resources** (2 points). Select a site that meets one of the following criteria:

a) Located within ¼ mile of seven basic community resources (Table 2).

b) Located within ½ mile of 11 basic community resources (Table 2).

c) Located within ½ mile of transit services that offer 60 or more transit rides per weekday (combined bus, rail, and ferry).

OR

5.3 **Outstanding Community Resources** (3 points). Select a site that meets one of the following criteria:

a) Located within ¼ mile of 11 basic community resources (Table 2).

b) Located within ½ mile of 14 basic community resources (Table 2).

c) Located within ½ mile of transit services that offer 125 or more transit rides per weekday (combined bus, rail, and ferry).

Transit rides per weekday are calculated as follows: (1) within a ½ mile radius, count all the transit stops; (2) multiply each transit stop by the number of buses, trains, and ferries that pass through that stop per day; (3) add the total number of rides available at each stop within ½ mile together. Example: if there are 4 bus stops, and at each bus stop the service frequency is half-hourly (48 times per day), the total transit rides per day is 192.

Table 2.
Types of Basic Community Resources

- ☐ Arts and entertainment center
- ☐ Bank
- ☐ Community or civic center
- ☐ Convenience store
- ☐ Daycare center
- ☐ Fire station
- ☐ Fitness center or gym
- ☐ Laundry or dry cleaner
- ☐ Library
- ☐ Medical or dental office
- ☐ Pharmacy
- ☐ Police station
- ☐ Post office
- ☐ Place of worship
- ☐ Restaurant
- ☐ School
- ☐ Supermarket
- ☐ Other neighborhood-serving retail
- ☐ Other office building or major employment center

Note: Up to two of each type of community resource may be counted. For example, two restaurants within ¼ mile may be counted as two community resources; four restaurants also count as two.

Synergies and Trade-Offs

A project receiving points for LL 1 is not eligible for points under LL 2-6, and vice versa.

LL 6. Access to Open Space

Maximum points: 1

Intent

Provide open spaces to encourage walking, physical activity, and time spent outdoors**.**

Requirements

Prerequisites

None.

Credits

6 **Access to Open Space** (1 point). Select a location within ½ mile of a publicly accessible or community-based open space that is at least ¾ acre in size. The open space requirement can be met by either one large open space or two smaller spaces totaling ¾ acre.

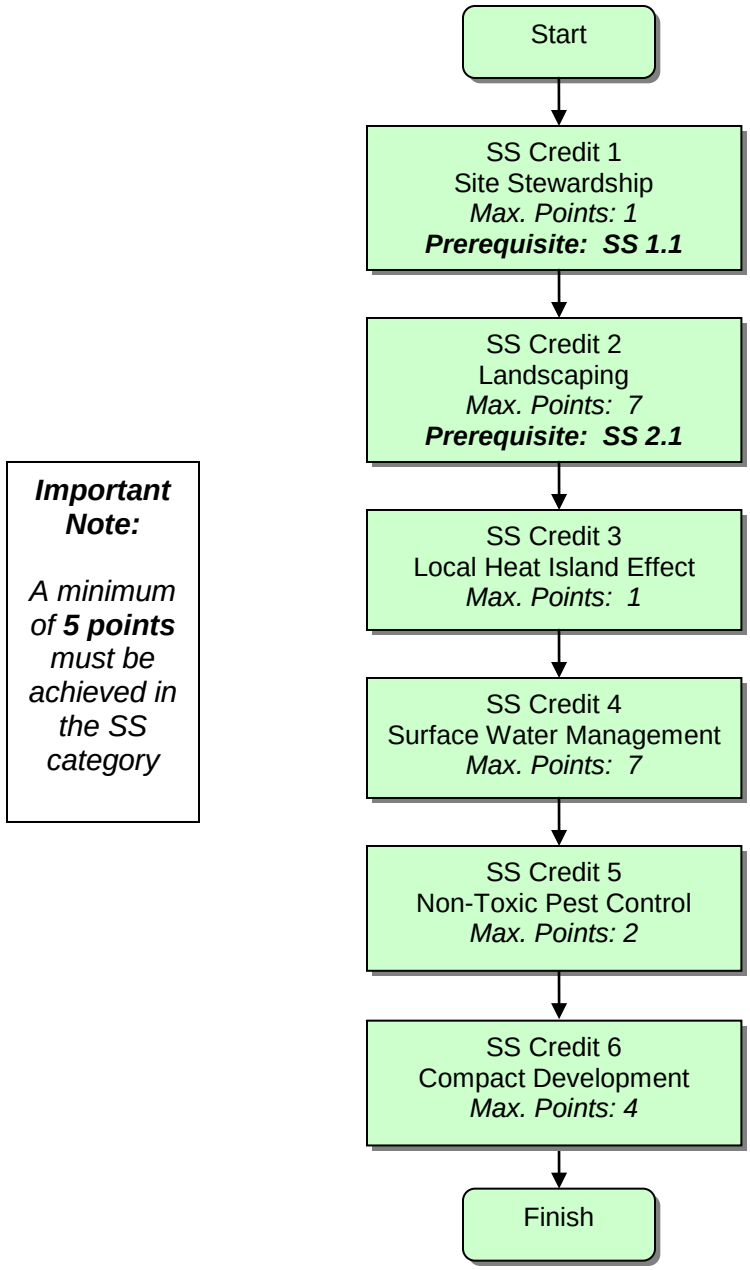
Note: *Open spaces* must consist predominantly of softscapes such as soil, grass, shrubs, and trees. These include natural open spaces; city, county, and state parks; play areas; and other community open spaces specifically intended for recreational use. Ponds can be counted as open space if they border a walking or bicycle path. Private lands open to the public for passive recreation are also acceptable provided there is deeded public access or a history of allowable public use and anticipated continued future public use for at least 10 years.

Synergies and Trade-Offs

A project receiving points for LL 1 is not eligible for points under LL 2-6, and vice versa.

Sustainable Sites (SS)

Pathway through the SS Category



SS 1. Site Stewardship

Maximum points: 1

Intent

Minimize long-term environmental damage to the building lot during the construction process.

Requirements

Prerequisites

1.1 **Erosion Controls During Construction.** Prior to construction, design and plan appropriate erosion control measures. During construction, implement these measures. Erosion control measures must include all of the following:

a) Stockpile and protect disturbed topsoil from erosion (for reuse).

b) Control the path and velocity of runoff with silt fencing or comparable measures.

c) Protect on-site storm sewer inlets, streams, and lakes with straw bales, silt fencing, silt sacks, rock filters, or comparable measures.

d) Provide swales to divert surface water from hillsides.

e) If soils in a sloped area (i.e., 25%, or 4:1 slope) are disturbed during construction, use tiers, erosion blankets, compost blankets, filter socks and berms, or some comparable approach to keep soil stabilized.

Credits

1.2 **Minimize Disturbed Area of Site** (1 point). Minimize disturbance to the site by meeting the following:

Where the site is not previously developed:

a) Develop a tree or plant preservation plan with “no-disturbance” zones clearly delineated on drawings and on the lot (see Note 1 below).

b) Leave undisturbed at least 40% of the buildable lot area, not including area under roof. Only softscapes can be counted toward this credit; projects cannot receive credit for preserving preexisting hardscapes, such as driveways.

OR

Where the site is previously developed:

c) Develop a tree or plant preservation plan with “no-disturbance” zones clearly delineated on drawings and on the lot (see Note 1 below), and rehabilitate the undisturbed portion of the lot by undoing any previous soil compaction, removing existing invasive plants, and meeting the requirements of SS 2.2 (see Note 2, below).

OR

d) Build on site with a lot area of less than 1/7 acre, or with housing density for the project that is equal to or greater than 7 units per acre. For multifamily buildings, the average lot size shall be calculated as the total lot size divided by the number of units.

Notes:
1. Any “no-disturbance” zones must also be protected from parked construction vehicles and building material storage. Soils compacted by vehicles or stored materials can cause major difficulties in establishing any new landscaping.
2. Homes that meet SS 2.2 for the entire lot can count points in both this credit and SS 2.2 (for 3 points total). SS 1.2 (d) applies only to the area of the lot not disturbed during construction. SS 2.2 applies to the area of the lot that is disturbed during construction.

Synergies and Trade-Offs

SS 4.2 rewards homes for the installation of permanent erosion controls.

If the project does not include full landscaping, homeowner association or other rules must require homeowners to have the site fully landscaped within one year; see SS 2. Erosion controls and soil stabilization measures must be robust enough to function until landscaping is in place (i.e., up to one year).

SS 2. Landscaping

Maximum points: 7

Intent

Design landscape features to avoid invasive species and minimize demand for water and synthetic chemicals.

Requirements

Prerequisites

2.1 **No Invasive Plants.** Introduce no invasive plant species into the landscape.

Note: *Invasive plant species* vary by region. Consult the local Cooperative Extension Service or state agencies. A list of regional resources is available from the U.S. Department of Agriculture, at www.invasivespeciesinfo.gov/unitedstates/state.shtml. Not all nonnative species are considered invasive.

Credits

Note: Points shown below are for homes that are fully landscaped. A project that has not completed the designed landscaping may earn up to 50% of the points for each credit as long as 50% or more of the designed landscaping is completed upon certification. In this case, 100% completion of the landscaping must be required by homeowner association or other rules within a specific time period not to exceed one year after occupancy. Erosion controls and soil stabilization measures must be robust enough to be effective for one year. The builder or project team must also develop a landscaping plan that meets the requirements in SS 2 and provide it to the homeowner.

2.2 **Basic Landscape Design** (2 points). Meet the following requirements for all designed landscape softscapes:

a) Any turf must be drought-tolerant.

b) Do not use turf in densely shaded areas.

c) Do not use turf in areas with a slope of 25% (i.e., 4:1 slope).

d) Add mulch or soil amendments as appropriate.

Mulch is defined as a covering placed around plants to reduce erosion and water loss and to help regulate soil temperature. In addition, upon decomposition, organic mulches serve as soil amendments. The type of mulch selected can affect soil pH.

e) All compacted soil (e.g., from construction vehicles) must be tilled to at least 6 inches."

AND/OR

2.3 **Limit Conventional Turf** (maximum 3 points, as specified in Table 3). Limit the use of conventional turf in the designed landscape softscapes.

Table 3. Limited Conventional Turf

Percentage of designed landscape softscape area that is conventional turf	*Points*
41–60%	1
21–40%	2
20% or less	3

AND/OR

2.4 **Drought-Tolerant Plants** (maximum 2 points, as specified in Table 4). Install drought-tolerant plants.

Table 4. Drought-Tolerant Plants

Percentage of installed plants that are drought-tolerant	*Points*
45–89%	1
90% or more	2

OR

2.5 **Reduce Overall Irrigation Demand by at Least 20%** (maximum 6 points, as specified in Table 5). Design the landscape and irrigation system to reduce overall irrigation water usage. The estimates must be calculated and prepared by a landscape professional, biologist, or other qualified professional using the method outlined below.

Table 5. Reduction in Water Demand

Reduction in estimated irrigation water usage	*SS 2.5 points*	*WE 2.3 points*	*Total points*
20–24%	2	0	2
25–29%	3	0	3
30–34%	4	0	4
35–39%	5	0	5
40–44%	6	0	6
45–59%	6	1	7
50–54%	6	2	8
55–59%	6	3	9
60% or more	6	4	10

Method for Calculating Reduction in Irrigation Demand

Step 1. Calculate the baseline irrigation water usage:

Baseline Usage = Landscaped Area * ET_0 * 0.62

where ET_o = Baseline Evapotranspiration Rate (available from local and state Departments of Agriculture)

Step 2. Calculate the design case irrigation water usage:

Design Case Usage = (Landscaped Area * ET_L ÷ IE) * CF * 0.62

where $ET_L = ET_0 * K_L$ and $K_L = K_S * K_{MC}$. Refer to Tables 6 and 7 for values for K_S and K_{MC}, and to Table 8 for values for IE. For CF, use estimated value based on manufacturer's specifications for percentage water savings.

Step 3. Calculate the percentage reduction in irrigation water usage:

Percentage Reduction = (1 – Design Case Usage ÷ Baseline Usage) * 100

Step 4. Refer to Table 5, above, to determine points earned.

Table 6. Species Factor

Vegetation type	*Species factor (K_S)*		
	Low	*Average*	*High*
Trees	0.2	0.5	0.9
Shrubs	0.2	0.5	0.7
Groundcover	0.2	0.5	0.7
Turf	0.6	0.7	0.8

Table 7. Microclimate Factor

Example microclimate impacts	*Microclimate factor (K_{MC})*		
	Low	*Average*	*High*
Shading	0.5	0.8	1.0
High sun exposure	1.0	1.2	1.5
Protection from wind	0.8	0.9	1.0
Windy area	1.0	1.2	1.5

Table 8. Irrigation Efficiency

Irrigation type	*Irrigation efficiency (IE)*	
	Low	*High*
Fixed spray	0.4	0.6
Impact and microspray	0.5	0.7
Rotors	0.6	0.8
Multistream rotators	0.6	0.8
Low volume and point source (e.g., drip)	0.7	0.9

Synergies and Trade-Offs

A project receiving points in SS 2.5 should also refer to WE 2.3.

Any measures chosen in SS 2 should be integrated with irrigation system design, which is addressed in WE 2. Rainwater and graywater reuse systems (WE 1) should also be included in landscaping design.

SS 3. Local Heat Island Effects

Maximum points: 1

Intent

Design landscape features to reduce local heat island effects.

Requirements

Prerequisites

None.

Credits

3 **Reduce Local Heat Island Effects** (1 point). Do one of the following:

a) Locate trees or other plantings to provide shading for at least 50% of sidewalks, patios, and driveways within 50 feet of the home. Shading should be calculated for noon on June 21, when the sun is directly overhead, based on five years' growth.

b) Install light-colored, high-albedo materials or vegetation for at least 50% of sidewalks, patios, and driveways within 50 feet of the home. Acceptable strategies include the following:

i. white concrete;
ii. gray concrete;
iii. open pavers (counting only the vegetation, not the pavers); and
iv. any material with a solar reflectance index (SRI) of at least 29.

Synergies and Trade-Offs

Shading hardscapes around the home can reduce irrigation needs as well as temper the home's outdoor environment and reduce cooling loads.

Providing shade is addressed in two other credits: EA 1.2 (Exceptional Energy Performance); and SS 4.3(b) and (c) (Vegetated Roof).

Locating fences, trees, shrubs or other plantings appropriately can capture or deflect seasonal breezes.

SS 4. Surface Water Management

Maximum points: 7

Intent

Design site features to minimize erosion and runoff from the home site.

Requirements

Prerequisites

None.

Credits

Note: Certain surface water management strategies may be regulated, restricted, or even prohibited by local water authorities or code requirements.

4.1 **Permeable Lot** (maximum 4 points, as specified in Table 9). Design the lot such that at least 70% of the built environment, not including area under roof, is permeable or designed to capture water runoff for infiltration on-site. Area that can be counted toward the minimum includes the following:

a) Vegetative landscape (e.g., grass, trees, shrubs).

b) Permeable paving, installed by an experienced professional. Permeable paving must include porous above-ground materials (e.g., open pavers, engineered products) and a 6-inch porous subbase, and the base layer must be designed to ensure proper drainage away from the home.

c) Impermeable surfaces that are designed to direct all runoff toward an appropriate permanent infiltration feature (e.g., vegetated swale, on-site rain garden, or rainwater cistern).

4.2 **Permanent Erosion Controls** (1 point). Design and install one of the following permanent erosion control measures:

a) If portions of the lot are located on a steep slope, reduce long-term runoff effects through use of terracing and retaining walls.

OR

b) Plant one tree, four 5-gallon shrubs, or 50 square feet of native groundcover per 500 square feet of disturbed lot area (including area under roof).

4.3 **Management of Runoff from Roof** (maximum 2 points). Design and install one or more of the following runoff control measures:

a) Install permanent stormwater controls (e.g., vegetated swales, on-site rain garden, dry well, or rainwater cistern) designed to manage runoff from the home (1 point).

b) Install vegetated roof to cover 50% of the roof area (0.5 point).

OR

c) Install vegetated roof to cover 100% of the roof area (1 point).

d) Have the site designed by a licensed or certified landscape design or engineering professional such that all water runoff from the home is managed through an on-site design element (2 points).

Table 9. Permeable Area

Percentage of buildable lot (excluding area under roof) that is permeable	*Points*
70–79%	1
80–89%	2
90–99%	3
100%	4

Synergies and Trade-Offs

SS 1.1 addresses erosion control during construction.

Trees, shrubs or groundcover installed for erosion control can be designed as drought-tolerant or otherwise preferable; see SS 2 for more information on landscaping. Conventional turf is less permeable than other plantings and consequently less effective at managing runoff.

SS 5. Nontoxic Pest Control

Maximum points: 2

Intent

Design home features to minimize the need for poisons for control of insects, rodents, and other pests.

Requirements

Prerequisites

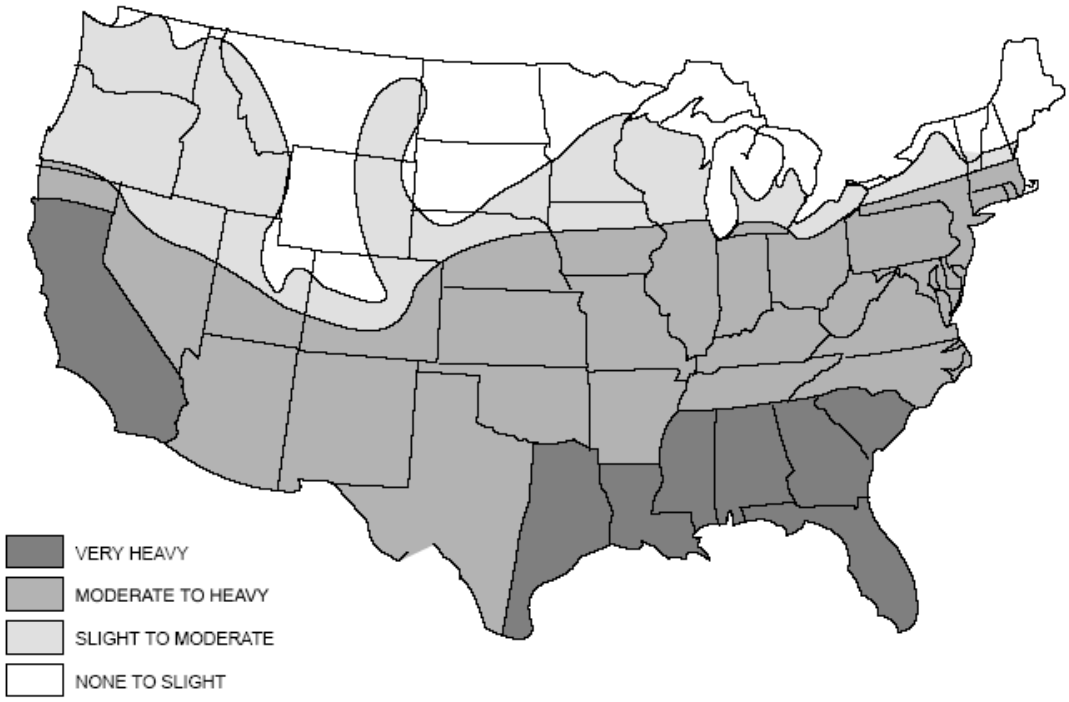
None.

Credits

5. **Pest Control Alternatives** (½ point each, maximum 2 points). Implement one or more of the measures below. All physical actions (for pest management practices) must be noted on construction plans.
   a) Keep all wood (i.e., siding, trim, structure) at least 12 inches above soil (code typically requires 8 inches).
   b) Seal all external cracks, joints, penetrations, edges, and entry points with caulking. Where openings cannot be caulked or sealed, install rodent- and corrosion-proof screens (e.g., copper or stainless steel mesh). Protect exposed foundation insulation with moisture-resistant, pest-proof cover (e.g., fiber cement board, galvanized insect screen).
   c) Include no wood-to-concrete connections *or* separate any exterior wood-to-concrete connections (e.g., at posts, deck supports, stair stringers) with metal or plastic fasteners or dividers.
   d) Install landscaping such that all parts of mature plants will be at least 24 inches from the home.
   e) In areas marked “moderate to heavy” through “very heavy” on the termite infestation probability map (Figure 1), implement one or more of the following measures (½ point each):
      i) Treat all cellulosic material (e.g., wood framing) with a borate product to a minimum of 3 feet above the foundation.
      ii) Install a sand or diatomaceous earth barrier.
      iii) Install a steel mesh barrier termite control system.
      iv) Install non-toxic termite bait system.
      v) Use noncellulosic (i.e., not wood or straw) wall structure.
      vi) Use solid concrete foundation walls or masonry wall with top course of solid block bond beam or concrete-filled block.

Figure 1. Termite Infestation Probability Map

Source: Excerpted from the 2000 International Residential Building Code™.



Note: Lines defining areas are approximate only. Local conditions may be more or less severe than indicated by the region classification.

FIGURE R301.2(6)
TERMITE INFESTATION PROBABILITY MAP

Synergies and Trade-Offs

Limiting conventional turf and installing native plants (SS 2) can help reduce the need for fertilizers and pesticides that contain toxic chemicals.

Keeping plants away from the home makes it unnecessary to irrigate close to the home and risk leaking moisture into the home's foundation.

The thermal bypass inspection, required in the EA credit category, addresses cracks, joints and penetrations in the building envelope.

SS 6. Compact Development

Maximum points: 4

Intent

Make use of compact development patterns to conserve land and promote community livability, transportation efficiency, and walkability.

Requirements

Prerequisites

None.

Credits

6.1 **Moderate Density** (2 points). Build homes with an average housing density of 7 or more dwelling units per acre of buildable land. A single home on 1/7-acre buildable lot qualifies.

OR

6.2 **High Density** (3 points). Build homes with an average housing density of 10 or more dwelling units per acre of buildable land. A single home on 1/10-acre buildable lot qualifies.

OR

6.3 **Very High Density** (4 points). Build homes with an average housing density of 20 or more dwelling units per acre of buildable land. A single home on 1/20-acre buildable lot qualifies.

Note*: Buildable land area* is calculated as follows:

- Exclude public streets or public rights of way, land occupied by nonresidential structures, public parks, and land excluded from residential development by law.
- For multiple-lot developments, include only the sum of the lot areas for homes being built for LEED for Homes.
- The numerator is the number of housing units in the project, and the denominator is the buildable land area included in the project (subject to the above exclustions). Both relate to the project only, not the surrounding area.

Synergies and Trade-Offs

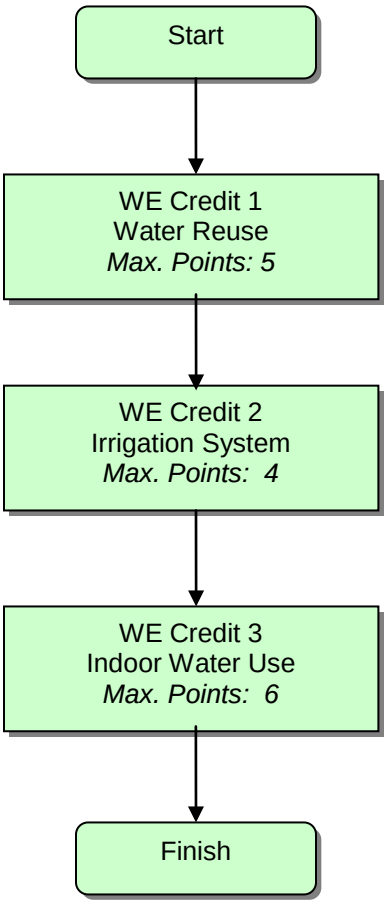
SS 1.2 is automatically granted to moderate, high, or very high density homes because of the reduced impact of compact development.

Water Efficiency (WE)

Pathway through the WE Category

Important Note:

*A minimum of **3 points** must be achieved in the WE category*



WE 1. Water Reuse

Maximum points: 5

Intent

Use municipal recycled water, or offset central water supply through the capture and controlled reuse of rainwater and/or graywater.

Requirements

Prerequisites

None.

Credits

Note: Rainwater and graywater capture systems are subject to local codes and may require special permits. Note that the water quality should meet local standards and consult manufacturers' recommendations to determine the compatibility of plumbing fixtures with graywater. Many states and regulatory agencies require that water going into a toilet or sink meet potable water standards; builders should comply with local codes.

1.1 **Rainwater Harvesting System** (maximum 4 points, as specified in Table 10). Design and install a rainwater harvesting and storage system (including surface runoff and/or roof runoff) for landscape irrigation use or indoor water use. The storage system must be sized to hold all the water from a 1-inch rainfall event (equivalent to 0.62 gallons per square foot of roof area used for capture), taking into consideration the size of the harvest system (i.e., 50% or 75% of total roof area, depending on the measure chosen from Table 10).

AND/OR

1.2 **Graywater Reuse System** (1 point). Design and install a graywater reuse system for landscape irrigation use (i.e., not a septic system) or indoor water use. The system must include a tank or dosing basin that can be used as part of the irrigation system. Graywater must be collected from at least one of the following:

- clothes washer;
- showers;
- some combination of faucets and other sources estimated to exceed 5,000 gallons per year.

OR

1.3 **Use of Municipal Recycled Water System** (3 points). Design the plumbing such that irrigation system water demand is supplied by municipal recycled water. This is applicable only in communities with a municipal recycled water program.

Note: A home using a municipal recycled water system cannot receive points under WE 1.2 (Graywater Reuse System) or WE 1.1 (Rainwater Harvesting System) for outdoor applications.

Table 10. Rainwater Harvesting

System size	*Application*	*Points*
≥ 50% of roof area	Indoor only	2
≥ 50% of roof area	Outdoor only	3
≥ 75% of roof area	Both indoor and outdoor	4

Synergies and Trade-Offs

A project receiving points for WE 1.3 must skip WE 1.1 and WE 1.2.

Rainwater harvesting and graywater reuse irrigation systems should be integrated with resource-efficient landscape (SS 2) and irrigation system design (WE 2).

WE 2. Irrigation System

Maximum points: 4

Intent

Minimize outdoor demand for water through water-efficient irrigation.

Requirements

Prerequisites

None.

Credits

Note: Points shown below are for irrigation systems installed throughout the designed landscape. If only 50% of the designed landscape includes these measures, then only 50% of the points are available. Even if part of the yard is not landscaped, the irrigation system must be stubbed to that part of the yard, as appropriate.

2.1 **High-Efficiency Irrigation System** (1 point each, maximum 3 points). Design and install a high-efficiency irrigation system (based on overall landscaping plans, including measures adopted in SS 2) such that any of the following are met:

a) Install an irrigation system designed by an EPA Water Sense certified professional.

b) Design and install an irrigation system with head-to-head coverage.

c) Install a central shut-off valve.

d) Install a submeter for the irrigation system.

e) Use drip irrigation for at least 50% of landscape planting beds to minimize evaporation.

f) Create separate zones for each type of bedding area based on watering needs.

g) Install a timer or controller that activates the valves for each watering zone at the best time of day to minimize evaporative losses while maintaining healthy plants and obeying local regulations and water use guidance.

h) Install pressure-regulating devices to maintain optimal pressure and prevent misting.

i) Utilize high-efficiency nozzles with an average distribution uniformity (DU) of at least 0.70. This may include conventional rotors, multistream rotors, or high-efficiency spray heads, but the DU must be verified by manufacturer documentation or third-party tests. A point source (drip) irrigation system should be counted as having a DU of 0.80.

j) Check valves in heads.

k) Install a moisture sensor controller or rain delay controller. For example, “smart" evapotranspiration controllers receive radio, pager, or Internet signals to direct the irrigation system to replace only the moisture that the landscape has lost because of heat, wind, etc.

AND/OR

2.2 **Third-Party Inspection** (1 point). Perform a third-party inspection of the irrigation system in operation, including observation of all of the following:

a) All spray heads are operating and delivering water only to intended zones.

b) Any switches or shut-off valves are working properly.

c) Any timers or controllers are set properly.

d) Any irrigation systems are located at least 2 feet from the home.

e) Irrigation spray does not hit the home.

OR

2.3 **Reduce Overall Irrigation Demand by at Least 45%** (maximum 4 points, as specified in Table 11). Design the landscape and irrigation system to reduce the overall irrigation water demand water budget. The estimates must be calculated and prepared by a landscape professional, biologist, or other qualified professional using the method outlined below.

Note: A project must earn full points in SS 2.5 before receiving points for this credit.

Table 11. Reduction in Water Demand

Reduction in estimated irrigation water usage	*WE 2.3 points*	*SS 2.5 points*	*Total points*
45–49%	1	6	7
50–54%	2	6	8
55–59%	3	6	9
60% or more	4	6	10

Method for Calculating Reduction in Irrigation Demand

Step 1. Calculate the baseline irrigation water usage:

Baseline Usage = Landscaped Area * ET_0 * 0.62

where ET_o = Baseline Evapotranspiration Rate (available from local and state Departments of Agriculture)

Step 2. Calculate the design case irrigation water usage:

Design Case Usage = (Landscaped Area * ET_L ÷ IE) * CF * 0.62

where $ET_L = ET_0 * K_L$ and $K_L = K_S * K_{MC}$. Refer to Tables 12 and 13 for values for K_S and K_{MC}, and to Table 14 for values for IE. For CF, use estimated value based on manufacturer's specifications for percentage water savings.

Step 3. Calculate the percentage reduction in irrigation water usage:

Percentage Reduction = (1 – Design Case Usage ÷ Baseline Usage) * 100

Step 4. Refer to Table 11, above, to determine points earned.

Table 12. Species Factor

Vegetation type	*Species factor (K_S)*		
	Low	*Average*	*High*
Trees	0.2	0.5	0.9
Shrubs	0.2	0.5	0.7
Groundcover	0.2	0.5	0.7
Turf	0.6	0.7	0.8

Table 13. Microclimate Factor

Example microclimate impacts	*Microclimate factor (K_{MC})*		
	Low	*Average*	*High*
Shading	0.5	0.8	1.0
High sun exposure	1.0	1.2	1.5
Protection from wind	0.8	0.9	1.0
Windy area	1.0	1.2	1.5

Table 14. Irrigation Efficiency

Irrigation type	*Irrigation efficiency (IE)*	
	Low	*High*
Fixed spray	0.4	0.6
Impact and microspray	0.5	0.7
Rotors	0.6	0.8
Multistream rotators	0.6	0.8
Low volume and point source (e.g., drip)	0.7	0.9

Synergies and Trade-Offs

A project receiving points for WE 2.3 must skip WE 2.1 and 2.2.

A project receiving points for WE 2.3 must achieve full points in SS 2.5.

This irrigation system design must address all aspects of the landscape design, including any features from SS 2, as well as any rainwater harvesting or graywater reuse system (WE 1).

WE 3. Indoor Water Use

Maximum points: 6

Intent

Minimize indoor demand for water through water-efficient fixtures and fittings.

Requirements

Prerequisites

None.

Credits

Note: Compensating shower valves[1,2] and conventional, non-compensating shower valves[3] may not work properly when low -flow showerheads (restricting water flow below 2.5 gpm) are installed. Installing low-flow showerheads where compensating valves or conventional, non-compensating valves are installed can increase the risk of scalding (or other types of injuries, such as slips and falls due to thermal shock) when the plumbing system experiences pressure changes. Make sure any low-flow showerhead is installed with a valve that has been designed, tested and verified to function safely at the reduced flow rate. If in doubt, consult the manufacturer of the valve before installing a low-flow showerhead. Please see the LEED for Homes Reference Guide for more information.

3.1 **High-Efficiency Fixtures and Fittings** (1 point each, maximum 3 points). Meet one or more of the following requirements by installing high-efficiency (low-flow) fixtures or fittings. A project cannot earn points in both WE 3.1 and WE 3.2 for the same fixture type (e.g., faucet, shower, or toilet).

a) The average flow rate for all lavatory faucets must be ≤ 2.0 gpm.

b) The average flow rate for all showers must be ≤ 2.0 gpm per stall.

c) The average flow rate for all toilets must be ≤ 1.3 gpf ***OR***

toilets must be dual-flush and meet the requirements of ASME A112.19.14 ***OR***

toilets must meet the U.S. EPA WaterSense specification and be certified and labeled accordingly.

3.2 **Very High Efficiency Fixtures and Fittings** (2 points each, maximum 6 points). Meet one or more of the following requirements by installing very high efficiency fixtures or fittings. A project cannot earn points in both WE 3.1 and WE 3.2 for the same fixture type (e.g., faucet, shower, or toilet).

a) The average flow rate for all lavatory faucets must be ≤ 1.5 gpm ***OR***

lavatory faucets must meet the U.S. EPA WaterSense specification and be certified and labeled accordingly.

b) The average flow rate for all showers must be ≤ 1.75 gpm per stall.

c) The average flow rate for all toilets must be ≤ 1.1 gpf.

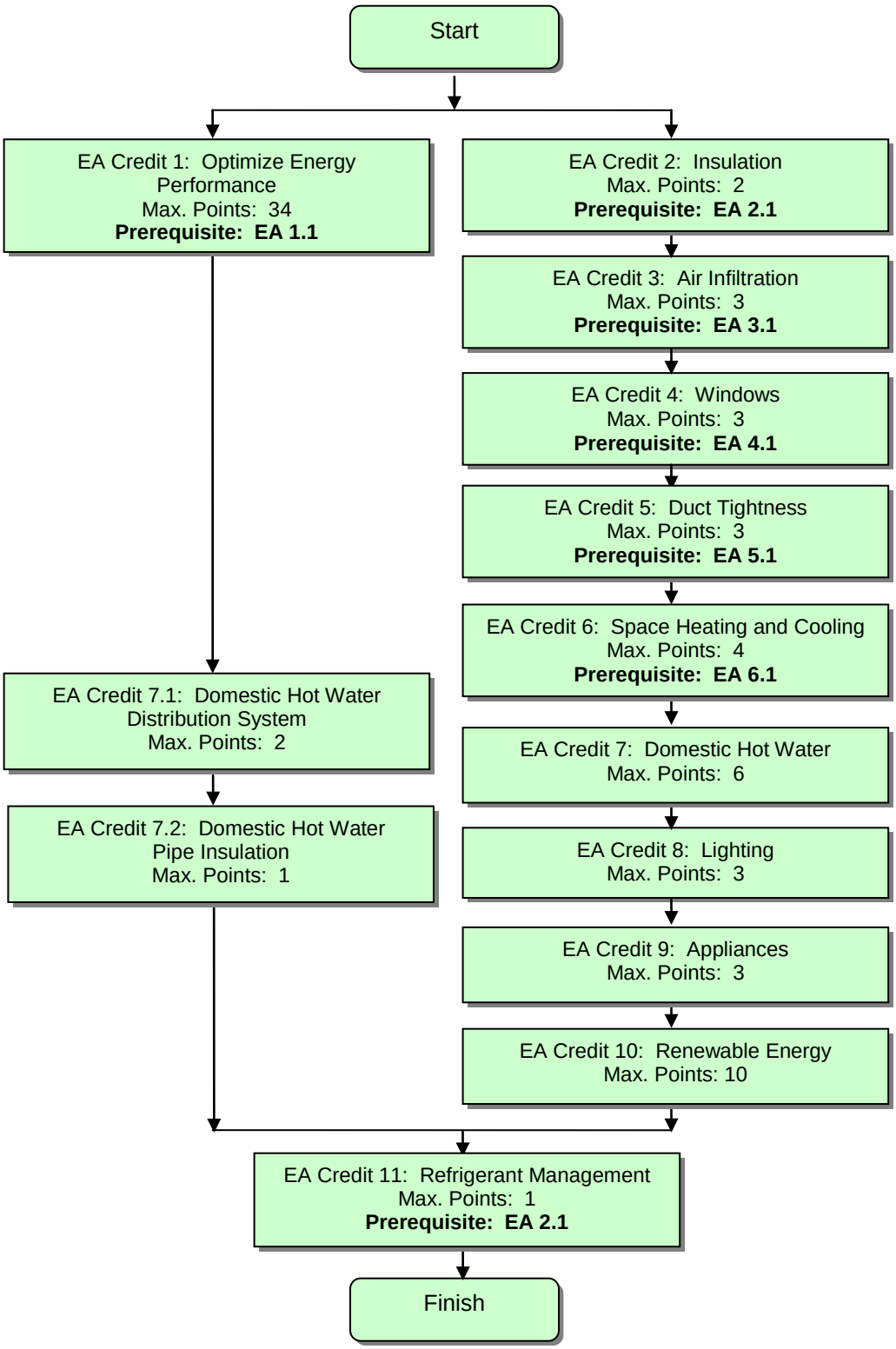
Synergies and Trade-Offs

Indoor water savings also can be achieved with more efficient water distribution systems and appliances. Points for indoor water distribution-related savings are available under EA 7.1, and points for appliance-related water savings are available under EA 9.

Low-flow showerheads and faucets will reduce demand for hot water and resulting energy use for water heating. Credits in EA 7 address water heating efficiency.

Energy & Atmosphere (EA)

Optional Pathways through the EA Category



EA 1. Optimize Energy Performance

Maximum points: 34

Intent

Improve the overall energy performance of a home by meeting or exceeding the performance of an ENERGY STAR labeled home.

Requirements

Prerequisites

1.1 **Performance of ENERGY STAR for Homes.** Meet the performance requirements of ENERGY STAR for Homes, including third-party inspections.

Credits

1.2 **Exceptional Energy Performance** (maximum 34 points). Exceed the performance of ENERGY STAR for Homes. Use the equations below relating the Home Energy Standards (HERS) Index to the appropriate number of LEED points.

Equation:

South

LEED Pts ={ [Log (100 - HERS Index)] / 0.024 } - 48.3

North

LEED Pts = { [Log (100 - HERS Index)] / .021 } - 60.8

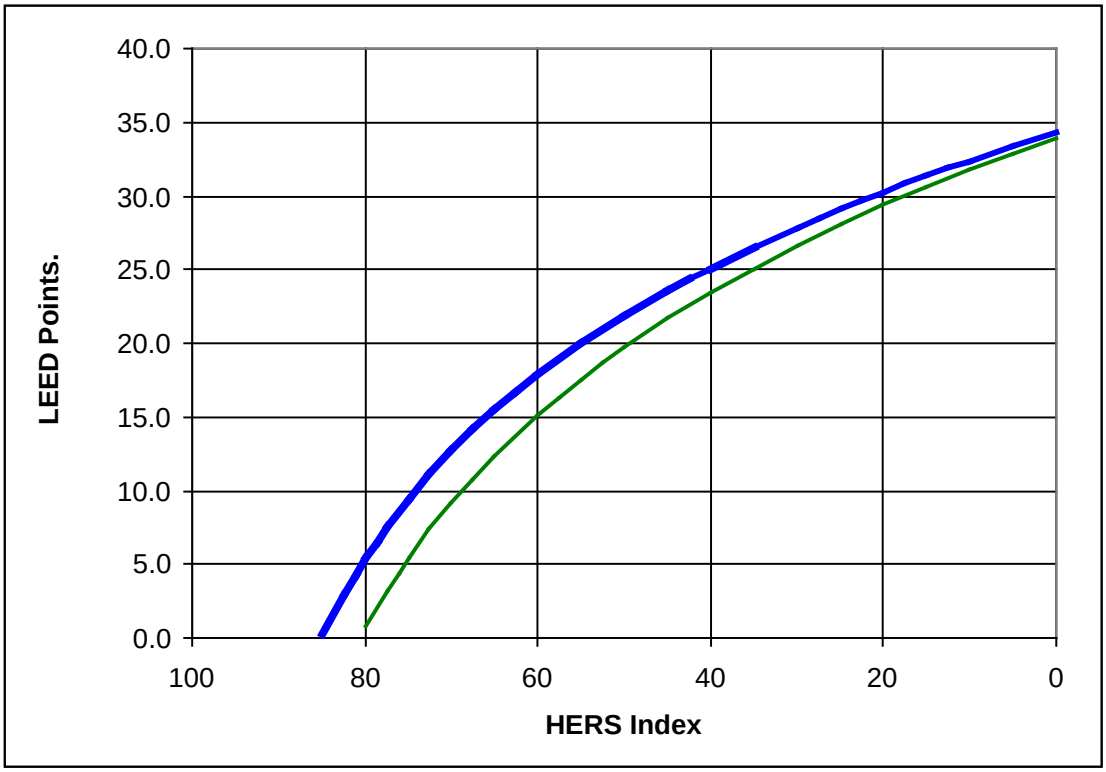
Table 15. HERS Index and LEED Points

IECC Climate Zones 1-5			IECC Climate Zones 6-8		
HERS Index	Percent Above IECC 2004	LEED for Homes Points	HERS Index	Percent Above IECC 2004	LEED for Homes Points
100	0		100	0	
95	5		95	5	
90	10		90	10	
85	15		85	15	
84	16	2.0	84	16	
83	17	3.0	83	17	
82	18	4.0	82	18	
81	19	5.0	81	19	
80	20	6.0	80	20	
79	21	7.0	79	21	2.0
78	22	7.5	78	22	3.0
77	23	8.5	77	23	4.0

Table 15, continued

IECC Climate Zones 1-5			IECC Climate Zones 6-8		
HERS Index	Percent Above IECC 2004	LEED for Homes Points	HERS Index	Percent Above IECC 2004	LEED for Homes Points
76	24	9.0	76	24	5.0
75	25	10.0	75	25	6.0
74	26	10.5	74	26	6.5
73	27	11.5	73	27	7.5
72	28	12.0	72	28	8.0
71	29	12.5	71	29	9.0
70	30	13.0	70	30	9.5
69	31	14.0	69	31	10.0
68	32	14.5	68	32	11.0
67	33	15.0	67	33	11.5
66	34	15.5	66	34	12.0
65	35	16.0	65	35	12.5
64	36	16.5	64	36	13.5
63	37	17.0	63	37	14.0
62	38	17.5	62	38	14.5
61	39	18.0	61	39	15.0
60	40	18.5	60	40	15.5
55	45	20.5	55	45	18.0
50	50	22.5	50	50	20.0
45	55	24.2	45	55	22.0
40	60	26.0	40	60	24.0
35	65	27.0	35	65	25.5
30	70	28.5	30	70	27.0
25	75	30.0	25	75	28.5
20	80	31.0	20	80	30.0
15	85	32.0	15	85	31.0
10	90	33.0	10	90	32.0
5	95	33.5	5	95	33.0
0	100	34.0	0	100	34.0

Figure 2. HERS Index Values and LEED Points



Synergies and Trade-Offs

A project receiving points for this credit must skip credits EA 2–6, 7.3 and 8–10.

Passive solar designs must be modeled and can take credit using the approach laid out in EA 1.

Shading and the reduction of local heat island effects (SS 3) can reduce energy demands for space cooling. Similarly, vegetated roofs (SS 4.3) can reduce both space heating and cooling loads.

High-efficiency appliances and fixtures (WE 3) can reduce hot water demand.

Reduced framing (MR 1) can allow for more insulation and fewer thermal breaks.

Proper design and verification of space heating and cooling distribution systems (EQ 6) can help provide thermal comfort with minimized waste. In hot and humid climates, effective dehumidification (EQ 3) can significantly reduce cooling loads.

EA 2. Insulation

Maximum points: 2

Intent

Design and install insulation to minimize heat transfer and thermal bridging.

Requirements

Prerequisites

2.1 **Basic Insulation.** Meet all the following requirements:

a) Install insulation that meets or exceeds the R-value requirements listed in Chapter 4 of the 2004 International Energy Conservation Code. Alternative wall and insulation systems, such as structural insulated panels (SIPs) and insulated concrete forms (ICFs), must demonstrate a comparable R-value, but thermal mass or infiltration effects cannot be included in the R-value calculation.

b) Install insulation to meet the Grade II specifications set by the National Home Energy Rating Standards (Table 16). Installation must be verified by an energy rater or Green Rater conducting a predrywall thermal bypass inspection, as summarized in Figure 3.

Note: For any portion of the home constructed with SIPs or ICFs, the rater must conduct a modified visual inspection using the ENERGY STAR Structural Insulated Panel Visual Inspection Form.

Credits

2.2 **Enhanced Insulation** (2 points). Meet the following requirements:

a) Install insulation that exceeds the R-value requirements listed in Chapter 4 of the 2004 International Energy Conservation Code by at least 5%. Alternative wall and insulation systems, such as structural insulated panels (SIPs) and insulated concrete forms (ICFs), must demonstrate a comparable R-value, but thermal mass or infiltration effects cannot be included in the R-value calculation.

b) Install insulation to meet the Grade I specifications set by the National Home Energy Rating Standards (Table 16). Installation must be verified by an energy rater or Green Rater conducting a predrywall thermal bypass inspection as summarized in Figure 3.

Note: For any portion of the home constructed with SIPs or ICFs, the rater must conduct a modified visual inspection, using the ENERGY STAR Structural Insulated Panel Visual Inspection Form.

Table 16. Summary of HERS Installation Grades

Please refer to "Adopted Enhancements to the Mortgage Industry National Home Energy Rating Standards," available from RESNET, for a more detailed description

Grade	*Description*
I	Meet the requirements of Grade II (below), but allow only very small gaps, and compression or incomplete fill amounts to 2% or less.
II	Moderate to frequent installation defects, gaps around wiring, electric outlets, etc. and incomplete fill amounts to 10% of less. Gaps running clear through the insulation amount to no more than 2% of the total surface area covered by the insulation. Wall insulation is enclosed on all six sides and in substantial contact with the sheathing material on at least one side (interior or exterior) of the cavity.

Synergies and Trade-Offs

A project receiving points for EA 1 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and all of the associated prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

MR 1.2 - 1.5 address framing efficiency. Efficient framing can create additional spacing in wall cavities, reducing thermal breaks and insulation compaction.

Environmentally preferable insulation is awarded in MR 2.2.

Figure 3. ENERGY STAR Thermal Bypass Inspection Checklist

ENERGY STAR

ENERGY STAR Qualified Homes
Thermal Bypass Inspection Checklist

Home Address:_____City:_____State:_____

Thermal Bypass	Inspection Guidelines	Corrections Needed	Builder Verified	Rater Verified	N/A
1. Overall Air Barrier and Thermal Barrier Alignment	**Requirements:** Insulation shall be installed in full contact with sealed interior and exterior air barrier except for alternate to interior air barrier under item no. 2 *(Walls Adjoining Exterior Walls or Unconditioned Spaces)*				
	All Climate Zones:				
	1.1 Overall Alignment Throughout Home	☐	☐	☐	☐
	1.2 Garage Band Joist Air Barrier (at bays adjoining conditioned space)	☐	☐	☐	☐
	1.3 Attic Eave Baffles Where Vents/Leakage Exist	☐	☐	☐	☐
	Only at Climate Zones 4 and Higher:				
	1.4 Slab-edge Insulation (A maximum of 25% of the slab edge may be uninsulated in Climate Zones 4 and 5.)	☐	☐	☐	☐
	Best Practices Encouraged, Not Req'd.:				
	1.5 Air Barrier At All Band Joists (Climate Zones 4 and higher)	☐	☐	☐	☐
	1.6 Minimize Thermal Bridging (e.g., OVE framing, SIPs, ICFs)	☐	☐	☐	☐
2. Walls Adjoining Exterior Walls or Unconditioned Spaces	**Requirements:** • Fully insulated wall aligned with air barrier at both interior and exterior, **OR** • Alternate for **Climate Zones 1 thru 3**, sealed exterior air barrier aligned with RESNET Grade 1 insulation fully supported • Continuous top and bottom plates or sealed blocking				
	2.1 Wall Behind Shower/Tub	☐	☐	☐	☐
	2.2 Wall Behind Fireplace	☐	☐	☐	☐
	2.3 Insulated Attic Slopes/Walls	☐	☐	☐	☐
	2.4 Attic Knee Walls	☐	☐	☐	☐
	2.5 Skylight Shaft Walls	☐	☐	☐	☐
	2.6 Wall Adjoining Porch Roof	☐	☐	☐	☐
	2.7 Staircase Walls	☐	☐	☐	☐
	2.8 Double Walls	☐	☐	☐	☐
3. Floors between Conditioned and Exterior Spaces	**Requirements:** • Air barrier is installed at any exposed insulation edges • Insulation is installed to maintain permanent contact w/ sub-floor above • **Optional until July 1, 2008**, insulation is installed to maintain permanent contact with air barrier below				
	3.1 Insulated Floor Above Garage	☐	☐	☐	☐
	3.2 Cantilevered Floor	☐	☐	☐	☐
4. Shafts	**Requirements:** Openings to unconditioned space are fully sealed with solid blocking or flashing and any remaining gaps are sealed with caulk or foam (provide fire-rated collars and caulking where required)				
	4.1 Duct Shaft	☐	☐	☐	☐
	4.2 Piping Shaft/Penetrations	☐	☐	☐	☐
	4.3 Flue Shaft	☐	☐	☐	☐
5. Attic/ Ceiling Interface	**Requirements:** • All attic penetrations and dropped ceilings include a full interior air barrier aligned with insulation with any gaps fully sealed with caulk, foam or tape • Movable insulation fits snugly in opening and air barrier is fully gasketed				
	5.1 Attic Access Panel (fully gasketed and insulated)	☐	☐	☐	☐
	5.2 Attic Drop-down Stair (fully gasketed and insulated)	☐	☐	☐	☐
	5.3 Dropped Ceiling/Soffit (full air barrier aligned with insulation)	☐	☐	☐	☐
	5.4 Recessed Lighting Fixtures (ICAT labeled and sealed to drywall)	☐	☐	☐	☐
	5.5 Whole-house Fan (insulated cover gasketed to the opening)	☐	☐	☐	☐
6. Common Walls Between Dwelling Units	**Requirements:** Gap btwn drywall shaft wall (common wall) and structural framing btwn units is sealed at all exterior boundary conditions				
	6.1 Common Wall Between Dwelling Units	☐	☐	☐	☐

Rater Inspection Date: _____ Builder Inspection Date: _____

Home Energy Rating Provider: _____ Builder Company Name: _____

Home Energy Rater Company Name: _____ Builder Division Name: _____

Home Energy Rater Signature: _____ Builder Employee Signature:_____

EA 3. Air Infiltration

Maximum points: 3

Intent

Minimize energy consumption caused by uncontrolled air leakage into and out of conditioned spaces.

Requirements

Prerequisites

3.1 **Reduced Envelope Leakage. Meet the a**ir leakage requirements shown in Table 17. The air leakage rate must be tested and verified by an energy rater.

Credits

3.2 **Greatly Reduced Envelope Leakage** (2 points). Meet the air leakage requirements shown in Table 17. The air leakage rate must be tested and verified by an energy rater.

OR

3.3 **Minimal Envelope Leakage** (3 points). Meet the air leakage requirements shown in Table 17. The air leakage rate must be tested and verified by an energy rater.

Table 17. Air Leakage Requirements

LEED Criteria	*Performance requirements (in ACH50)*			
	IECC Climate Zones 1-2	*IECC Climate Zones 3-4*	*IECC Climate Zones 5-7*	*IECC Climate Zone 8*
EA 3.1: Reduced Envelope Leakage (mandatory)	7.0	6.0	5.0	4.0
EA 3.2: Greatly Reduced Envelope Leakage (optional)	5.0	4.25	3.5	2.75
EA 3.3: Minimal Envelope Leakage (optional)	3.0	2.5	2.0	1.5

Synergies and Trade-Offs

A project receiving points for EA 1 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

Natural air leakage through the envelope contributes to the overall ventilation rate of the home. From a health perspective, it is important to not underventilate a home. From an energy perspective, it is also important not to overventilate. EQ 4 addresses the balance between mechanical and natural ventilation.

EA 4. Windows

Maximum points: 3

Intent

Maximize the energy performance of windows.

Requirements

Prerequisites

4.1 **Good Windows.** Meet all the following requirements:

a) Design and install windows and glass doors that have NFRC ratings that meet or exceed the window requirements of the ENERGY STAR for Homes national Builder Option Package (Table 18).

b) The ratio of skylight glazing to conditioned floor area may not exceed 3%.[1] All skylights must meet the ENERGY STAR performance requirements for skylights, but are exempt from the requirements in Table 18.

c) Homes in the North or North/Central climate zones that have a total window-to-floor area ratio (WFA) of 18% or more must meet a more stringent U-factor requirement (also applicable to EA 4.2 and 4.3):

U-factor = [0.18 / WFA] * [U-factor from Table 18]

d) Homes in the South or South/Central climate zones that have a total window-to-floor area ratio (WFA) of 18% or more must meet a more stringent solar heat gain coefficient (SHGC) requirement (also applicable to EA 4.2 and 4.3):

SHGC = [0.18 / WFA] * [SHGC from Table 18]

Note: Up to 0.75% of the window-to-floor area may be used for decorative glass or skylight area that does not meet the U-factor and SHGC requirements above.

Credits

4.2 **Enhanced Windows** (2 points). Design and install windows and glass doors that have NFRC ratings that exceed the window requirements in the ENERGY STAR for Homes national Builder Option Package (Table 18).

OR

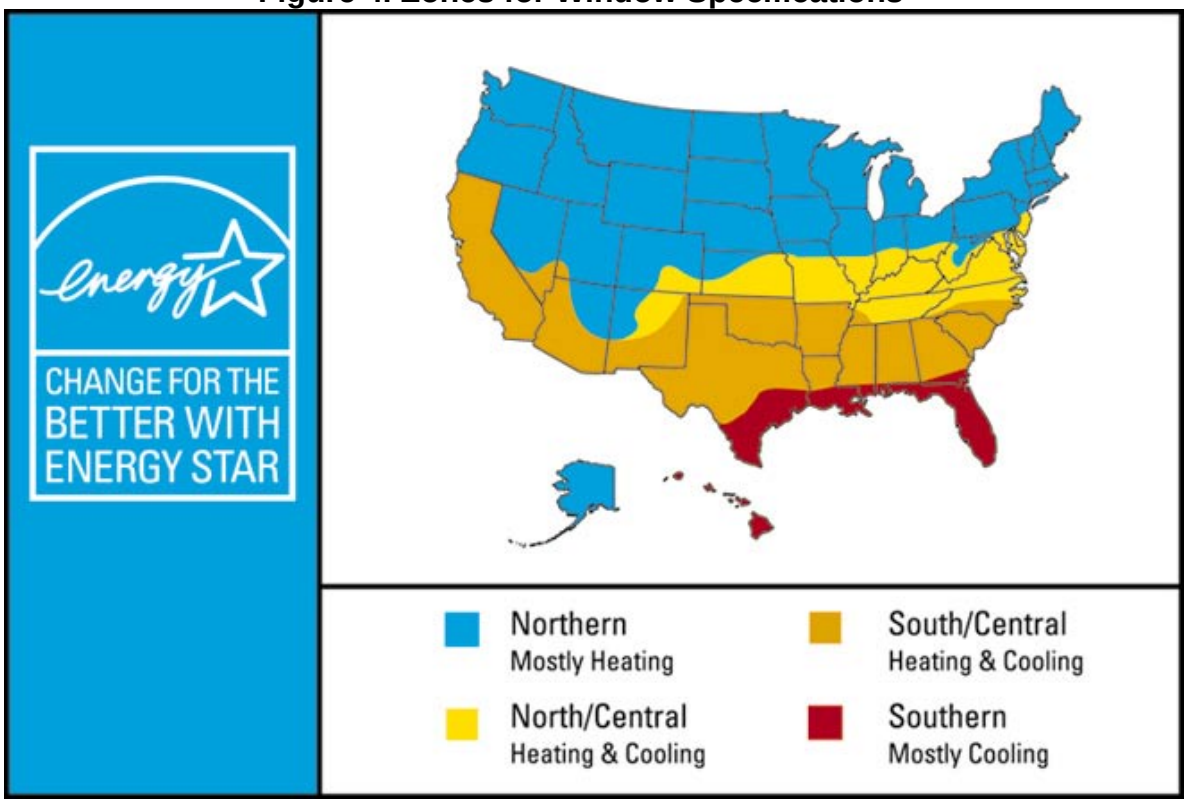
4.3 **Exceptional Windows** (3 points). Design and install windows and glass doors that have NFRC ratings that substantially exceed the window requirements in the ENERGY STAR for Homes national Builder Option Package (Table 18).

[1] For example, a home with 2,000 square feet of conditioned floor area may not have more than 60 square feet of skylight glazing.

Table 18. ENERGY STAR Requirements for Windows and Glass Doors

		ENERGY STAR zone			
	Metric	*Northern*	*North Central*	*South Central*	*Southern*
EA 4.1: Good Windows (prerequisite)	U-factor	≤ 0.35	≤ 0.40	≤ 0.40	≤ 0.55
	SHGC	Any	≤ 0.45	≤ 0.40	≤ 0.35
EA 4.2: Enhanced Windows (optional, 2 points)	U-factor	≤ 0.31	≤ 0.35	≤ 0.35	≤ 0.55
	SHGC	Any	≤ 0.40	≤ 0.35	≤ 0.33
EA 4.3: Exceptional Windows (optional, 3 points)	U-factor	≤ 0.28	≤ 0.32	≤ 0.32	≤ 0.55
	SHGC	Any	≤ 0.40	≤ 0.30	≤ 0.30

Figure 4. Zones for Window Specifications



Synergies and Trade-Offs

A project receiving points for EA 1 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all of the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

Improving the window performance may also reduce heating and/or cooling loads and the energy associated with operating heating and cooling equipment.

EA 5. Heating and Cooling Distribution System **Maximum points: 3**

Intent

Minimize energy consumption due to thermal bridges and/or leaks in the heating and cooling distribution system.

Requirements

A. Forced-Air Systems

Prerequisites

5.1 **Reduced Distribution Losses.** Meet the following requirements:

a) Limit duct air leakage rate to outside the conditioned envelope. The tested duct leakage rate must be ≤ 4.0 cfm at 25 Pascals per 100 square feet of conditioned floor area (for each installed system), verified by the energy rater. Testing is waived if the home meets EA 5.3 (b) or (c).

b) Do not install ducts in exterior walls unless extra insulation is added to maintain the overall UA for an exterior wall without ducts. Ducts may be run inside interior wall cavities but must be fully ducted (i.e., do not use the wall cavity as the duct).

c) Use at least R-6 insulation around ducts in unconditioned spaces.

Credits

5.2 **Greatly Reduced Distribution Losses** (2 points). Limit duct air leakage to outside the conditioned envelope. The tested duct leakage rate must be ≤ 3.0 cfm at 25 Pascals per 100 square feet of conditioned floor area (for each installed system), verified by the energy rater.

OR

5.3 **Minimal Distribution Losses** (3 points). Meet one of the following requirements:

a) Limit duct air leakage to outside the conditioned envelope. The tested duct leakage rate must be ≤ 1.0 cfm at 25 Pascals per 100 square feet of conditioned floor area, verified by the energy rater.

b) Locate the air-handler unit and all ductwork within the conditioned envelope and minimize envelope leakage (i.e., meet the requirements of EA 3.3).

c) Locate the air-handler unit and all ductwork visibly within conditioned spaces (i.e., no ductwork hidden in walls, chases, floors, or ceilings).

B. Nonducted HVAC Systems (e.g., Hydronic Systems)

Prerequisites

5.1 **Reduced Distribution Losses.** Use at least R-3 insulation around distribution pipes in unconditioned spaces.

Credits

5.2 **Greatly Reduced Distribution Losses** (2 points). Keep the system (including boiler and distribution pipes) entirely within the conditioned envelope.

5.3 **Minimal Distribution Losses** (1 point). Install outdoor reset control (i.e., controls that modulate distribution water temperature based on outdoor air temperature).

Synergies and Trade-Offs

A project receiving points for EA 1.2 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all of the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

EQ 6 requires proper duct design to ensure adequate air flow and includes credit for testing air flow into each room.

MR 1.2–1.5 address framing efficiency. HVAC and framing efficiency are closely linked; floor, ceiling, and roof framing layouts should be designed to use framing material efficiently and at the same time accommodate duct runs as efficiently as possible. Addressing both simultaneously provides an opportunity to achieve multiple resource efficiencies through one design exercise.

EQ prerequisite 10 prohibits the placement of ductwork in the garage.

EA 6. Space Heating and Cooling Equipment **Maximum points: 4**

Intent

Reduce energy consumption associated with the heating and cooling system.

Requirements

Note: Both the space heating and the space cooling equipment must meet the requirements of this credit. If only one type of equipment qualifies, then half the points should be taken. Homes built without air-conditioning should be modeled under EA 1, using the default (minimum efficiency allowed) in both the reference and the rated homes.

Prerequisites

6.1 **Good HVAC Design and Installation.** Meet each of the following requirements:

a) Design and size HVAC equipment properly using ACCA Manual J, the ASHRAE 2001 Handbook of Fundamentals or an equivalent computation procedure.

b) Install HVAC equipment that meets the requirements of the ENERGY STAR for Homes national Builder Option Package (Table 19).

c) Install ENERGY STAR labeled programmable thermostat (except heat pumps and hydronic systems).

Credits

6.2 **High-Efficiency HVAC** (2 points). Design and install HVAC equipment that is better than the equipment required by the ENERGY STAR Builder Option Package (Table 19).

OR

6.3 **Very High Efficiency HVAC** (maximum 4 points). Design and install HVAC equipment that is substantially better than the equipment required by the ENERGY STAR Builder Option Package (Table 19). Any piping designed as part of a heat pump system to carry water that is well above (or below) the thermostatic temperature settings in the home must have R-4 insulation or greater.

Note: The maximum of 4 points is available only if a heat pump is installed. Furnace and boiler systems can earn a maximum of 3 points.

Synergies and Trade-Offs

A project receiving points for EA 1 is not eliglble for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all of the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

Substantial energy savings can be achieved by using heat recovery equipment. Heat or energy recovery systems are rewarded in EQ 4.2.

EQ 10 prohibits the placement of the air handler unit in the garage. EA 11 requires a refrigerant charge test and encourages the selection of preferred refrigerants.

Table 19(a). HVAC Requirements for IECC Climate Zones 4–8.

		HVAC equipment					
					Ground-source heat pumps		
	End use	*Central AC and air source heat pumps*	*Furnaces (gas, oil or propane)*	*Boilers (gas, oil or propane)*	*Open loop*	*Closed loop*	*Direct expansion*
EA 6.1: Good HVAC Design and Installation (prerequisite)	Cooling	≥ 13 SEER			≥ 16.2 EER	≥ 14.1 EER	≥ 15 EER
	Heating	≥ 8.2 HSPF	≥ 90 AFUE	≥ 85 AFUE	≥ 3.6 COP	≥ 3.3 COP	≥ 3.5 COP
EA 6.2: High-Efficiency HVAC (2 points)	Cooling	≥ 14 SEER			≥ 17.8 EER	≥ 15.5 EER	≥ 16.5 EER
	Heating	≥ 8.6 HSPF	≥ 92 AFUE	≥ 87 AFUE	≥ 4.0 COP	≥ 3.6 COP	≥ 3.9 COP
EA 6.3: Very High Efficiency HVAC (heat pump, 4 points; other systems, 3 points)	Cooling	≥ 15 SEER			≥ 19.4 EER	≥ 17 EER	≥ 18 EER
	Heating	≥ 9.0 HSPF	≥ 94 AFUE*	≥ 90 AFUE	≥ 4.3 COP	≥ 4.0 COP	≥ 4.2 COP

** Furnace with low electric energy use.*

Table 19(b). HVAC Requirements for IECC Climate Zones 1–3.

		HVAC equipment					
					Ground-source heat pumps		
	End use	*Central AC and air source heat pumps*	*Furnaces (gas, oil or propane)*	*Boilers (gas, oil or propane)*	*Open loop*	*Closed loop*	*Direct expansion*
EA 6.1: Good HVAC Design and Installation (prerequisite)	Cooling	≥ 14 SEER			≥ 16.2 EER	≥ 14.1 EER	≥ 15 EER
	Heating	≥ 8.2 HSPF	≥ 80 AFUE	≥ 80 AFUE	≥ 3.6 COP	≥ 3.3 COP	≥ 3.5 COP
EA 6.2: High-Efficiency HVAC (2 points)	Cooling	≥ 15 SEER			≥ 17.8 EER	≥ 15.5 EER	≥ 16.5 EER
	Heating	≥ 8.6 HSPF	≥ 90 AFUE	≥ 85 AFUE	≥ 4.0 COP	≥ 3.6 COP	≥ 3.9 COP
EA 6.3: Very High Efficiency HVAC (heat pump, 4 points; other systems, 3 points)	Cooling	≥ 16 SEER			≥ 19.4 EER	≥ 17 EER	≥ 18 EER
	Heating	≥ 9.0 HSPF	≥ 92 AFUE*	≥ 87 AFUE	≥ 4.3 COP	≥ 4.0 COP	≥ 4.2 COP

** Furnace with low electric energy use.*

EA 7. Water Heating

Maximum points: 6

Intent

Reduce energy consumption associated with the domestic hot water system, including improving the efficiency of both the hot water system design and the layout of the fixtures in the home.

Requirements

Prerequisites

None.

Credits

7.1 **Efficient Hot Water Distribution** (2 points). Design and install an energy-efficient hot water distribution system (see Figure 5). None of the branch length requirements below apply to cold water demand loads (e.g., toilets), washing machines, or tubs without showerheads. Select one of the following designs:

a) *Structured plumbing system*. The system must meet all of the following:

i. The system must have a demand-controlled circulation loop that is insulated to at least R-4.

ii. The total length of the circulation loop must be less than 40 linear feet of plumbing in one-story homes. Add 2x the ceiling height for two-story homes, and add 4x the ceiling height for three- or four-story homes.

iii. Branch lines from the loop to each fixture must be ≤10 feet long and a maximum of ½-inch nominal diameter.

iv. The system must be designed with a push button control in each full bathroom and the kitchen and an automatic pump shut-off.

b) *Central manifold distribution system*. The system must meet all of the following:

i. The central manifold trunk must be no more than 6 feet in length.

ii. The central manifold trunk must be insulated to at least R-4.

iii. No branch line from the central manifold to any fixtures may exceed 20 feet in one-story homes. Add 1x the ceiling height for two-story homes, and add 2x the ceiling height for three- or four-story homes.

iv. Branch lines from the manifold must be a maximum of ½-inch nominal diameter.

c) *Compact design of conventional system*. The system must meet all of the following:

i. No branch line from the water heater to any fixtures may exceed 20 feet in one-story homes. Add 1x the ceiling height for two-story homes, and add 2x the ceiling height for three- or four-story homes.

ii. Branch lines from the central header to each fixture must be a maximum of ½-inch nominal diameter.

7.2 **Pipe Insulation** (1 point). All domestic hot water piping shall have R-4 insulation. Insulation shall be properly installed on all piping elbows to adequately insulate the 90-degree bend.

7.3 **Efficient Domestic Hot Water (DHW) Equipment** (maximum 3 points). Design and install energy-efficient water heating equipment. Select one measure from Table 20 below.

Figure 5(a). Sample Schematic of a Structured Plumbing System

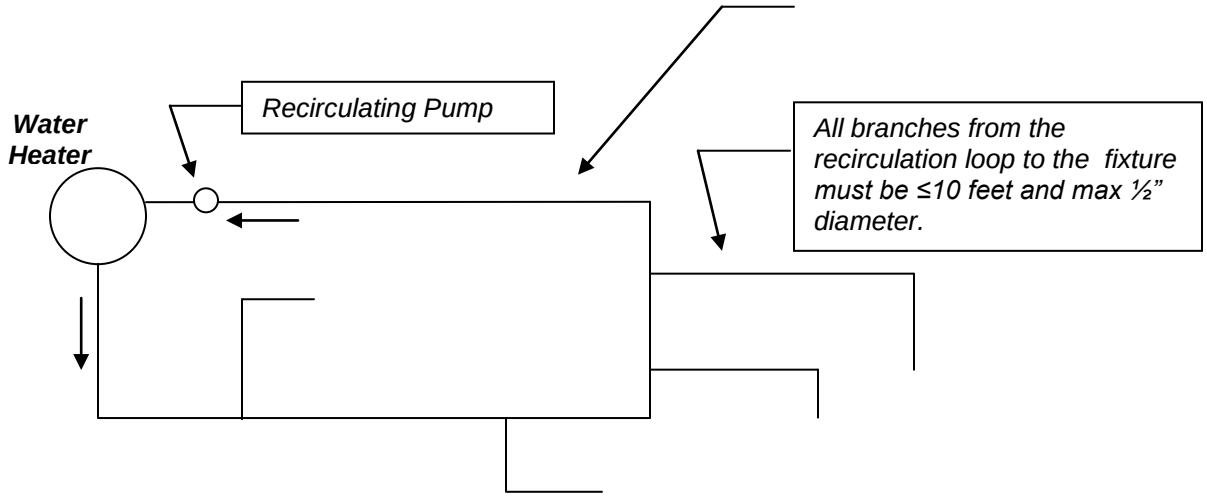


Figure 5(b). Sample Schematic of a Central Manifold Distribution System

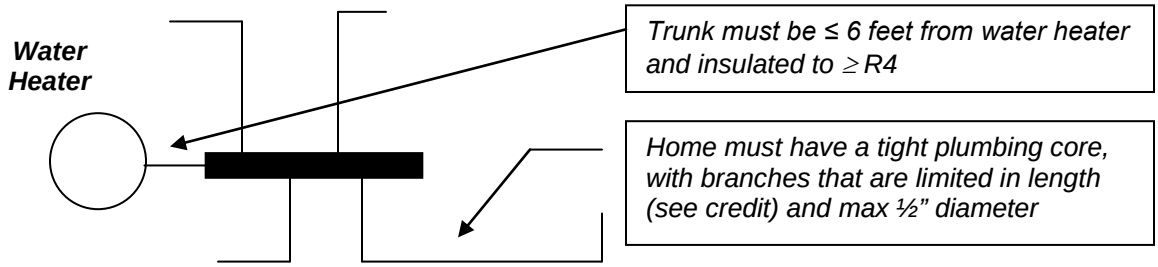


Figure 5(c). Sample Schematic of a Compact Design

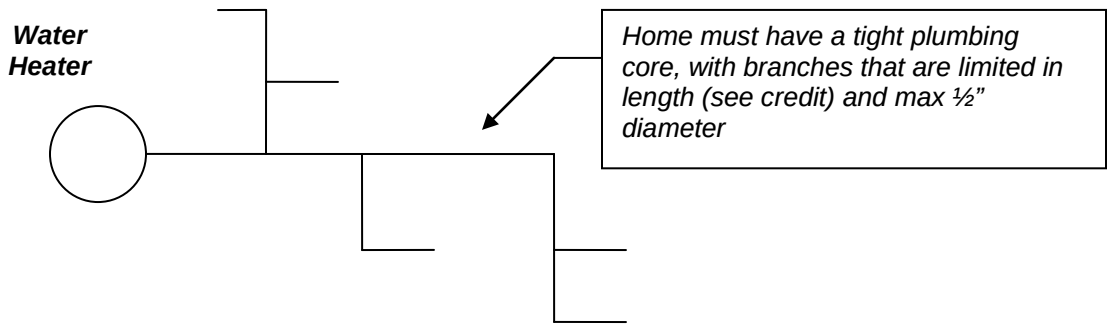


Table 20. High-Efficiency Water Heating Equipment

Water heater type and efficiency requirement	*Description*	*Points*
Gas water heaters		
EF ≥ 0.53 (80 gallon)	High-efficiency storage water heater	1
EF ≥ 0.57 (60 gallon)	High-efficiency storage water heater	1
EF ≥ 0.61 (40 gallon)	High-efficiency storage water heater	1
EF ≥ 0.8	Storage or tankless water heater	2
CAE ≥ 0.8	Combination water and space heaters	2
Electric water heaters		
EF ≥ 0.89 (80 gallon)	High-efficiency storage water heater	1
EF ≥ 0.92 (50 gallon)	High-efficiency storage water heater	1
EF ≥ 0.93 (40 gallon)	High-efficiency storage water heater	1
EF ≥ 0.99	Tankless water heater	2
EF ≥ 2.0	Heat pump water heater	3
Solar water heaters (backup)		
≥ 40% of annual DHW load	With preheat tank	2
≥ 60% of annual DHW load	With preheat tank	3

EF = Energy factor. Energy factors for equipment from various manufacturers are available at http://www.gamanet.org/gama/inforesources.nsf/vContentEntries/Product+Directories.
CAE = Combined annual efficiency.

Synergies and Trade-Offs

A project receiving points for EA 1 is not eliglble for EA 7.3, and vice versa. A project pursuing EA 7.3 must follow the prescriptive pathway and meet all of the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section. EA 7.1 and 7.2 are available to every project, whether the performance approach (EA 1) or the prescriptive approach (EA 2–10) is used.

Low-flow showerheads and faucets may also reduce demand for hot water and resulting energy use for water heating. Points for installing low-flow showerheads are available under WE 3. Additional reductions in hot water energy use achieved through efficient appliances are addressed in EA 9.

EA 8. Lighting

Maximum points: 3

Intent

Reduce energy consumption associated with interior and exterior lighting.

Requirements

Prerequisites

8.1 **ENERGY STAR Lights.** Install at least four ENERGY STAR labeled light fixtures or ENERGY STAR labeled compact fluorescent light bulbs (CFLs) in high-use rooms (kitchen, dining room, living room, family room, hallways).

Credits

8.2 **Improved Lighting** (1.5 maximum points). Select and install one or both of the following measures:

a) Indoor lighting (0.5 points). Install three additional ENERGY STAR labeled light fixtures or ENERGY STAR labeled compact fluorescent light bulbs (CFLs) in high-use rooms. These are in addition to the four ENERGY STAR lights required by EA 8.1.

b) Exterior lighting (1 point). All exterior lighting must have either motion sensor controls or integrated photovoltaic cells. The following lighting is exempt: emergency lighting; lighting required by code for health and safety purposes; and lighting used for eye adaptation near covered vehicle entrances or exits.

OR

8.3 **Advanced Lighting Package** (3 points). Install ENERGY STAR Advanced Lighting Package using only ENERGY STAR labeled fixtures. The Advanced Lighting Package consists of a minimum of 60% ENERGY STAR qualified hard-wired fixtures and 100% ENERGY STAR–qualified ceiling fans (if any).

OR

Install ENERGY STAR labeled lamps in 80% of the fixtures throughout the home. ENERGY STAR labeled CFLs are acceptable. All ceiling fans must be ENERGY STAR labeled.

Synergies and Trade-Offs

A project receiving points for EA 1 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all the associated prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

Improving the lighting efficiency may also reduce cooling loads and the energy consumption associated with air–conditioning.

EA 9. Appliances

Maximum points: 3

Intent

Reduce appliance energy consumption.

Requirements

Prerequisites

None.

Credits

9.1 **High-Efficiency Appliances** (maximum 2 points). Install appliances from the list below. To receive points for one type (e.g., refrigerator), every appliance of that type must meet the applicable requirement below.

a) ENERGY STAR labeled refrigerator(s) (1 point).

b) ENERGY STAR labeled ceiling fans (at least one in living or family room *and* one per bedroom) (0.5 point).

c) ENERGY STAR labeled dishwasher(s) that use 6.0 gallons or less per cycle (0.5 point).

d) ENERGY STAR labeled clothes washer(s) (0.5 point).

9.2 **Water-Efficient Clothes Washer** (1 point). Install clothes washer with modified energy factor (MEF) ≥ 2.0 and water factor (WF) < 5.5. A clothes washer that meets these requirements and the requirement in EA 9.1 can be counted for both.

Synergies and Trade-Offs

A project receiving points for EA 1 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

EA 10. Renewable Energy

Maximum points: 10

Intent

Reduce consumption of nonrenewable energy sources by encouraging the installation and operation of renewable electric generation systems.

Requirements

Prerequisites

None.

Credits

10 **Renewable Energy System** (maximum 10 points). Design and install a renewable electricity generation system. Use energy modeling to estimate both the energy supplied by the renewable energy system and the annual reference electrical load. Receive 1 point for every 3% of the annual reference electrical load met by the system.

Annual reference electric load is defined as the amount of electricity that a typical home (e.g., the HERS Reference Home) would consume in a typical year. The annual reference electric load must be determined using the procedures specified in the 2006 Mortgage Industry National Home Energy Rating Standards (HERS) Guidelines.

For example,

Annual reference electric load	= 10,000 KWh
Annual electricity consumption in LEED home	= 7,000 KWh
Annual electricity supplied by renewable energy system	= 1,800 KWh
Percentage of annual reference electric load supplied by renewable energy system	= 1,800 / 10,000
	= 18.0%
LEED points, under EA 10	*= 18.0 ÷ 3 = 6.0 points*

Synergies and Trade-Offs

A project receiving points for EA 1 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all of the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

Passive solar designs must be modeled and can take credit using the approach laid out in EA 1.

Solar hot water heating systems are rewarded in EA 7.3.

EA 11. Residential Refrigerant Management **Maximum points: 1**

Intent

Select and test air-conditioning refrigerant to ensure performance and minimize contributions to ozone depletion and global warming.

Requirements

Prerequisites

11.1 **Refrigerant Charge Test.** Provide proof of proper refrigerant charge of the air-conditioning system (unless home has no mechanical cooling system).

Credits

11.2 **Appropriate HVAC Refrigerants** (1 point). Do one of the following:

a) Do not use refrigerants.

b) Install an HVAC system with non-HCFC refrigerant (e.g., R-410a).

c) Install an HVAC system with a refrigerant that complies with the following equation. (See Table 21 for examples of the equation applied to R410a used in different system sizes).

$$LCGWP + LCODP \times 10^5 \leq 160$$

where

LCODP = [ODPr x (Lr x Life + Mr) x Rc]/Life

LCGWP = [GWPr x (Lr x Life + Mr) x Rc]/Life

LCODP = Lifecycle Ozone Depletion Potential (lb CFC11/ton-year)

LCGWP = Lifecycle Direct Global Warming Potential (lb CO_2/ton-year)

GWPr = Global Warming Potential of Refrigerant (0–12,000 lb CO_2/lbr)

ODPr = Ozone Depletion Potential of Refrigerant (0–0.2 lb CFC11/lbr)

Lr = Refrigerant Leakage Rate (0.5–2.0%; default of 2% unless otherwise demonstrated)

Mr = End-of-life Refrigerant Loss (2.0–10%; default of 10% unless otherwise demonstrated)

Rc = Refrigerant Charge (0.50–5.0 lbs of refrigerant per ton of cooling capacity)

Life = Equipment Life (10–35 years; default based on equipment type, unless otherwise demonstrated)

Table 21. Examples of Residential Refrigerants Eligible for EA 11.2

Refrigerant	*Combined LCGWP+ LCODP score*	*System size*	*Refrigerant charge*	*Leakage rate*	*Equipment life*
R410a	152	2 tons	3.7 lb/ton	1.5%	15 years
R410a	151	3 tons	3.0 lb/ton	2.0%	15 years
R410a	151	4 tons	3.0 lb/ton	2.0%	15 years
R410a	121	5 tons	3.0 lb/ton	2.0%	15 years

Synergies and Trade-Offs

Efficient air-conditioning systems are covered under EA 6.

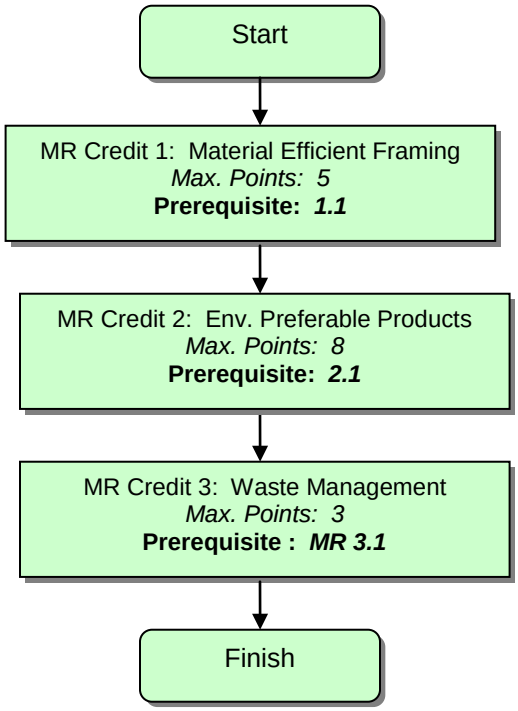
This credit is available to every project, whether the performance approach (EA 1) or the prescriptive approach (EA 2–10) is used.

Materials and Resources (MR)

Pathway through the MR Category

Important Note:

*A minimum of **2 points** must be achieved in the MR category*



MR 1. Material-Efficient Framing

Maximum points: 5

Intent

Optimize the use of framing materials.

Requirements

Prerequisites

1.1 **Framing Order Waste Factor Limit.** Limit the overall estimated waste factor to 10% or less. If the waste factor on any portion of the framing order exceeds 10%, calculate the overall waste factor as shown in Table 22.

Waste factor is defined as the percentage of framing material ordered in excess of the estimated material needed for construction.

Table 22. Sample Framing Order Waste Factor Calculation

Framing component	*Total cost*	*Waste factor*	*Waste cost*
Random lengths	$1,000	15%	$150
Studs	$2,000	5%	$100
Beams and headers	$500	20%	$100
Roof deck	$2,000	0%	$0
Wall sheathing	$0	0%	$0
Rafters	$2,000	0%	$0
Ceiling joists	$1,500	10%	$150
Cornice work	$3,000	10%	$300
TOTAL	$12,000		$1,000
Overall waste factor (waste $ / cost $)			8.3%

Credits

1.2 **Detailed Framing Documents** (1 point). Prior to construction, create detailed framing plans or scopes of work and accompanying architectural details for use on the job site. Indicate the specific locations, spacing, and sizes of all framing members in the floors, walls, roof, and ceiling (if different from the roof).

1.3 **Detailed Cut List and Lumber Order** (1 point). The requirements in MR 1.2 must be met to earn this credit. Prior to construction, create a detailed cut list and lumber order that corresponds directly to the framing plans and/or scopes of work.

AND/OR

1.4 **Framing Efficiencies** (maximum 3 points). Implement measures from Table 23.

OR

1.5 **Off-Site Fabrication** (4 points). Use either of the following alternatives to on-site framing:

a) Panelized construction. Wall, roof, and floor components are delivered to the job site preframed.

b) Modular, prefabricated construction. All principal building sections are delivered to the job site as prefabricated modules.

Table 23. Efficient Framing Measures

Measure	*Points*
Precut framing packages	1.0
Open-web floor trusses	1.0
Structural insulated panel (SIP) walls	1.0
SIP roof	1.0
SIP floors	1.0
Stud spacing greater than 16” o.c	1.0
Ceiling joist spacing greater than 16” o.c.	0.5
Floor joist spacing greater than 16” o.c.	0.5
Roof rafter spacing greater than 16” o.c.	0.5
Implement any 2 of the following: • Size headers for actual loads • Use ladder blocking or drywall clips • Use 2-stud corners	0.5

Note: Alternative measures not listed in Table 23 may be eligible to earn points if they save comparable amounts of framing material. A formal credit interpretation request with full justification of any alternative measure’s potential savings must be submitted by the Provider to USGBC.

Synergies and Trade-Offs

Reduced framing can reduce the number and size of thermal breaks and increase the amount of insulation installed, leading to better energy performance (EA 1 and 2).

Credit MR 1.2 is a prerequisite for MR 1.3. A home that earns points for MR 1.2, 1.3 and 1.4 cannot earn points for MR 1.5, and vice versa.

Optimizing the use of framing will reduce the amount of construction waste (MR 3.2).

MR 2. Environmentally Preferable Products

Maximum points: 8

Intent

Increase demand for environmentally preferable products and products or building components that are extracted, processed, and manufactured within the region.

Requirements

Prerequisites

2.1 **FSC Certified Tropical Wood.** Meet the following two requirements, as applicable:

a) Provide all wood product suppliers with a notice (see Figure 6, below) containing all the following elements:

i. a statement that the builder's preference is to purchase products containing tropical wood only if it is FSC-certified;
ii. a request for the country of manufacture of each product supplied; *and*
iii. a request for a list of FSC-certified tropical wood products the vendor can supply.

b) If tropical wood is intentionally used (i.e., specified in purchasing documents), use only FSC-certified tropical wood products. Reused or reclaimed materials are exempt.

Note: A species of wood is considered *tropical* for the purposes of this prerequisite if it is grown in a country that lies between the Tropics of Cancer and Capricorn.

Credits

2.2 **Environmentally Preferable Products** (0.5 point each, maximum 8 points). Use building component materials that meet one or more of the criteria below. Except as noted in Table 24, a material must make up 90% of the component, by weight or volume. A single component that meets each criterion (i.e., environmentally preferable, low emissions, and local sourcing) can earn points for each.

a) Environmentally preferable products (0.5 point per component). Use products that meet the specifications in Table 24.

Note: Recycled content products must contain a minimum of 25% postconsumer recycled content, except as noted in Table 24. Postindustrial (preconsumer) recycled content must be counted at half the rate of postconsumer content.

AND/OR

b) Low emissions (0.5 point per component). Use products that meet the emissions specifications in Table 24.

AND/OR

c) Local production (0.5 point per component). Use products that were extracted, processed, *and* manufactured within 500 miles of the home.

Table 24. Environmentally Preferable Products

Assembly	Component	EPP specifications (0.5 point per component)	Emission specifications (0.5 point per component)	Local production (0.5 point per component)
Exterior wall	Framing / wall structure	Concrete wall structure: Use 30% fly ash or slag wood frame: FSC-certified or reclaimed or finger joint studs	*N/A*	Eligible
Exterior wall	Siding or masonry	Recycled content, reclaimed, or FSC-certified	*N/A*	Eligible
Floor	Flooring (45% of total floor area)	Linoleum, cork, bamboo, FSC-certified or reclaimed wood, sealed concrete, recycled-content flooring, *or combination*	Carpet & pad: all carpet & pad complies with Carpet & Rug Institute Green Label Plus program Hard flooring: automatic 1/2 point for 100% hard surface flooring Hard flooring: additional 1/2 point for using a product that is SCS FloorScore certified	Eligible
Floor	Flooring (90% of total floor area)	Meet specifications above to receive *additional* 0.5 point.		Eligible (*additional* 0.5 point)
Floor	Framing	FSC-certified or reclaimed	*N/A*	Eligible
Foundation	Aggregate	*N/A*	*N/A*	Eligible
Foundation	Cement	Use 30% fly ash or slag	*N/A*	Eligible
Interior wall	Framing	FSC-certified or reclaimed	*N/A*	Eligible
Interior walls AND ceilings	Gypsum board	*N/A*	*N/A*	Eligible
Interior walls AND ceilings AND millwork	Paints and coatings	Recycled paint that meets Green Seal standard GS-43	Use products that comply with all applicable standards in Table 25.	Not eligible
Landscape	Decking or patio material	Recycled content, FSC-certified, or reclaimed	*N/A*	Eligible
Other	Cabinets	Recycled content, FSC-certified, or reclaimed AND composite materials must contain no added urea-formaldehyde resins	*N/A*	Eligible
Other	Counters (kitchens and bathrooms)	Recycled content, FSC-certified, or reclaimed AND composite materials must contain no added urea-formaldehyde resins	*N/A*	Eligible
Other	Doors (not including garage or insulated doors)	Recycled content, FSC-certified, or reclaimed	*N/A*	Eligible
Other	Trim	Recycled content, FSC-certified, or reclaimed AND composite materials must contain no added urea-formaldehyde resins	*N/A*	Eligible
Other	Adhesives and sealants	*N/A*	Use products that comply with all applicable standards in Table 26.	Not eligible
Other	Window framing	Recycled content, FSC-certified, or reclaimed	*N/A*	Eligible
Roof	Framing	FSC-certified	*N/A*	Eligible
Roof	Roofing	Recycled content	*N/A*	Eligible
Roof AND floor AND wall	Insulation	Recycled content of 20% or more	Comply with California "Practice for Testing of VOCs from Building Materials Using Small Chambers": www.dhs.ca.gov/ehlb/IAQ/VOCS/Practice.htm	Eligible
Roof, floor, wall (2 of 3)	Sheathing	Recycled content, FSC-certified, or reclaimed	N/A	Eligible

Figure 6. Example Notice to Wood Products Suppliers

Notice to Vendors: [The company] prefers to purchase products that contain tropical wood only if they are certified according to the guidelines of the Forest Stewardship Council (FSC). Please provide the country of manufacture of each product you expect to supply to us. Also please provide a list of FSC-certified products you can supply.

Table 25. Standards for Environmentally Preferable Paints and Coatings

Component	*Applicable standard (VOC content)*	*Reference*
Architectural paints, coatings and primers applied to interior walls and ceilings	Flats: 50 g/L Nonflats: 150 g/L	Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993
Anticorrosive and antirust paints applied to interior ferrous metal substrates	250 g/L	Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997
Clear wood finishes	Varnish: 350 g/L Lacquer: 550 g/L	South Coast Air Quality Management District Rule 1113, Architectural Coatings
Floor coatings	100 g/L	
Sealers	Waterproofing: 250 g/L Sanding: 275 g/L All others: 200 g/L	
Shellacs	Clear: 730 g/L Pigmented: 550 g/L	
Stains	250 g/L	

Table 26. Standards for Low-Emissions Adhesives and Sealants

(meet South Coast Air Quality Management District Rule #1168)

	Applicable standard (VOC content, g/L less water)
Architectural applications	
Indoor carpet adhesives	50
Carpet pad adhesives	50
Wood flooring adhesives	100
Rubber floor adhesives	60
Subfloor adhesives	50
VCT and asphalt adhesives	50
Drywall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Specialty applications	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact adhesive	80
Special-purpose contact adhesive	250
Structural wood member adhesive	140
Sheet-applied rubber lining operations	850
Top and trim adhesive	250
Substrate-specific applications	
Metal to metal	30
Plastic foams	50
Porous materials (except wood)	50
Wood	30
Fiberglass	80
Sealants	
Architectural	250
Nonmembrane roof	300
Roadway	250
Single-ply roof membrane	450
Other	420
Sealant primers	
Architectural nonporous	250
Architectural porous	775
Other	750

Synergies and Trade-Offs

Products with low emissions of volatile organic compounds (VOCs) may improve indoor air quality. Such products are included in this credit rather than in the EQ section in order to consolidate information pertaining to materials selection, specification, and purchase.

A substantial amount of energy is used to transport materials from product manufacturing plants to home construction sites. Choosing local products will reduce the embedded transportation energy usage associated with construction.

MR 3. Waste Management

Maximum points: 3

Intent

Reduce waste generation to a level below the industry norm.

Requirements

Prerequisites

3.1 **Construction Waste Management Planning.** Complete the following tasks related to management of construction waste:

a) Investigate and document local options for diversion (e.g. recycling, reuse) of all anticipated major constituents of the project waste stream, including cardboard packaging and household recyclables (e.g., beverage containers).

b) Document the diversion rate for construction waste. Record the diversion rate for land clearing and/or demolition, if applicable (e.g., on gut rehab project), separately from the rate for the new construction phase of the project.

Credits

3.2 **Construction Waste Reduction** (maximum 3 points). Reduce or divert waste generated from new construction activities from landfills and incinerators to a level below the industry norm. Use either of two options:

a) Reduced construction waste. Generate 2.5 pounds (or 0.016 cubic yards) or less of net waste (not including waste diverted for reclamation or recycling) per square foot of conditioned floor area. Use column 1 or 2 and column 5 of Table 27 to determine the score.[2]

b) Increased waste diversion. Divert 25% of more of the total materials taken off the construction site from landfills and incinerators. Use column 3 or 4 and column 5 of Table 27 to determine the score; calculate the percentage using either weight or volume.

Note*:* Land clearing and demolition waste (e.g., from removal of preexisting structures on the site) should not be counted in this calculation**.**

[2] The industry average is 4.2 pounds (0.0265 cubic yards) of waste per square foot of conditioned floor area, based on data provided by the National Association of Home Builders' Research Center.

Table 27. Waste Diversion

Amount to landfills and incinerators				
Reduced construction waste		*Increased waste diversion*		
Pounds / ft^2	*Cubic yards / 1,000 ft^2*	*Percentage waste*	*Percentage diverted*	*Points*
4.0	25.5	100%	0%	0.0
3.5	22.3	88%	13%	0.0
3.0	19.1	75%	25%	0.5
2.5	15.9	63%	38%	1.0
2.0	12.8	50%	50%	1.5
1.5	9.6	38%	63%	2.0
1.0	6.4	25%	75%	2.5
0.5	3.2	13%	88%	3.0

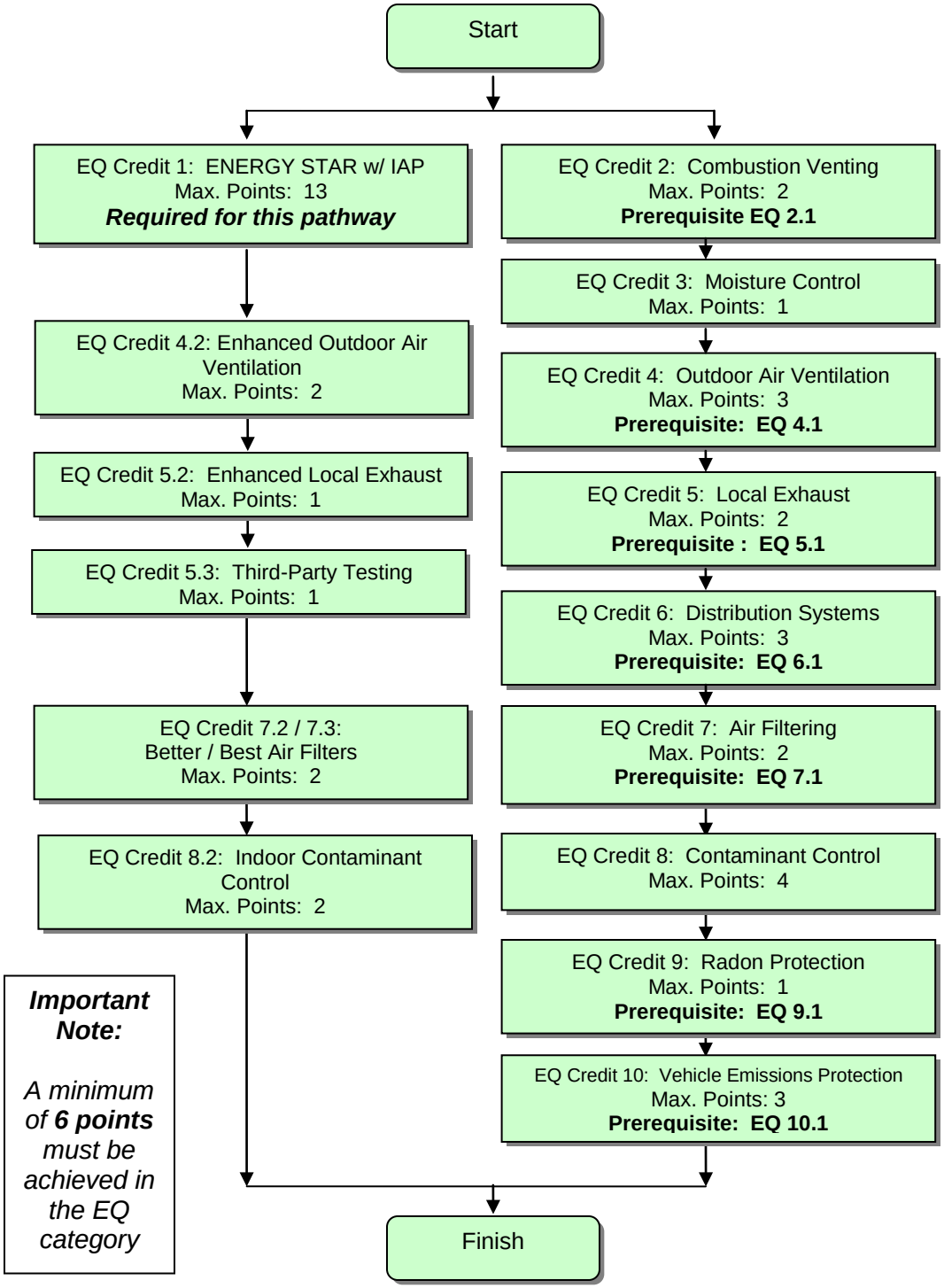
Synergies and Trade-Offs

Waste can be minimized by creating a detailed framing plan and using advanced framing techniques or off-site fabrication (MR 1).

The use of products with reclaimed or recycled content (MR 2.2) reduces both the production of new materials and the burden on landfills.

Indoor Environmental Quality (EQ)

Optional Pathways through the EQ Category



EQ 1. ENERGY STAR with Indoor Air Package

Maximum points: 13

Intent

Improve the overall quality of a home's indoor environment by installing an approved bundle of air quality measures.

Requirements

Prerequisites

None.

Credits

1 **ENERGY STAR with Indoor Air Package** (13 points). Complete all the requirements of the U.S. Environmental Protection Agency's ENERGY STAR with Indoor Air Package (IAP).

Synergies and Trade-Offs

A project receiving points for this credit may skip the prerequisites in EQ 2-10, and is not eligible to earn points in EQ 2.2, 3, 4.3, 6, 8.1, 8.3, 9, and 10.

Achieving the measures in EPA's Indoor Air Package may qualify a home to receive points in other categories of the LEED for Homes Rating System. See Table 28 for equivalencies.

Table 28. Applicability of ENERGY STAR Indoor Air Package Measures to LEED for Homes

LEED for Homes prerequisites / credits	*Relevant Indoor Air Package measures*	*Applicability*
Innovation & Design Process 2.1, 2.2	Various	Meeting Indoor Air Package specifications will address many durability issues listed in durability inspection checklist template.
Sustainable Sites 5	3.1–3.4	Depending on project location, meeting Indoor Air Package specifications may earn up to 2 LEED points.
Energy & Atmosphere 6.1	4.1, 7.4	Meeting Indoor Air Package specifications achieves prerequisites EA 6.1(a) and 6.1(c).
Materials & Resources 2.2	6.3–6.9	Depending on project details, meeting Indoor Air Package specifications may earn up to 2 LEED points.

EQ 2. Combustion Venting

Maximum points: 2

Intent

Minimize the leakage of combustion gases into the occupied space of the home.

Requirements

Prerequisites

2.1 **Basic Combustion Venting Measures.** Meet all the following requirements.

a) No unvented combustion appliances (e.g., decorative logs) are allowed.

b) A carbon monoxide (CO) monitor must be installed on each floor.

c) All fireplaces and woodstoves must have doors.

d) Space and water heating equipment that involves combustion must meet one of the following. Space heating systems in homes located in IECC-2006 climate zone 1 or 2 are exempt.

i. it must be designed and installed with closed combustion (i.e., sealed supply air and exhaust ducting);

ii. it must be designed and installed with power-vented exhaust; or

iii. it must be located in a detached utility building or open-air facility.

Credits

2.2 **Enhanced Combustion Venting Measures** (maximum 2 points). Install no fireplace or woodstove, or design and install a fireplace or woodstove according to the requirements in Table 29.

Table 29. Fireplace and Stove Combustion-Venting Requirements

Fireplace or stove	*Enhanced combustion-venting measures*	
	Better practice (1 point)	*Best practice (2 points)*
None	See 'best practice'.	Granted automatically.
Masonry wood-burning fireplace	Install masonry heater as defined by American Society for Testing and Materials Standard E-1602 and International Building Code 2112.1.	Meet requirement for 'better practice', *and* conduct back-draft potential test to ensure $\Delta P \leq 5$ Pascals (see "conducting a back-draft potential test" below).
Factory-built wood-burning fireplace	Install equipment listed by approved safety testing facility (e.g., UL, CSA, ETL) that either is EPA certified or meets the following: equipment with catalytic combustor must emit less than 4.1 g/hr of particulate matter, and equipment without catalytic combustor must emit less than 7.5 g/hr of particulate matter.	Meet requirement for better practice, *and* conduct back-draft potential test to ensure $\Delta P \leq 5$ Pascals (see "Conducting a Back-Draft Potential Test," below).
Woodstove and fireplace insert	Install equipment listed by approved safety testing facility that either is EPA certified or meets following requirement: equipment with catalytic combustor must emit less than 4.1 g/hr of particulate matter, and equipment without catalytic combustor must emit less than 7.5 g/hr of particulate matter.	Meet requirement for better practice, *and* conduct back-draft potential test to ensure $\Delta P \leq 5$ Pascals (see "conducting a back-draft potential test" below).
Natural gas, propane, or alcohol stove	Install equipment listed by approved safety testing facility that is power-vented or direct-vented and has permanently fixed glass front or gasketed door.	Meet requirement for better practice, *and* include electronic (not standing) pilot.
Pellet stove	Install equipment that is either EPA certified or listed by approved safety testing facility to have met requirements of ASTM E 1509-04, "Standard Specification for Room Heaters, Pellet Fuel-Burning Type."	Meet requirement for better practice, *and* include power venting or direct venting.

Conducting a Back-Draft Potential Test

Using the results from a blower-door test, measure the pressure difference created by the presence of a chimney-vented appliance. To ensure a limited risk of back-drafting, the pressure difference (ΔP) must be less than or equal to 5 Pascals, where

$$\Delta P = (Q/C)^{1/n} \quad \text{(must be} \leq 5 \text{ Pascals)}$$

and Q is equal to the sum of the rated exhaust provided by the two biggest exhaust appliances in the home, and C and n are both constants produced by the blower-door test results.

Synergies and Trade-Offs

A project receiving points for EQ 1 is not eligible to earn points in EQ 2.2. A project pursuing EQ 2.2 must meet all the prerequisites in EQ 2–10.

EQ 3. Moisture Control

Maximum points: 1

Intent

Control indoor moisture levels to provide comfort, reduce the risk of mold, and increase the durability of the home.

Requirements

Prerequisites

None.

Credits

3 **Moisture Load Control** (1 point). Install dehumidification equipment with sufficient latent capacity to maintain relative humidity at or below 60%. This must be achieved through one of the following:

a) Additional dehumidification system(s).

b) A central HVAC system equipped with additional controls to operate in dehumidification mode.

Note: LEED for Homes does not encourage active dehumidification for all projects. Work with the HVAC contractor to determine whether this credit is appropriate and/or necessary.

Synergies and Trade-Offs

A project receiving points for EQ 1 is not eligible to earn points in EQ 3. A project pursuing EQ 3 must meet all the prerequisites in EQ 2–10.

Water leakage through the building envelope can cause mold and other indoor environmental problems. Improved foundation, exterior walls, and roof water management should be addressed in the durability inspection checklist (ID 2).

In hot and humid climates, dehumidification can reduce the energy demands associated with air-conditioning (EA 1, 6).

EQ 4. Outdoor Air Ventilation

Maximum points: 3

Intent

Reduce occupant exposure to indoor pollutants by ventilating with outdoor air.

Requirements

Prerequisites

4.1 **Basic Outdoor Air Ventilation.** Design and install a whole building ventilation system that complies with ASHRAE Standard 62.2. A summary of alternatives is provided below, but the HVAC contractor should review and follow the requirements of ASHRAE Standard 62.2, Sections 4 and 7.

a) Mild climate exemption. A home built in a climate with fewer than than 4,500 infiltration degree-days[3] is exempt from this prerequisite.

b) Continuous ventilation. Meet the ventilation requirements in Table 30 below.

c) Intermittent ventilation. Use Equation 4.2 of ASHRAE Standard 62.2 to demonstrate adequate ventilation air flow.

d) Passive ventilation. Have a passive ventilation system approved and verified by a licensed HVAC engineer as providing ventilation equivalent to that achieved by continuous ventilation systems as described in Table 30.

Credits

4.2 **Enhanced Outdoor Air Ventilation** (2 points). Meet one of the following:

a) In mild climates (fewer than 4,500 infiltration degree-days), install a whole-building active ventilation system that complies with ASHRAE Standard 62.2.

OR

b) Install a system that provides heat transfer between the incoming outdoor air stream and the exhaust air stream, such as a heat-recovery ventilator (HRV) or energy-recovery ventilator (ERV). The heat recovery system must be listed by a certified testing lab (e.g., UL, ETL).

4.3 **Third-Party Performance Testing** (1 point). Have a third-party test the flow rate of air brought into the home, and verify that the requirements of ASHRAE Standard 62.2 are met. In exhaust-only ventilation systems, install exhaust ducts according to Table 7.1 of ASHRAE Standard 62.2, and either test the flow rate out of the home or conduct air flow tests to ensure back-pressure of ≤ 0.20 inches w.c.

[3] It is assumed that in mild climates (areas with fewer than 4,500 infiltration degree-days), the minimum outdoor air ventilation needs can be met with open windows and doors. Homes in these areas are also exempt from meeting the air filtering requirements of ASHRAE Standard 62.2 under EQ 7.1.

Table 30. Minimum Air Flow Requirements for Continuous Ventilation Systems, in cfm

Conditioned floor area (ft^2)	*Bedrooms*				
	0, 1	*2, 3*	*4, 5*	*6, 7*	*> 7*
≤ 1,500	30	45	60	75	90
1,501–3,000	45	60	75	90	105
3,001–4,500	60	75	90	105	120
4,501–6,000	75	90	105	120	135
6,001–7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

Synergies and Trade-Offs

A project receiving points for EQ 1 is not eligible to earn points for EQ 4.3, but may earn points for EQ 4.2. A project pursuing EQ 4.3 must meet all the prerequisites in EQ 2–10.

Natural air leakage through the envelope contributes to the overall ventilation rate of the home (EA 3.1–3.3). From a health perspective, it is important not to underventilate a home. From an energy perspective, it is important not to overventilate.

Exhaust fans, which also provide the local exhaust required by EQ 5.1, can simultaneously provide the outdoor air ventilation system for the home.

A heat-recovery system can substantially reduce the energy used by the heating and cooling equipment (EA 6).

EQ 5. Local Exhaust

Maximum points: 2

Intent

Reduce moisture and exposure to indoor pollutants in kitchens and bathrooms.

Requirements

Prerequisites

5.1 **Basic Local Exhaust.** Meet all the following requirements:

a) Design and install local exhaust systems in all bathrooms (including half-baths) and the kitchen to meet the requirements of Section 5 of ASHRAE Standard 62.2. Sample requirements that relate to minimum intermittent local exhaust flow rates are shown in Table 31, below.

b) Design and install the fans and ducts to meet the requirements of Section 7 of ASHRAE Standard 62.2.

c) Exhaust air to the outdoors (i.e., exhaust to attics or interstitial spaces is not permitted).

d) Use ENERGY STAR labeled bathroom exhaust fans (except for exhaust fans serving multiple bathrooms).

Table 31. Minimum Air Flow Requirements for Intermittent Local Exhaust

Location	*Minimum air flow*
Kitchen	100 cfm; vented range hood required if exhaust fan flow rate is less than 5 kitchen air changes per hour.
Bathroom	50 cfm

Credits

5.2 **Enhanced Local Exhaust** (1 point). Use one of the following strategies in every bathroom to control the use of the local exhaust fan:

a) An occupancy sensor.

b) An automatic humidistat controller.

c) An automatic timer to operate the fan for a timed interval after occupant leaves the room.

d) A continuously operating exhaust fan.

5.3 **Third-Party Performance Testing** (1 point). Perform a third-party test of each exhaust air flow rate for compliance with the requirements in Section 5 of ASHRAE Standard 62.2.

Synergies and Trade-Offs

A project receiving points for EQ 1 is eligible to earn points for EQ 5.2 and EQ 5.3.

If designed properly, exhaust fans can also provide sufficient outdoor air ventilation system for the entire home, as required by EQ 4.1.

EQ 6. Distribution of Space Heating and Cooling

Maximum points: 3

Intent

Provide appropriate distribution of space heating and cooling in the home to improve thermal comfort and energy performance.

Requirements

A. Forced-Air Systems:

Prerequisites

6.1 **Room-by-Room Load Calculations.** Perform design calculations (using ACCA Manuals J and D, the ASHRAE Handbook of Fundamentals, or an equivalent computation procedure) and install ducts accordingly.

Credits

6.2 **Return Air Flow** (1 point). Ensure that every room (except baths, kitchens, closets, pantries, and laundry rooms) has adequate return air flow through the use of multiple returns, transfer grilles, or jump ducts. Meet one of the following requirements:

a) Size the opening to 1 square inch per cfm of supply (this area may include free area undercut below door).

b) Demonstrate that the pressure differential between closed rooms and adjacent spaces with return is no greater than 2.5 Pa (0.01 inch w.c.).

6.3 **Third-Party Performance Test** (2 points). Have the total supply air flow rates in each room tested using a flow hood with doors closed, or one of the other acceptable methods cited by the ACCA Quality Installation Specifications. Supply air flow rates must be within +/- 15% (or +/- 10 cfm) of calculated values from ACCA Manual J (as required by EA 6.1).

B. Nonducted HVAC Systems (e.g., Hydronic Systems):

Prerequisites

6.1 **Room-by-Room Load Calculations.** Perform design calculations (using ACCA Manual J and D, the ASHRAE Handbook of Fundamentals, or an equivalent computation procedure) and install system accordingly.

Credits

6.2 **Room-by-Room Controls** (1 point). Design the HVAC system with flow control valves on every radiator.

6.3 **Multiple Zones** (2 points). Install nonducted HVAC system with at least two distinct zones with independent thermostat controls.

Synergies and Trade-Offs

A project receiving points for EQ 1 is not eligible to earn points for EQ 6.2 or EQ 6.3. A project pursuing EQ 6.2 or EQ 6.3 must meet all the prerequisites in EQ 2–10.

The choice of air filter (EQ 7) should be made prior to duct design, to ensure adequate air flow. Filters with a high MERV can create a large pressure drop that should be accommodated during system design.

Space heating and cooling loads and room air flow rates must be calculated using ACCA Manual J (EA 6.1). The design calculations conducted for this credit should be based on those Manual J calculations.

Duct installation should be visually inspected during the predrywall insulation inspection (EA 5).

EQ 7. Air Filtering

Maximum points: 2

Intent

Reduce particulate matter from the air supply system.

Requirements

A. Forced-Air Systems:

Prerequisites

7.1 **Good Filters.** Install air filters with a minimum efficiency reporting value (MERV) ≥ 8 and ensure that air handlers can maintain adequate pressure and air flow. Air filter housings must be airtight to prevent bypass or leakage.

Credits

7.2 **Better Filters** (1 point). Install air filters ≥ MERV 10 and ensure that air handlers can maintain adequate pressure and air flow. Air filter housings must be airtight to prevent bypass or leakage.

OR

7.3 **Best Filters** (2 points). Install air filters ≥ MERV 13 and ensure that air handlers can maintain adequate pressure and air flow. Air filter housings must be airtight to prevent bypass or leakage.

B. Nonducted HVAC Systems (e.g., Hydronic Systems):

Prerequisites

7.1 **Good Filters.** Install air filters ≥ MERV 8 and maintain adequate pressure and air flow in any mechanical ventilation systems. A home in a climate with fewer than 4,500 infiltration degree-days, or a home that uses only passive or exhaust-only ventilation, is exempt from this requirement.

Credits

7.2 **Better Filters** (1 point). Install air filters ≥ MERV 10 and maintain adequate pressure and air flow for any mechanical ventilation systems.

7.3 **Best Filters** (2 points). Install air filters ≥ MERV 13 and maintain adequate pressure and air flow for any mechanical ventilation systems.

Synergies and Trade-Offs

A project receiving points for EQ 1 is eligible to earn points for EQ 7.2 or EQ 7.3.

The choice of air filter should be made during or prior to duct design (EQ 6) to ensure adequate air flow. Filters with a high MERV can create a large pressure drop that should be accommodated during system design.

EQ 8. Contaminant Control

Maximum points: 4

Intent

Reduce occupants' and construction workers' exposure to indoor airborne contaminants through source control and removal.

Requirements

Prerequisites

None.

Credits

8.1 **Indoor Contaminant Control during Construction** (1 point). Upon installation, seal all permanent ducts and vents to minimize contamination during construction. Remove any seals after all phases of construction are completed.

8.2 **Indoor Contaminant Control** (1 point each, maximum 2 points). Select from the following measures:

a) Design and install permanent walk-off mats at each entry that are at least 4 feet in length and allow accessibility for cleaning (e.g., grating with catch basin).

b) Design a shoe removal and storage space near the primary entryway, separated from living areas. This space may not have wall-to-wall carpeting, and it must be large enough to accommodate a bench and at least two pairs of shoes per bedroom.

c) Install a central vacuum system with exhaust to the outdoors. Ensure that the exhaust is not near any ventilation air intake.

8.3 **Preoccupancy Flush** (1 point). Flush the home with fresh air, according to the following guidelines:

a) Flush prior to occupancy but after all phases of construction are completed.

b) Flush the entire home, keeping all interior doors open.

c) Flush for 48 total hours; the hours may be nonconsecutive, if necessary.

d) Keep all windows open and run a fan (e.g., HVAC system fan) continuously *or* flush the home with all HVAC fans and exhaust fans operating continuously at the highest flow rate.

e) Use additional fans to circulate air within the home.

f) Replace or clean HVAC air filter afterward, as necessary.

Synergies and Trade-Offs

A project receiving points for EQ 1 is not eligible to earn points for EQ 8.1 or EQ 8.3, but may earn points for EQ 8.2. A project pursuing EQ 8.2 must meet all the prerequisites in EQ 2–10.

Products with low VOC emissions greatly benefit indoor air quality. Source control of these kinds of emissions is addressed in MR 2.

EQ 9. Radon Protection

Maximum points: 1

Intent

Reduce occupant exposure to radon gas and other soil gas contaminants.

Requirements

Prerequisites

9.1 **Radon-Resistant Construction in High-Risk Areas.** If the home is in EPA Radon Zone 1, design and build the home with radon-resistant construction techniques as prescribed by EPA, the International Residential Code, Washington State Ventilation and Indoor Air Quality Code, or some equivalent code or standard.

Credits

9.2 **Radon-Resistant Construction in Moderate-Risk Areas** (1 point). If the home is outside EPA Radon Zone 1, design and build the home with radon-resistant construction techniques as prescribed by EPA, the International Residential Code, Washington State Ventilation and Indoor Air Quality Code, or some equivalent code or standard.

Note: Radon-resistant construction does not guarantee that occupants will not be exposed to radon. The Surgeon General and EPA recommend that every home in the country be tested for radon. Information about radon testing is available at the EPA Web site, at www.epa.gov/radon/radontest.html.

Synergies and Trade-Offs

A project receiving points for EQ 1 is not eligible to earn points for EQ 9.2.

EQ 10. Garage Pollutant Protection

Maximum points: 3

Intent

Reduce occupant exposure to indoor pollutants originating from an adjacent garage.

Requirements

Prerequisites

10.1 **No HVAC in Garage.** Place all air-handling equipment and ductwork outside the fire-rated envelope of the garage.

Credits

10.2 **Minimize Pollutants from Garage** (2 points). Tightly seal shared surfaces between garage and conditioned spaces, including all of the following:

a) In conditioned spaces above the garage:
   i) seal all penetrations;
   ii) seal all connecting floor and ceiling joist bays; and
   iii) paint walls and ceilings (carbon monoxide can penetrate unfinished drywall through diffusion).

b) In conditioned spaces next to the garage:
   i) weather-strip all doors;
   ii) place carbon monoxide detectors in adjacent rooms that share a door with the garage;
   iii) seal all penetrations; and
   iv) seal all cracks at the base of the walls.

AND/OR

10.3 **Exhaust Fan in Garage** (1 point). Install an exhaust fan in the garage that is rated for continuous operation and designed to be operated in one of the following ways. Nonducted exhaust fans must be 70 cfm or greater, and ducted exhaust fans must be 100 cfm or greater.

a) Fan must run continuously; or

b) Fan must be designed with an automatic timer control linked to an occupant sensor, light switch, garage door opening-closing mechanism, carbon monoxide sensor, or equivalent. The timer must be set to provide at least three air changes each time the fan is turned on.

OR

10.4 **Detached Garage or No Garage** (3 points).

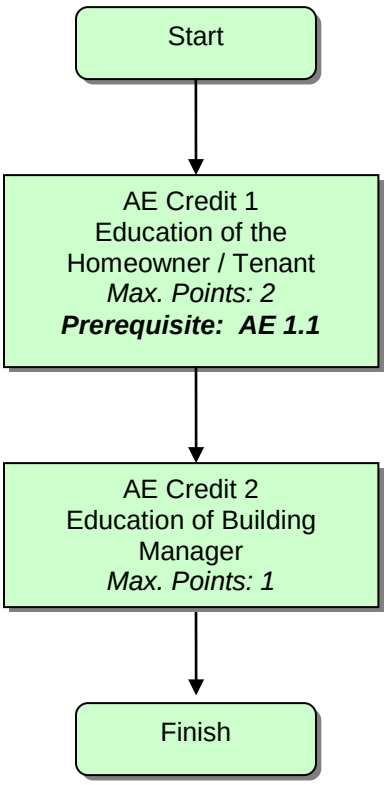
Synergies and Trade-Offs

A project receiving points for EQ 1 is not eligible to earn points for EQ 10.2, EQ 10.3, or EQ 10.4. A project receiving points EQ 10.4 is not eligible to earn points for EQ 10.2 or 10.3, and vice versa.

EQ 10.1 should be taken into consideration when designing the HVAC and heating and cooling distribution system (EA 5, 6; EQ 4, 6).

Awareness & Education (AE)

Pathway through the AE Category



AE 1. Education of the Homeowner or Tenant **Maximum points: 2**

Intent

Maintain the performance of the home by educating the occupants (i.e., the homeowner or tenant) about the operations and maintenance of the home's LEED features and equipment.

Requirements

Prerequisites

1.1 **Basic Operations Training.** Provide the home's occupant(s) with the following:

a) An operations and maintenance manual or binder that includes all the following items:

i. The completed checklist of LEED for Homes features.

ii. A copy of each signed Accountability Form.

iii. A copy of the durability inspection checklist.

iv. The product manufacturers' manuals for all installed equipment, fixtures, and appliances.

v. General information on efficient use of energy, water, and natural resources.

vi. Operations and maintenance guidance for any LEED for Homes–related equipment installed in the home, including

- space heating and cooling equipment;
- mechanical ventilation equipment;
- humidity control equipment;
- radon protection system;
- renewable energy system; and
- irrigation, rain water harvesting, and or graywater system.

vii. Guidance on occupant activities and choices, including the following:

- cleaning materials, methods, and supplies;
- water-efficient landscaping;
- impacts of chemical fertilizers and pesticides;
- irrigation;
- lighting selection; and
- appliance selection.

viii. Educational information on "green power".

b) A minimum one-hour walkthrough of the home with the occupant(s), featuring the following:

i. Identification of all installed equipment.

ii. Instruction in how to use the measures and operate the equipment.

iii. Information on how to maintain the measures and equipment.

Credits

1.2 **Enhanced Training** (1 point). Provide two hours of training for the occupant(s) in addition to the training provided for AE 1.1. Examples of eligible trainings include:

a) An additional walkthrough or training held in another home that has similar green measures and equipment.

b) A builder- or developer-sponsored meeting of potential homebuyers that informs participants of the unique features of a LEED home.

c) A group homebuyer training that includes discussion of the required items in the occupant's operations and maintenance manual, including information on efficient use of resources, appropriate use of measures and systems and proper maintenance of measures and systems.

d) A homebuyer DVD with operations and maintenance information on the home's LEED for Homes measures.

1.3 **Public Awareness** (1 point). Promote general public awareness about LEED for Homes by conducting at least three of the following activities:

a) Hold an advertised, attended public open house that lasts at least four hours per day on at least four weekends, or participate in a green building exhibition or tour. The home or building must display at least four informational stations about the LEED for Homes features (and/or offer a guided tour that highlights at least four LEED for Homes features).

b) Publish a website with at least two pages that provides detailed information about the features and benefits of LEED homes.

c) Generate a newspaper article on the LEED for Homes project.

d) Display LEED for Homes signage, measuring six square feet or more, on the exterior of the home or building.

Synergies and Trade-Offs

Many of the measures in the Rating System should be addressed in the operations manual and the on-site training, particularly any measures that require routine maintenance (e.g., air filters) or instruction for proper operation (e.g., heat-recovery systems).

AE 2. Education of Building Manager

Maximum points: 1

Intent

Maintain the performance of the home by educating the building manager about the operations and maintenance of the home's LEED features and equipment.

Requirements

Prerequisites

None.

Credits

2 **Education of Building Manager** (1 point). For multifamily buildings (more than five units), provide the building manager with the following:

a) A building owner's manual or binder that includes these items:

i. The completed checklist of LEED for Homes features.

ii. A copy of each signed Accountability Form.

iii. A copy of the durability inspection checklist.

iv. The product manufacturers' manuals for all installed equipment, fixtures, and appliances.

v. General information on efficient use of energy, water, and natural resources.

vi. Operations and maintenance guidance for any LEED for Homes related equipment installed in the home, including:

- space heating and cooling equipment;
- mechanical ventilation equipment;
- humidity control equipment;
- radon protection system;
- renewable energy system; and
- irrigation, rainwater harvesting, and/or graywater system.

vii. Guidance on occupant activities and choices, including the following:

- cleaning materials, methods, and supplies;
- water-efficient landscaping;
- impacts of chemical fertilizers and pesticides;
- irrigation;
- lighting selection; and
- appliance selection.

viii. Educational information on "green power".

b) A minimum one-hour walkthrough of the building before occupancy, featuring the following:

i. Identification of all installed equipment.

ii. Instruction in how to use the measures and operate the equipment in each unit.

iii. Information on how to maintain the measures and equipment in each unit.

Synergies and Trade-Offs

Many of the measures in the Rating System should be addressed in the building manager's manual and on-site training, particularly any measures that require routine maintenance (e.g., air filters) or specific instruction for proper operation (e.g., heat-recovery systems).

Abbreviations and Acronyms

ACCA – Air Conditioning Contractors of America
AE – Awareness & Education section
AFUE – annual fuel utilization efficiency
ALP – ENERGY STAR Advanced Lighting Package
AP – LEED Accredited Professional
ASHRAE – American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME – American Society of Mechanical Engineers
ASTM – American Society for Testing and Materials
CAE – combined annual efficiency
CFA – conditioned floor area
CFC – chlorofluorocarbon
CFL – compact fluorescent light
CFM – cubic feet per minute
CFR – US Code of Federal Regulations
CIR – Credit Interpretation Request
CO – carbon monoxide
COC – chain of custody
COP – coefficient of performance
CRI – Carpet & Rug Institute
CZ – climate zone
DHW – domestic hot water
DOE – US Department of Energy
DU – distribution uniformity
EA – Energy & Atmosphere section
EER – energy efficiency rating
EERE – US Office of Energy Efficiency and Renewable Energy
EF – energy factor
EPA – US Environmental Protection Agency
ET – evapo-transpiration
EQ – Indoor Environmental Quality section
FEMA – US Federal Emergency Management Agency
FSC – Forest Stewardship Council
GPF – gallons per flush
GPM – gallons per minute
HCFC – hydrochlorofluorocarbon
HEPA – high-efficiency particle absorbing
HERS – Home Energy Rating Standards

HET – high-efficiency toilet
HOA – homeowner's association
HSPF – heating season performance factor
HVAC – heating, ventilation, and air conditioning
IAP – ENERGY STAR with Indoor Air Package
IAQ – indoor air quality
ICF – insulated concrete form
ID – Innovation & Design section
IDR – Innovative Design Request
IECC – International Energy Conservation Code
IRC – International Residential Code
KW – kilowatt
KWH – kilowatt-hour
LED – light-emitting diode
LEED – Leadership in Energy and Environmental Design
LL – Location & Linkages section
MEF – modified energy factor
MERV – minimum efficiency reporting value
MR – Materials & Resources section
NFRC – National Fenestration Rating Council
OSB – oriented strand board
RESNET – Residential Energy Services Network
SCS – Scientific Certification Systems
SEER – seasonal energy efficiency rating
SHGC – solar heat gain coefficient
SIP – structural insulated panels
SS – Sustainable Sites section
SRI – solar reflectance index
TASC – Technical Advisory Subcommittee
UL – Underwriter's Laboratory
USGBC – US Green Building Council
VOC – volatile organic compound
WE – Water Efficiency section
WF – water factor
WFA – window-to-floor ratio

Glossary

adhesive any substance used to bond one surface to another by attachment. Adhesives include adhesive bonding primers, adhesive primers, adhesive primers for plastics, and any other primer.

albedo a measure of the reflectivity of a surface. High-albedo materials are very reflective of solar radiation.

balancing damper an adjustable plate that regulates air flow within ducts.

bedroom in LEED for Homes, any room or space that could be used or is intended to be used for sleeping purposes and meets local fire and building code requirements.

borate a wood preservative that is nontoxic to humans but highly toxic to wood-boring insects, such as termites.

buildable land the portion of a site where construction can occur. Buildable land excludes public streets and other public rights-of-way, land occupied by nonresidential structures, public parks and land excluded from residential development by law.

built environment the manmade alterations to a specific area, including its natural resources. On a home site, this includes everything that has been disturbed during construction.

catchment the surface area of a roof that captures rainwater for a rainwater harvesting system.

central vacuum system a network of tubing with inlets throughout the house designed to remove dust and debris to a remote receptacle. A central vacuum system is more efficient than a traditional vacuum cleaner.

chain-of-custody in forest certification, the path taken by raw materials, processed materials, and products from the forest to the consumer, including all successive stages of processing, transformation, manufacturing and distribution. A chain-of-custody certificate number on invoices for nonlabeled products indicates that the certifier's guidelines for product accounting have been followed. A chain-of-custody certification is not required by distributors of a product that is individually labeled with the Forest Stewardship Council logo and manufacturer's chain-of-custody number.

charrette an intensive, collaborative session in which a project team discusses design and construction options related to all aspects of the home.

chlorofluorocarbon (CFC) a chemical compound, once commonly used in refrigeration, that depletes the stratospheric ozone layer.

circulation loop a system that returns cold water to the water heater (instead of down the drain) until hot water reaches the faucet. A circulation loop is one component of a structured plumbing system.

climate zone in the U.S., one of 8 regions as defined by the International Energy Conservation Code that characterize the temperature of an area of the country. Climate zone 1 is the hottest and climate zone 8 is the coldest.

closed combustion a design for furnaces and water heaters in which the supply air is ducted from the outside and exhaust gases are ducted to the outdoors. All elements of the system are sealed to prevent combustion exhaust from leaking into the home.

combustion exhaust gases the most common gases resulting from fossil fuel combustion, including carbon dioxide, carbon monoxide, sulfur dioxide and nitrogen oxides. These gases pose health hazards at high concentrations.

compensating shower valves: designed to keep bathing water temperatures in the shower fairly constant when other appliances, such as a washing machine or toilet, are in use and when the hot or cold water supply pressures change or the bathing water outlet temperature changes. Three types of valves are available: ***Thermostatic compensating valves*** are designed to keep bathing water temperatures in the shower fairly constant when other appliances, such as a washing machine or toilet, are in use and when the hot or cold water supply pressures change or the bathing water outlet temperature changes. The response of this type of mechanism is different to that of a pressure balance compensating valve. ***Pressure balance compensating valves*** are designed to keep bathing water temperature in the shower fairly constant when other appliances, such as a washing machine or toilet, are in use and when the hot or cold water supply pressures change. ***Conventional, non-compensating valves*** are completely dependent on the user to adjust the temperature at all times by changing the adjustment.

composite wood a product consisting of wood or plant particles or fibers bonded together by a synthetic resin or binder. Examples include plywood, particleboard, oriented-strand board (OSB), medium-density fiberboard (MDF) and composite door cores.

conditioned space interior area that utilizes any method of air-conditioning or heating to control temperature and/or humidity levels, usually measured in cubic feet.

conventional turf grass, typically a monoculture, that requires considerable watering, mowing, and/or fertilizers. What is considered conventional turf may vary by region.

demand-controlled circulation the automatic circulation of water, triggered by a switch or sensor, through a looped system to ensure that hot water is immediately available while keeping unused cold water in the system, saving both water and energy.

density the quantity of structures on a site, measured for residential buildings as dwelling units per acre of buildable land available for residential uses, and for nonresidential buildings as floor area ratio per net acre of buildable land available for nonresidential uses.

designed landscape the arrangement of features on a site, including softscapes (e.g., grass, shrubs) and hardscapes (e.g., patios, fountains) but not areas under roof. Preserved natural areas are not considered part of the designed landscape.

development the homes and building lots that surround the new LEED home project that is to be built. A development may be new or preexisting. Preexisting developments may be referred to as the community.

distribution uniformity A metric for estimating how uniformly water is applied to an area. Distribution Uniformity (DU) ranges between 0 and 1, where 1 indicates that the irrigation system is providing perfectly equal coverage. A higher DU means less likelihood of overwatering or underwatering.

disturbed lot area the part of a site that is directly affected by construction activity, including any activity that would compact the soil or damage vegetation.

diverted waste debris from construction or demolition that is not sent to a landfill or incinerator. Strategies for diverting waste include reclamation, recycling and, for certain materials, mulching.

drip irrigation system a network of pipes and valves that rest on the soil or underground and slowly deliver water to the root systems of plants. Drip irrigation saves water by minimizing evapotranspiration and topsoil runoff. Drip irrigation usually involves a network of pipes and valves that rest on the soil or underground at the root zone.

dry well an underground structure that collects runoff and distributes it over a large area, increasing absorption and minimizing erosion.

dual-flush toilet a toilet with two flush volumes, one for solid waste and a reduced volume for liquid waste.

durability The ability of a building or any of its components to perform its required function in its service environment over the period of time without unforeseen cost for maintenance or repair.

edge development generally, a group of homes that extend an existing community beyond its borders but remain connected to it. In LEED for Homes, at least 25% of an edge development's perimeter must border land that has been previously developed.

ENERGY STAR home a home built to a high standard of energy efficiency (at least 15% more efficient than the International Energy Conservation Code). For more information, visit www.energystar.gov/homes.

ENERGY STAR with Indoor Air Package (IAP) a certification program that recognizes homes with systems to ensure high standards of indoor air quality and rated as an ENERGY STAR home.

envelope see *thermal envelope.*

erosion a process in which materials of the earth's surface are loosened, dissolved or worn away and transported by natural agents, such as water, wind or gravity.

fly ash the fine ash residue from coal combustion. Fly ash can be substituted for Portland cement, a bonding material in concrete.

formaldehyde a naturally occurring volatile organic compound used as a preservative. When present in high concentrations, formaldehyde can cause headaches, dizziness, mental impairment, and other symptoms—and may be a carcinogen.

graywater wastewater that comes from household baths and clothes washers and is neither clean nor heavily soiled. More specifically, (1) "untreated house-hold wastewater which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes-washer and laundry tubs. It shall not include wastewater from kitchen sinks or dishwashers" (Uniform Plumbing Code, Appendix G, "Grey Water Systems for Single-Family Dwellings); (2) "wastewater discharged from lavatories, bathtubs, showers, clothes washers, and laundry sinks" (International Plumbing Code, Appendix C, "Grey water Recycling Systems"). Some states and local authorities allow kitchen sink wastewater to be included in graywater.

Green Rater an individual that performs field inspections and performance testing of LEED for Homes measures for the LEED for Homes Provider. A HERS rater with additional training can become a Green Rater.

hardscape "elements added to a natural landscape, such as paving stones, gravel, walkways, irrigation systems, roads, retaining walls, sculpture, street amenities, fountains, and other mechanical features" (American Society of Landscape Architects). Hardscapes are often impermeable, but they are not impermeable by definition.

high-efficiency toilet (HET) a toilet that uses no more than 1.3 gallons per flush.

Home Energy Rating System (HERS) index a system for evaluating the energy efficiency of a home using an energy simulation model. A HERS index of 100 represents the energy efficiency of a home that meets basic IECC code requirements; each additional index point represents a 1% increase in energy use, and lower index numbers indicate the percentage savings in energy use.

hydrochlorofluorocarbon (HCFC) a chemical compound used as a refrigerant. HCFCs deplete the stratospheric ozone layer but to a lesser extent than chlorofluorocarbons (CFCs).

hydronic system a heating or cooling system that uses circulating water as the heat-transfer medium, such as a boiler with hot water circulated through radiators.

infill site a lot in an existing community. In LEED for Homes, an infill site is defined as having at least 75% of its perimeter bordering land that has been previously developed.

infiltration degree-days the sum of the heating degree-days and the cooling degree-days.

invasive species "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health" (Executive Order 13112). Not all nonnative species are considered invasive, and invasive species differ by region. Regional agencies that list invasive species are available at www.invasivespeciesinfo.gov/unitedstates/state.shtml.

ladder blocking a method of framing in which interior partition walls meet and are reinforced by exterior walls, with minimal framing.

light fixture illumination that is permanently fixed to the home. A fluorescent light fixture has an integrated ballast. A compact fluorescent lamp (CFL) is not a light fixture.

local heat island effect the incidence of higher air and surface temperatures caused by the absorption of solar energy and its reemission from roads, buildings and other structures.

lot the individual parcel of land on which a home is to be built.

minimum efficiency reporting value (MERV) the effectiveness of a mechanical air filter based on the number and size of the particles that pass through it under normal conditions. The higher the rating, the more effective the filter.

native plant a plant that has evolved within the particular habitat that it is being used. Native plants provide food and shelter to indigenous wildlife and grow in balance with surrounding plant and animal species. The characterization of a plant as 'native' may vary regionally and even locally.

no-disturbance zone an area that is preserved during construction.

postconsumer recycled content material used and then recycled by consumers, as distinguished from the recycled by-products of manufacturing, called preconsumer (postindustrial) recycled content.

postconsumer waste material generated by households or by commercial, industrial and institutional facilities that can no longer be used for its intended purpose. This includes returns of materials from the distribution chain (Source: ISO 14021). Examples include construction and demolition debris, materials collected through recycling programs, broken pallets (from a pallet refurbishing company, not a pallet-making company), discarded cabinetry and decking, and home maintenance waste (leaves, grass clippings, tree trimmings).

potable suitable for drinking. Potable water is generally supplied by municipal water systems.

power-vented exhaust the use of an active fan system to pull combustion gases out of the home. Combustion equipment with power venting can use indoor air as the combustion supply air.

preconsumer content material diverted from the waste stream during the manufacturing process. Formerly known as postindustrial content. Examples include planer shavings, plytrim, sawdust, chips, bagasse, culls, trimmed materials and obsolete inventory.

Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it (Source ISO 14021).

previously developed land having pre-existing paving, construction, or significantly altered landscapes. This does not apply to altered landscapes resulting from current agricultural use, forestry use, or use as preserved natural area.

previously developed site in LEED for Homes, a lot consisting of at least 75% previously developed land**.**

prime farmland "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses" (U.S. CFR, Title 7, Part 657.5).

project the design and construction of a LEED home. A project may include multiple homes in a development.

Provider an organization that recruits, trains and coordinates LEED for Homes Green Raters to serve as third-party verifiers of LEED homes. Providers are the official certifiers of LEED for Homes on behalf of the U.S. Green Building Council.

radon a radioactive gas that naturally vents from the ground. Not all homes have problems with radon. High levels of radon are known to be carcinogenic.

rain garden a swale, or low tract of land into which water flows, planted with vegetation that requires or tolerates high moisture levels. A rain garden can be designed to reduce the volume of water entering storm drains and replenish groundwater.

reclaimed material building components that have been recovered from a demolition site and are reused in their original state (i.e., not recycled). Also known as salvaged or reused material.

recycled content the weight of recycled material, including both postconsumer and preconsumer (postindustrial) material, divided by the overall weight of the assembly.

recycling the collection, reprocessing, marketing and use of materials that were diverted or recovered from the solid waste stream.

refrigerant a fluid that absorbs heat from a reservoir at low temperatures and rejects heat at higher temperatures.

reuse the return of salvaged materials to use in the same or a related capacity.

R-value a measure of thermal resistance, defined as the number of watts lost per square meter at a given temperature difference. R-value is the inverse of U- value (i.e., R = 1/U).

salvaged material see 'reclaimed material'.

sedimentation the deposition of soil and other natural solids in waterbodies. Sedimentation decreases water quality and accelerates the aging process of lakes, rivers and streams.

siltation the deposition and accumulation of fine very particles in waterbodies. Siltation is often harmful to lake, river and stream ecosystems.

site the individual building lot where a home is to be built. A site may include all of the lots that a builder is responsible for.

softscape the natural elements of a landscape, such as plant materials and soil. Softscapes can include hard elements, such as rocks.

solar heat gain coefficient (SHGC) a measure of how well a window blocks heat from the sun, expressed as a fraction of the heat from the sun that enters the window. A lower SHGC is generally preferable, particularly in hot climates.

solar window screen mesh used to block light and heat from the sun, as well as insects.

subdivision the homes and building lots that immediately surround the new LEED home project that is to be built. A subdivision may be new or preexisting, and belongs to a larger development.

sustainable forestry the practice of managing forest resources to meet the long-term forest product needs of humans while maintaining the integrity of forested landscapes and sustaining a full range of forest values—economic, social and ecological.

Technical Advisory Sub- Committee in LEED for Homes, a group of specialists who rule on Credit Interpretation Requests and Innovative Design Requests.

termite a wood-eating social insect (order Isoptera) that can cause serious structural damage to buildings in many regions of the United States. Also known as white ant.

thermal bridge a part of a building envelope that has high heat conductance, lowering the average R-value.

thermal envelope the thermal enclosure created by the building exterior and insulation.

topsoil The uppermost layer of soil, containing high levels of nutrients and organic matter. Healthy topsoil is essential for the survival of trees and plants.

tree/plant preservation plan A formal assessment of the lot and a development of a landscaping plan that seeks to preserve the most trees and native plants. This is important to do as one of the first steps in the design process to ensure the developed area takes into account the preservation plan.

ureaformaldehyde a combination of urea and formaldehyde used in some glues and adhesives, particularly in composite wood products. At room temperature, ureaformaldehyde emits formaldehyde, a toxic and possibly carcinogenic gas.

U-value a measure of thermal conductivity (often used for windows) that is the inverse of R-value. A lower U-value means a more energy-efficient window. Also known as U-factor.

vegetated roof a roof partially or fully covered by vegetation, used to manage water runoff and provide additional insulation in winter and cooling in summer.

vegetated swale see *rain garden.*

volatile organic compound (VOC) a carbon compound that vaporizes (becomes a gas) at normal room temperatures. VOCs contribute to air pollution directly and through atmospheric photochemical reactions to produce secondary air pollutants, principally ozone and peroxyacetyl nitrate.

walk-off mat an exterior pad or grate designed to trap dust and debris.

wetland an area inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions (U.S. Code of Federal Regulations, Title 40, Part 232). Wetlands generally include swamps, marshes, bogs, and similar areas.