LEED Rating System Draft
November 2010

HOMES

Includes:
Homes (Single Family and Low-Rise Multifamily)
Mid-Rise (Multifamily)

INTEGRATED PROCESS (IP) 8

IP Prerequisite: Preliminary Rating **8**
Homes, Mid-Rise 8

IP Credit: Trades Training **9**
Homes, Mid-Rise 9

IP Credit: LEED AP for Homes **10**
Homes, Mid-Rise 10

LOCATION AND TRANSPORTATION (LT) 11

LT Credit: LEED for Neighborhood Development **11**
Homes, Mid-Rise 11

LT Credit: Preferred Locations **12**
Homes, Mid-Rise 12

LT Credit: Compact Development **13**
Homes, Mid-Rise 13

LT Credit: Community Resources **14**
Homes, Mid-Rise 14

LT Credit: Access to Transit **15**
Homes, Mid-Rise 16

LT Credit: Connected and Open Community **17**
Homes, Mid-Rise 17

LT Credit: Housing and Jobs Proximity **18**
Homes, Mid-Rise 18

LT Credit: Alternative Transportation **19**
Homes, Mid-Rise 19

SUSTAINABLE SITES (SS) 20

SS Prerequisite: Construction Activity Pollution Prevention **20**
Homes, Mid-Rise 20

SS Prerequisite: No Invasive Plants **21**
Homes, Mid-Rise 21

SS Credit: Site Selection **22**

Homes, Mid-Rise 22

SS Credit : Site Development-Protect or Restore Habitat 22
Homes, Mid-Rise 23

SS Credit: Heat Island Reduction 25
Homes, Mid-Rise 25

SS Credit: Rainwater Management 26
Homes, Mid-Rise 26

SS Credit: Non-Toxic Pest Control 27
Homes, Mid-Rise 27

WATER EFFICIENCY (WE) 29

WE Credit: Indoor Water Use 29
Homes 29
Mid-Rise 30

WE Credit: Outdoor Water Use 32
Homes, Mid-Rise 32

WE Credit: WaterSense for New Homes 33
Homes 33
Mid-Rise 33

ENERGY AND ATMOSPHERE (EA) 35

EA Prerequisite: Performance of ENERGY STAR for Homes 35
Homes 35
Mid-Rise 36

EA Prerequisite: Maximum Absolute Energy Performance 38
Homes 38

EA Credit: Optimize Absolute Energy Performance 39
Homes 39
Mid-Rise 39

EA Credit: Efficient Hot Water Distribution system 40
Homes 41

EA Credit: Solar Ready Design 43
Homes 43
Mid-Rise 44

PRESCRIPTIVE PATHWAY 45

EA Credit: Efficient Hot Water Distribution system 45
Homes 45

EA Credit: Solar Ready Design 45
Homes 45

EA Credit: Building Orientation for Solar Design 46
Homes 46

EA Credit: Air Infiltration 46
Homes 46

EA Credit: Envelope Insulation 48
Homes 48

EA Credit: Windows 49
Homes 49

EA Credit: Space Heating & Cooling Equipment 51
Homes 51

EA Credit: Heating & Cooling Distribution Systems 53
Homes 53

EA Credit: Energy Recovery Ventilation 55
Homes 55

EA Credit: Efficient Domestic Hot Water Equipment 56
Homes 56

EA Credit: Lighting 57
Homes 57

EA Credit: High Efficiency Appliances 58
Homes 58

EA Credit: Renewable Energy 59
Homes 59

MATERIALS AND RESOURCES (MR) 60

MR Prerequisite: Certified Tropical Wood 60
Homes, Mid-Rise 60

MR Prerequisite: Durability Management 60
Homes 60
Mid-Rise 61

MR Credit: Material-Efficient Framing 62

Homes, Mid-Rise 62

MR Credit: Environmentally Preferable Products 62
Homes, Mid-Rise 62

MR Credit: Construction Waste Management 64
Homes 65
Mid-Rise 66

MR Credit: Design for Adaptability 67
Homes, Mid-Rise 67

INDOOR ENVIRONMENTAL QUALITY (EQ) 70

EQ Prerequisite: ENERGY STAR for Homes HVAC Checklists 70
Homes 70

EQ Prerequisite: Ventilation 71
Homes 71
Mid-Rise 73

EQ Prerequisite: Combustion Venting 73
Homes, Mid-Rise 74

EQ Prerequisite: Garage Pollutant Protection 75
Homes, Mid-Rise 75

EQ Prerequisite: Radon Resistant Construction 76
Homes, Mid-Rise 76

EQ Prerequisite: Air Filtering 77
Homes, Mid-Rise 77

EQ Prerequisite: Environmental Tobacco Smoke 78
Homes, Mid-Rise 78

EQ Prerequisite: Compartmentalization 79
Homes, Mid-Rise 79

PERFORMANCE PATH 80

EQ Credit: EPA Indoor airPLUS – Required for this Pathway 80
Homes 80

EQ Credit: Enhanced Ventilation 81
Homes 81
Mid-Rise 82

EQ Credit: Air Filtering 83

Homes, Mid-Rise 83

EQ Credit: Contaminant Control 84
Homes 84
Mid-Rise 85

EQ Credit: Balancing of Heating & Cooling Distribution Systems 86
Homes, Mid-Rise 86

PRESCRIPTIVE PATH 88

EQ Credit: Contaminant Control During Construction 89
Homes 89
Mid-Rise 89

EQ Credit: Combustion Venting 89
Homes, Mid-Rise 90

EQ Credit: Garage Pollutant Protection 91
Homes 91
Mid-Rise 92

EQ Credit: Radon Resistant Construction 92
Homes, Mid-Rise 92

EQ Credit: Moisture Control 93
Homes, Mid-Rise 93

EQ Credit: Low Emissions Products 95
Homes, Mid-Rise 95

EQ Credit: Ban Environmental Tobacco Smoke 96
Homes, Mid-Rise 96

EQ Credit: Enhanced Compartmentalization 97
Homes, Mid-Rise 97

PERFORMANCE (PF) 98

PF Prerequisite: Metering 98
Homes 98
Mid-Rise 98

PF Prerequisite: Education of the Homeowner/Tenant 99
Homes, Mid-Rise 99

PF Credit: Advanced Utility Tracking 101
Homes 101
Mid-Rise 102

INNOVATION (IN) 103

IN Credit: Innovation 103
Homes, Mid-Rise 103

REGIONAL PRIORITY (RP) 104

RP Credit: Regional Priority 104
Homes, Mid-Rise 104

Glossary 105

INTEGRATED PROCESS (IP)

IP PREREQUISITE: PRELIMINARY RATING

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

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

Requirements

HOMES, MID-RISE

As early as practical, conduct a preliminary LEED for Homes meeting, with the participation of the key members of the verification and 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.

IP CREDIT: TRADES TRAINING

This credit is available in the Pilot Credit Library

This credit applies to:

- Homes
- Mid-Rise

Intent

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

Requirements

HOMES, MID-RISE

Beginning prior to construction but after trades have been hired for the project, hold a total of 8 hours of training focusing on the green aspects of the project, including each LEED for Homes relevant prerequisite, and the expectations for ensuring certification. Special focus should be on where trades have traditionally struggled in the past to meet the higher expectations of a green building. Include at least the following trades:

- Plumbing
- Mechanical systems
- Insulation

IP CREDIT: LEED AP FOR HOMES

This credit applies to:

- Homes
- Mid-Rise

Intent

To support and encourage the project team integration required by a LEED project and to streamline the application and certification process.

Requirements

HOMES, MID-RISE

At least one (1) principal participant of the project team shall be a LEED Accredited Professional (AP) for Homes.

In addition, two (2) individuals representing primary disciplines on the project are required to be LEED APs (any specialty) or Green Associates.

LOCATION AND TRANSPORTATION (LT)

Point Floor: At least 15% of total points available in the combined LT & EA sections must be earned.

LT CREDIT: LEED FOR NEIGHBORHOOD DEVELOPMENT

This credit applies to:

- Homes
- Mid-Rise

Intent

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

Requirements

HOMES, MID-RISE

Locate the project in a Stage 2 Pre-Certified LEED for Neighborhood Development plan or a Stage 3 LEED-ND Certified Neighborhood Development.

LT CREDIT: PREFERRED LOCATIONS

This credit applies to:

- Homes
- Mid-Rise

Intent

To encourage development within *existing* cities, suburbs, and towns to reduce adverse environmental and public health effects associated with sprawl. To reduce development pressure beyond the limits of existing development. To conserve natural and financial resources required for construction and maintenance of infrastructure.

Requirements

HOMES, MID-RISE

Option 1: Infill (X points). Select a lot where at least 75% of the perimeter immediately borders previously developed land.

Where a lot is surrounded by roads or rail lines, this credit applies to the land across the road or rail line.

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

Option 2: Previously Developed (X point). Build on land that meets ALL of the following conditions:

- At least 75% of the lot OR disturbed land is previously developed
- The lot is connected to existing central water and sewer service lines.

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 and recently occupied or used land at the time of groundbreaking for the entire development.

AND/OR

Option 3: Brownfield Development (X points) Meet both of the following requirements:

- Locate the project on a site, part or all of which is documented as contaminated/brownfield as defined by a local, state, or federal government agency (or by means of an ASTM E1903-97 Phase II Environmental Site Assessment or a local Voluntary Cleanup Program) ; and
- Remediate site contamination such that the controlling public authority approves the protective measures and/or cleanup as effective, safe, and appropriate for the future use of the site.

LT CREDIT: COMPACT DEVELOPMENT

This credit applies to:

- Homes
- Mid-Rise

Intent

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

Requirements

HOMES, MID-RISE

Construct or renovate a building that meets all of the following criteria:

- ☐ Earn at least X points in LT Credit: Preferred Location
- ☐ Meet the dwelling unit per acre of *buildable land area* density defined in Table 1:

Table 1.

Average Housing Density (dwelling units/acre)	Points
≥ 7 dwelling units/acres of buildable land	
≥ 12 dwelling units/acres of buildable land	
≥ 20 dwelling units/acres of buildable land	

Exemplary performance is available for projects with a density of ≥ 40 DU/acre

LT CREDIT: COMMUNITY RESOURCES

This credit applies to:

- Homes
- Mid-Rise

Intent

Encourage the building of LEED homes in development patterns that encourage daily walking, biking, and transit use, to reduce *vehicle miles traveled* (VMT) and automobile dependence, and support car-free living.

Requirements

HOMES, MID-RISE

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.

Construct or renovate a project on a site that meets the following criteria:

a) Is within the required walking distance of the following diverse services (see below for list of diverse uses)

Diverse Uses within ¼ mile walk		Diverse Uses within ½ mile walk	Points
4-6	OR	7-10	
7-10		≥ 11	
≥ 11		-	

- Has pedestrian access between the project and the services

For mixed-use projects, up to half of the counted diverse uses may be within the project boundary, provided it is open to the public. Counted diverse uses outside of the project boundary must be in place upon occupation of the applicant project.

The following restrictions apply:

a. A single establishment may not be counted in two categories (e.g., a place of worship may be counted only once even if it also contains a daycare facility, and a retail store may be counted only once even if it sells products in several categories).
b. For buildings with multiple diverse uses under a common roof (e.g., shopping malls), establishments may each count if they are distinctly operated enterprises with separate exterior entrances, but no more than half of the minimum number of diverse uses can be situated in a single building or under a common roof.
c. Only two establishments of a single type may be counted (e.g., if five restaurants are within the required distance, only two may be counted).

Diverse Uses:

Food Retail
Supermarket
Other food store with produce

Community-Serving Retail
Clothing store or department store selling clothes
Convenience store
Farmer's market
Hardware store
Pharmacy
Other retail

Services
Bank
Gym, health club, exercise studio
Hair care
Laundry, dry cleaner
Restaurant, café, diner (excluding establishments with only drive-throughs)

Civic and Community Facilities
Adult or senior care (licensed)
Child care (licensed)
Community or recreation center
Cultural arts facility (museum, performing arts)
Educational facility (including K–12 school, university, adult education center, vocational school, community college)
Family entertainment venue (theater, sports)
Government office that serves public on-site
Place of worship
Medical clinic or office that treats patients
Police or fire station
Post office
Public library
Public park
Social services center
Open Space

Adapted from Criterion Planners, INDEX neighborhood completeness indicator, 2005.

LT CREDIT: ACCESS TO TRANSIT

This credit applies to:

- Homes
- Mid-Rise

Intent

To reduce pollution and land development impacts from automobile use.

Requirements

HOMES, MID-RISE

Locate the project within a ¼-mile *walk distance* of bus or streetcar stops, or within a ½-mile walk distance of *bus rapid transit* stops, light or heavy rail stations, or ferry terminals. The transit service at those stops in aggregate meets the minimums listed in Table 1.

- A bus or streetcar stop cannot be counted unless it is a part of a pair that serves a route in opposite directions and has average walk distance of ¼-mile.
- Trips in opposite directions are counted separately.
- A single stop that serves as the terminal for a transit route can also be counted.
- Only one stop per route in a given direction can be counted.

Table 1. Minimum daily transit service for projects with multiple transit types (bus, streetcar, rail, or ferry).

Weekday trips	Points
30	
60	
132	
246	

LT CREDIT: CONNECTED AND OPEN COMMUNITY

This credit is available in the Pilot Credit Library

This credit applies to:

- Homes
- Mid-Rise

Intent

To promote *projects* that are well connected to the community at large. To encourage development within *existing* communities that minimizes vehicle miles traveled. To improve public health by encouraging daily physical activity.

Requirements

HOMES, MID-RISE

Locate the project such that the connectivity of the existing streets, sidewalks and all weather pathways within ¼ mile of the project boundary is at least 300 intersections per square mile.

- All streets and *all weather pathways* that are counted toward the connectivity requirement must be available for general public use and not gated. Gated areas are not considered available for public use, with the exception of education and health care campuses and military bases where gates are used for security purposes.
- Sidewalk intersections may be counted only if they are a unique *right of way*
- Publicly accessible *alleys* may be counted.
- Intersections with cul-de-sacs are not counted.

Number of intersections within ¼ mile radius	Points
60	
80	

LT CREDIT: HOUSING AND JOBS PROXIMITY

This credit is available in the Pilot Credit Library

This credit applies to:

- Homes
- Mid-Rise

Intent

To reduce automobile dependence by locating projects near employment opportunities.

Requirements

HOMES, MID-RISE

Option 1: Central Business District

Locate the building near a *central business district*.

Proximity to central business district	Points
< 10 miles	
< 3 miles	

OR

Option 2: Job Center

Locate the building in an area that is within a ½ mile radius of existing *full-time-equivalent* jobs.

Case 1: Projects With Less Than 2,500 Units

Number of jobs within ½ mile	Points
2500	
5000	

Case 2: Projects With More Than 2,500 Residential Units

Number of jobs within ½ mile	Points
1 x residential units	
2 x residential units	

LT CREDIT: ALTERNATIVE TRANSPORTATION

This credit is available in the Pilot Credit Library

This credit applies to:

- Homes
- Mid-Rise

Intent

To reduce pollution and land development impacts from automobile use.

Requirements

HOMES, MID-RISE

For Multi-Family Projects Only:

Option 1: Bicycle Storage (X points). Provide covered storage facilities for securing bicycles for 15% or more of building occupants. Expect 2 persons for a studio or 1-bedroom apartment, with one additional person per additional bedroom.

AND/OR

Option 2: Parking Capacity / Low Emitting and Fuel-Efficient Vehicles (X points). Provide one of the following:

- Low-emitting and fuel-efficient vehicles for 3% of the total vehicle parking capacity and provide preferred parking for these vehicles.
- Preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site.
- Install alternative-fuel refueling stations for 3% of the total vehicle parking capacity of the site (liquid or gaseous fueling facilities must be separately ventilated or located outdoors).
- Size parking capacity to not exceed minimum local zoning requirements, AND, provide infrastructure to facilitate shared vehicle usage such as carpool drop-off areas, designated parking for vanpools, or car-share services, ride boards, and shuttle services to mass transit.
- Provide no new parking.

SUSTAINABLE SITES (SS)

Point Floor: At least 25% of total points available in the SS section must be earned.

SS PREREQUISITE: CONSTRUCTION ACTIVITY POLLUTION PREVENTION

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

To reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.

Requirements

HOMES, MID-RISE

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

- Stockpile and protect disturbed topsoil from erosion (for reuse).
- Control the path and velocity of runoff with silt fencing or comparable measures.
- Protect on-site storm sewer inlets, streams, and lakes with straw bales, silt fencing, silt sacks, rock filters, or comparable measures.
- Provide swales to divert surface water from hillsides.
- If soils in a sloped area (i.e., 15%, or 6.6:1 slope) are disturbed during construction, use tiers, erosion blankets, compost blankets, filter socks and berms, or some comparable approach to keep soil stabilized.

SS PREREQUISITE: NO INVASIVE PLANTS

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

Design landscapes to avoid invasive species.

Requirements

HOMES, MID-RISE

Introduce no invasive plant species into the landscape.

Note: *Invasive plant species* vary by region. Consult the USDA GRIN Taxonomy for Plants database or the National Association of Exotic Pest Plant Councils exotic pest lists for plants in natural areas and wildlands. Not all nonnative species are considered invasive.

SS CREDIT: SITE SELECTION

This credit applies to:

- Homes
- Mid-Rise

Intent

To avoid the development of inappropriate sites.

Requirements

HOMES, MID-RISE

Do not develop new buildings, hardscapes, roads or parking areas on portions of sites that meet any of the following criteria:

- Prime farmland as defined by the U.S. Department of Agriculture in the United States Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5); or prime or unique soils, or soils of state significance, as identified in a Natural Resources Conservation Service state soils survey.
- Previously undeveloped land within a 100-year floodplain as defined by the Federal Emergency Management Agency (FEMA) or a more recent state of local floodplain management agency map if it is more restrictive.
- Previously undeveloped land specifically identified as habitat for any species or ecological communities on federal or state threatened or endangered lists or classified by NatureServe as HG (potentially extinct), G1 (critically important), or G2 (imperiled).
- Previously undeveloped land within 50 feet of any wetlands as defined by the 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 within setback distances from wetlands prescribed in state or local regulations, as defined by local or state rule or law, whichever is more stringent.
- Previously undeveloped land that is within 100 feet of a water body, defined as seas, lakes, rivers, streams and tributaries that support or could support fish, recreation or industrial use, consistent with the terminology of the Clean Water Act.
- Land that prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland as value is accepted in trade by the public landowner.

Previously developed buildings and hardscapes are exempt from the above requirements.

SS CREDIT : SITE DEVELOPMENT-PROTECT OR RESTORE HABITAT

This credit applies to:

- Homes
- Mid-Rise

Intent

Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.

Requirements

HOMES, MID-RISE

Meet one of the following options:

Option 1 - Onsite Restoration. Meet both of the following:

1. Restore a minimum of 30% of the total site area (including building footprint), with native or adapted vegetation (non-turf).

2. For sites containing greenfield area develop a no-disturbance zone that preserves and protects a minimum of 40% of the greenfield portion of the site from all development and construction activity.

   Note: Projects using vegetated roof surfaces may apply the vegetated roof surface to this calculation if the plants meet the definition of native/adapted and provide the habitat and biodiversity intent of the credit.

   A list of plants native to each state can be found at the Lady Bird Johnson Wildflower Center, the North American Native Plant Society or the National Wildlife Federation's Certified Wildlife Habitat.

OR

Option 2: Compact Development

Earn at least (X) points in LT Credit: Compact Development, at least 12 units/acre for single family and multi-family low-rise

OR

Option 3 - Offsite conservation

On sites that meet any of the following conditions:

- previously developed or graded sites
- prime farmland
- within 50 feet of wetlands
- on public parkland

Donate land in perpetuity equal to 60% of the total site area (including the building footprint) to a land trust in another location. This requirement can be met by:

- Direct donation of land held by the project owner to the land trust by the time of LEED application
- Financial donation to the land trust by the project owner to acquire new land holdings by the time of LEED application
- Financial donation to the land trust by the project owner to offset the purchase price of existing holdings acquired within 2 years of the LEED application date.

The donated land must comply with BOTH of the following provisions:

- The project team donates the land within the same EPA Level III Ecoregion indentified for the project site.
- The land trust must adhere to the “Land Trust: “Standards and Practices”.

SS CREDIT: HEAT ISLAND REDUCTION

This credit is available in the Pilot Credit Library

This credit applies to:

- Homes
- Mid-Rise

Intent

To reduce heat islands to minimize impacts on microclimates and human and wildlife habitats.

Requirements

HOMES, MID-RISE

Ensure that at least 50% of hardscapes (e.g., sidewalks, patios, driveways, parking lots and roofs) on the project site meet one of the following requirements:

OPTION 1: Shading

Locate trees or other plantings to provide shadingof hardscapes. Shading should be calculated for noon on June 21, when the sun is directly overhead, based on five years' growth.

OR

OPTION 2: Reflective Materials

Install light-colored, high-albedo materials or vegetation of hardscapes. Acceptable strategies include the following:

- white concrete;
- reflective roofing;
- ENERGY STAR qualified roof products used in appropriately sloped application;
- open pavers (counting only the vegetation, not the pavers), or an engineered grass paver; and
- any material with a solar reflectance index (SRI) meeting the following criteria in Table 1.

Table 1.

Application	Slope	SRI
Low-slope	≤ 2:12	78
Steep-slope	> 2:12	29

Reflective materials having a lower SRI value than those listed above may be used if the weighted SRI average meets the following criteria:

$$\frac{\text{Hardscape Area Meeting Minimum SRI}}{\text{Total Hardscape Area}} \times \frac{\text{SRI of Installed Hardscape}}{\text{Required SRI}} \geq 50\%$$

SS CREDIT: RAINWATER MANAGEMENT

This credit applies to:

- Homes
- Mid-Rise

Intent

To limit disruption of the site's natural hydrology.

Requirements

HOMES, MID-RISE

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

OPTION 1: Permeable Lot (maximum X points, as specified in Table 1). Design the lot such that at least 70% of the building land, 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:

- Vegetative landscape or roof (e.g., grass, trees, shrubs).
- 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 sub-base, and this base layer must be designed to ensure proper drainage away from the home.
- 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).

Table 1. Permeable Area

Percentage of built environment (including area under roof) that is permeable	Points
55–69%	
70–84%	
85% or greater	

OR

OPTION 2: Professional Landscape Design (X points). Have the site designed by a licensed or certified landscape design or engineering professional such that 100% of water runoff from the built environment is captured on site for reuse or infiltration back into the water table.

SS CREDIT: NON-TOXIC PEST CONTROL

This credit applies to:

- Homes
- Mid-Rise

Intent

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

Requirements

HOMES, MID-RISE

Implement one or more of the measures below. (½ point each, maximum X points).

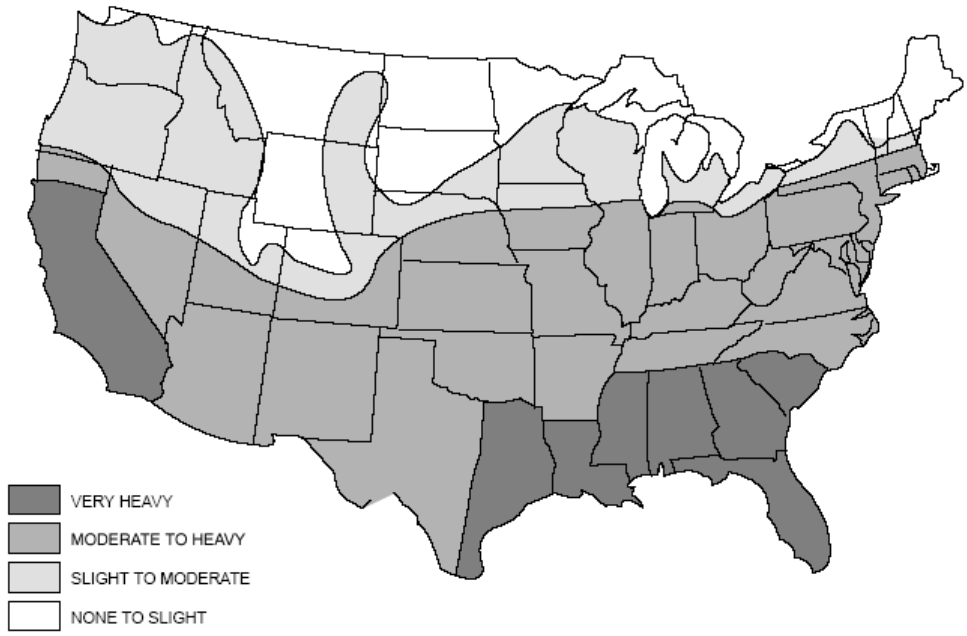
- **pest control measures.** Treat all cellulosic material (e.g., wood framing) with a borate product to a minimum of 3 feet above the foundation.
- Install a sand or diatomaceous earth barrier at least 12" wide and down to the bottom of the foundation.
- Install a steel mesh barrier termite control system.
- Install non-toxic termite bait system.
- Use noncellulosic (i.e., not wood or straw) wall structure.
- Use solid concrete foundation walls or masonry wall with top course of solid block bond beam or concrete-filled block.

AND/OR

CASE 2. General Pest Control Measures In areas marked "moderate to heavy" through "very heavy" on the termite infestation probability map (Figure 1), credit must be received for at least one measure from the 'HEAVY TERMITE ZONE PEST CONTROL MEASURES' list before taking credit for measures on this list.

1. Construction:
   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.
2. Landscaping:
   a. Plant types with no foliage within 24 inches of the ground should be selected for placement closest to home / building to prevent pest harborage
   b. Install landscaping so that the closest edge of the base of plant rootballs will be at least 24 inches from the home.
   c. Irrigation sprinklers and emitters are located at a minimum of 2 feet from structures.
   d. Mulch when used in landscape beds within 12 inches of foundation is kept to a depth under 1.5 inches.

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

WATER EFFICIENCY (WE)

Point Floor: At least 30% of total points available in the WE section must be earned.

WE CREDIT: INDOOR WATER USE

This credit applies to:

- Homes
- Mid-Rise

Intent

Minimize indoor demand for water through high efficiency fixtures and fittings.

Requirements

HOMES

Case 1: Single Family

Projects that install a showerhead of more than 2.5 gpm per shower compartment must use Option 2.

OPTION 1: High Efficiency Fixtures & Fittings. Meet the following requirements for the fixtures and fittings listed below (X points per fixture type):

- ☐ Lavatory Faucets: Each fixture/fitting must be WaterSense Certified AND meet an average rated flow volume of ≤ 1.25 gallons per minute (gpm) across all lavatory faucets.
- ☐ Showerheads: Each fixture/fitting must be WaterSense Certified AND meet an average rated flow volume of ≤ 1.75 gallons per minute (gpm) per shower compartment.
- ☐ Toilets: Each fixture/fitting must be WaterSense Certified AND meet an average rated flush volume of ≤ 1.08 gallons per flush (gpf) across all toilets.

OR

OPTION 2: Indoor Water Use Reduction. (up to X points) Using the LEED Indoor Water Use Calculator, show a total calculated water use reduction of up to at least 5 gallons per day relative to the baseline across all indoor water fixtures and fittings as shown in Table 1 below:

Table 1.

Water Saved (GPD)	Points
5.0	
10.0	
15.0	
20.00	

The baseline water consumption figures for the LEED Indoor Water Use Calculator are shown in Table 2 below:

Table 2.

Fixture	Baseline Flush/Flow Rate[1]	Estimated Usage
Shower Compartment	2.5 gpm	4.85 minutes
Lavatory Faucet	2.2 gpm	9.34 minutes
Toilet	1.6 gpf	5.05 flushes

To calculate savings, find the average flush/flow rate for each fixture type, and multiply by the daily usage. The difference between the daily GPD baseline usage and the proposed GPD is the savings.

AND/OR

Option 3: Water Efficient Appliances

- Water-Efficient Clothes Washer. Install clothes washers with modified energy factor (MEF) ≥ 2.0 and water factor (WF) < 5.5.

Compensating shower valves[1,2] and conventional, non-compensating shower valves[3] may not work properly when high efficiency showerheads (restricting water flow below 2.5 gpm) are installed. Installing high efficiency 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 high efficiency 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 high efficiency showerhead. Please see the LEED for Homes Reference Guide for more information.

Case 2: Multi-Family:

Meet the above requirements for all in-unit spaces.

In addition, the requirements of each credit that the project receives points for must also be met by the average flow of fixtures/fittings in residential-associated and non-residential spaces.

No additional credit is awarded if the flow rate for fixtures and fittings in non-unit spaces is more efficient than in-unit spaces.

MID-RISE

Meet the below requirements for all in-unit spaces.

In addition, the requirements of each credit that the project receives points for must also be met by the average flow of fixtures/fittings in residential-associated and non-residential spaces.

No additional credit is awarded if the flow rate for fixtures and fittings in non-unit spaces is more efficient than in-unit spaces.

Projects that install a showerhead of more than 2.5 gpm per shower compartment must use Option 2.

OPTION 1: High Efficiency Fixtures & Fittings. Meet the following requirements for the fixtures and fittings listed below (X points per fixture type):

[1] Baseline flush/flow rates based on EPAct 1992

- ☐ Lavatory Faucets: Each fixture/fitting must be WaterSense Certified AND meet an average rated flow volume of ≤ 1.25 gallons per minute (gpm) across all lavatory faucets.
- ☐ Showerheads: Each fixture/fitting must be WaterSense Certified AND meet an average rated flow volume of ≤ 1.75 gallons per minute (gpm) per shower compartment.
- ☐ Toilets: Each fixture/fitting must be WaterSense Certified AND meet an average rated flush volume of ≤ 1.08 gallons per flush (gpf) across all toilets.

OR

OPTION 2: Indoor Water Use Reduction. (up to X points) Using the LEED Indoor Water Use Calculator, show a total calculated water use reduction of up to at least 5 gallons per day relative to the baseline across all indoor water fixtures and fittings as shown in Table 1 below:

Table 1.

Water Saved (GPD)	Points
5.0	
10.0	
15.0	
20.00	

The baseline water consumption figures for the LEED Indoor Water Use Calculator are shown in Table 2 below:

Table 2.

Fixture	Baseline Flush/Flow Rate[2]	Estimated Usage
Shower Compartment	2.5 gpm	4.85 minutes
Lavatory Faucet	2.2 gpm	9.34 minutes
Toilet	1.6 gpf	5.05 flushes

To calculate savings, find the average flush/flow rate for each fixture type, and multiply by the daily usage. The difference between the daily GPD baseline usage and the proposed GPD is the savings.

AND/OR

Option 3: Water Efficient Appliances

- Water-Efficient Clothes Washer. Install clothes washers with modified energy factor (MEF) ≥ 2.0 and water factor (WF) < 5.5.

Compensating shower valves[1,2] and conventional, non-compensating shower valves[3] may not work properly when high efficiency showerheads (restricting water flow below 2.5 gpm) are installed. Installing high efficiency 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 high efficiency 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 high efficiency showerhead. Please see the LEED for Homes Reference Guide for more information.

[2] Baseline flush/flow rates based on EPAct 1992

WE CREDIT: OUTDOOR WATER USE

This credit applies to:

- Homes
- Mid-Rise

Intent

Reduce water consumption from landscape through irrigation.

Requirements

HOMES, MID-RISE

OPTION 1: Calculated Landscape Water Use Reduction. Reduce outdoor water consumption of landscaped area by 30% or more as calculated using the LEED-WaterSense Water Budget Tool.

Credit is earned using the following scale:

% Water Use Reduction from Calculated Baseline	Points Earned
30%	
45%	
60%	
≥ 75%	

Project with pools and other outdoor water features must use this compliance pathway.

OR

OPTION 2. Prescriptive Approach. Meet both of the following: (X points)

- No more than 40% of the landscaped area may be ***conventional turfgrass***.
- Install native plantings on at least 50% of the landscaped area.

  A list of plants native to each state can be found at the Lady Bird Johnson Wildflower Center or the North American Native Plant Society

WE CREDIT: WATERSENSE FOR NEW HOMES

This credit is available in the Pilot Credit Library

This credit applies to:

- Homes
- Mid-Rise

Intent

Improve the overall water efficiency of the home by completing an approved bundle of water efficiency measures that are third-party verified by a water efficiency expert.

Requirements

HOMES

Case 1: Single Family

Complete all of the requirements of the U.S. Environmental Protection Agency's WaterSense Specification for Single-Family New Homes.

Case 2: Multi-Family

Meet all of the following:

- Hot Water Delivery System – To minimize water wasted while waiting for hot water, the hot water distribution system shall store no more than 0.5 gallons (1.9 liters) of water in any piping/manifold between the hot water source and any hot water fixture. For projects with central water heating systems that serve multiple units, store no more than 0.5 gallons of water in any piping/manifold between the common hot water line and any hot water fixture.

- Meet the Outdoor Water-Efficiency Criteria of the U.S. Environmental Protection Agency's WaterSense Specification for Single-Family New Homes

MID-RISE

Meet all of the following:

- Hot Water Delivery System – To minimize water wasted while waiting for hot water, the hot water distribution system shall store no more than 0.5 gallons (1.9 liters) of water in any piping/manifold between the hot water source and any hot water fixture. For projects with central water heating

systems that serve multiple units, store no more than 0.5 gallons of water in any piping/manifold between the common hot water line and any hot water fixture.

- Meet the Outdoor Water-Efficiency Criteria of the U.S. Environmental Protection Agency's WaterSense Specification for Single-Family New Homes

ENERGY AND ATMOSPHERE (EA)

Point Floor: At least 15% of total points available in the combined LT & EA sections must be earned.

EA PREREQUISITE: PERFORMANCE OF ENERGY STAR FOR HOMES

This prerequisite is available in the Pilot Credit Library

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

Improve the overall energy performance of a home to lower the building's greenhouse gas emissions.

Requirements

HOMES

Option 1: Performance Pathway

Meet all of the following requirements:

1. Meet the performance requirements of ENERGY STAR for Homes version 3, including all of the following:
    - Successful completion of the thermal enclosure system rater checklist, the HVAC system quality installation rater and contractor checklists, and the water management system builder and rater checklists;
    - Achieve a HERS Index at or below the ENERGY STAR for Homes version 3 HERS Index Target
2. At least one of the following appliances must be ENERGY STAR qualified and installed in each dwelling unit:
    - Refrigerator
    - Dishwasher
    - Clothes Washer

    Note: For buildings that do not have in-unit kitchens or laundry rooms, projects must install ENERGY STAR qualified appliances for all of their refrigerators, dishwashers, or clothes washers in their central kitchen or laundry room.

OR

Option 2: Prescriptive Pathway

Meet all of the following requirements:

1. Meet the prescriptive requirements of ENERGY STAR for Homes version 3, including all of the following:

- Successful completion of the thermal enclosure system rater checklist, the HVAC system quality installation rater and contractor checklists, and the water management system builder and rater checklists;
- Meet the requirements of the ENERGY STAR for Homes version 3 Prescriptive Pathway, which includes meeting or exceeding all components of the ENERGY STAR Reference Design.

2. All pipes used for space heating must be insulated to at least R-3 in unconditioned spaces.
3. At least one of the following appliances must be ENERGY STAR qualified and installed in each dwelling unit:
   - Refrigerator
   - Dishwasher
   - Clothes Washer

   Note: For buildings that do not have in-unit kitchens or laundry rooms, projects must install ENERGY STAR qualified appliances for all of their refrigerators, dishwashers, or clothes washers in their central kitchen or laundry room.

PERFORMANCE PATHWAY

Projects with any of the following characteristics must use the LEED Energy and Atmosphere Performance Pathway:

1. Projects that exceed the square footage of the ENERGY STAR Benchmark Home Size.
2. Projects with pools, heated driveways or other major energy users not included in RESNET energy modeling guidelines.
3. Projects that are not installing heating systems or not installing cooling systems, unless a professional HVAC contractor signs off that there is no significant heating/cooling load to necessitate a heating or cooling system.

Bedrooms in Home to be Built	1	2	3	4	5	6	7
Conditioned floor area of benchmark home	1,000	1,600	2,200	2,800	3,400	4,000	4,600

For homes with more than 7 bedrooms, add 600 ft^2 to the condition floor area of the reference home.

MID-RISE

1. Meet the requirements of ENERGY STAR for MultiFamily High-Rise, including a 15% improvement in the building performance rating compared with Appendix G of ASHRAE Standard 90.1-2007 (with errata but without addenda).

Calculate the baseline building performance rating according to the EPA's Multifamily High-Rise Simulation Guidelines building performance rating method, which is modeled off of Appendix G of ANSI/ASHRAE/IESNA Standard 90.1 2007 (with errata but without addenda) using a computer simulation model for the whole building project.

The individual calculating the baseline performance rating must have experience performing energy modeling per ASHRAE Standard. 90.1, Appendix G. Experience with LEED-NC energy modeling is preferred, but not required.

Appendix G of Standard 90.1 2007 requires that the energy analysis done for the building performance rating method include all energy costs associated with the building project. To achieve

points using this credit, the proposed design must meet the following criteria:

- Comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) in Standard 90.1 2007 (with errata but without addenda).
- Include all energy costs associated with the building project.

For the purpose of this analysis, process energy is considered to include, but is not limited to, office and general miscellaneous equipment, computers, elevators and escalators, kitchen cooking and refrigeration, laundry washing and drying, lighting exempt from the lighting power allowance (e.g., lighting integral to medical equipment) and other (e.g., waterfall pumps).

Regulated (non-process) energy includes lighting (for the interior, parking garage, surface parking, façade, or building grounds, etc. except as noted above), heating, ventilation and air conditioning (HVAC) (for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), and service water heating for domestic or space heating purposes.

For multi-family buildings, the typical examples of un-regulated (process) loads within dwelling units include lighting, kitchen appliances, consumer electronics, and motors of small individual exhaust fans in kitchens and bathrooms.

Process loads must be identical for both the baseline building performance rating and the proposed building performance rating. However, project teams may follow the exceptional calculation method (ANSI/ASHRAE/IESNA Standard 90.1 2007 G2.5) to document measures that reduce process loads. Documentation of process load energy savings must include a list of the assumptions made for both the base and the proposed design, and theoretical or empirical information supporting these assumptions. For example, performance credit may be documented for Energy Star large kitchen appliances, hot water savings associated with low-flow fixtures and shower heads, Energy Star exhaust fans, etc.

AND

2. Testing and Verification. Meet all of the EPA Multifamily High-rise Program Testing and Verification Protocols requirements.

EA PREREQUISITE: MAXIMUM ABSOLUTE ENERGY PERFORMANCE

This prerequisite applies to:

- Homes

Intent

Improve the overall energy performance of a home to lower the building's greenhouse gas emissions.

Requirements

HOMES

Have equal or lower estimated annual energy usage than the LEED MMBtu Target for the building. In this calculation, on-site renewable electricity generation may only be used as an:

> OFFSET for the building's lighting and appliance load until it matches the lighting and appliance load of the LEED MMBtu Target building, and/or
>
> OFFSET for pools, heated driveways or other permanently installed major uses not included in RESNET energy modeling guidelines.

EA CREDIT: OPTIMIZE ABSOLUTE ENERGY PERFORMANCE

This credit applies to:

- Homes
- Mid-Rise

Intent

Improve the overall energy performance of a home to lower the building's greenhouse gas emissions.

Requirement

HOMES

Design and construct a home that reduces the estimated annual energy usage compared to the LEED Index Target.

Points can be earned as follows:

% Reduction from LEED Index Target	Points
3%	
6%	
9%	
12%	
15%	
18%	
21%	
24%	
27%	
30%	
33%	
36%	
39%	
42%	
45%	
48%	
51%	
54%	
57%	
60%	

MID-RISE

Demonstrate a percentage improvement in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda) using a computer simulation model for the whole building project. Use the chart below relating the percentage of energy cost savings to the appropriate number of LEED points.

Energy Cost Savings Above ASHRAE 90.1-2010	LEED for Homes Mid-rise Points
10%	
12%	TBD
14%	
16%	
18%	
20%	
22%	
24%	
26%	
28%	
30%	
32%	
34%	
36%	
38%	
40%	
42%	
44%	
46%	Maximum Points Available
48%	
50%	

EA CREDIT: EFFICIENT HOT WATER DISTRIBUTION SYSTEM

This credit applies to:

- Homes

Intent

Reduce energy consumption associated with the domestic hot water system by improving thelayout of the fixtures in the home.

Requirements

HOMES

Option 1. Efficient Hot Water Distribution. 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, tubs without showerheads, or stovetop pot-fillers. This credit may be met through the use of multiple water heaters. Select one of the following designs:

1. *Structured plumbing system*. The system must meet all of the following:
    a. The system must have a demand-controlled circulation loop that is insulated to at least R-4.
    b. Branch lines from the loop to each fixture must be ≤10 feet long and a maximum of ½-inch nominal diameter.
    c. The system must be designed with a push button control in each full bathroom and the kitchen and an automatic pump shut-off.
    d. 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.
2. *Central manifold distribution system.* The system must meet all of the following:
    a. The central manifold trunk must be no more than 6 feet in length.
    b. The central manifold trunk must be insulated to at least R-4.
    c. 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.
    d. Branch lines from the manifold must be a maximum of ½-inch nominal diameter.
3. *Compact design of conventional system*. The system must meet all of the following:
    a. 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.
    b. Branch lines from the central header to each fixture must be a maximum of ½-inch nominal diameter.

OR

4. *Calculated Savings.* The hot water distribution system shall store no more than 0.5 gallons (1.9 liters) of water in any piping/manifold between the hot water source and any hot water fixture. For information on calculating water consumption, see Table 1, below.

Table 1. Internal Volume of Various Water Distribution Tubing

Internal Volume of Various Water Distribution Tubing

Ounces of Water Per Foot Length of Hot Water Tubing								
Nominal Size (Inches)	Copper M	Copper L	Copper K	CPVC CTS SDR 11	CPVC SCH 40	PEX-Al-PEX ASTM F 1281	PE-AL-PE	PEX CTS SDR 9
⅜	1.06	0.97	0.84	N/A	1.17	0.63	0.63	0.64
½	1.69	1.55	1.45	1.25	1.89	1.31	1.31	1.18
¾	3.43	3.22	2.90	2.67	3.38	3.39	3.39	2.35
1	5.81	5.49	5.17	4.43	5.53	5.56	5.56	3.91
1 ¼	8.70	8.36	8.09	6.61	9.66	8.49	8.49	5.81
1 ½	12.18	11.83	11.45	9.22	13.20	13.88	13.88	8.09
2	21.08	20.58	20.04	15.79	21.88	21.48	21.48	13.86

Source: Modified from *2009 International Plumbing Code Table E202.1. International Code Council. January*

Conversions: 1 gallon (3.8 liters) = 128 ounces
1 ounce = 0.00781 gallons (0.0296 liters)
0.5 gallons (1.9 liters) = 64 ounces
0.6 gallons (2.3 liters) = 76.8 ounces

AND/OR

Option 2. Pipe Insulation (X points). All domestic hot water piping, including sub-slab pipes, shall have R-4 insulation. Insulation shall be properly installed on all piping elbows to adequately insulate the 90-degree bend.

EA CREDIT: SOLAR READY DESIGN

This credit applies to:

- Homes
- Mid-Rise

Intent

Reduce energy consumption and greenhouse gas emissions by designing to maximize opportunities for solar design.

Requirements

HOMES

Case 1: Single Family

Option 1: PV Ready - this credit cannot be earned if the home installs a PV system that earns credit within EA 1.

1. have all necessary hardware and a chaseway for electrical work for a functional PV system, AND
2. the design and installation must be signed-off by a PV contractor; AND
3. the roof must have a minimum of 450 square feet of south-facing area that is oriented appropriately for solar applications; AND
4. the occupant manual must have detailed information about the system, so as to enable future occupants to easily install an active PV system.

AND/OR

Option 2: Solar DHW Ready – this credit cannot be earned if the home installs a solar DHW system that earns credit within EA 1 or EA 8 Option 3. For each domestic water heater, meet the following requirements

1. have all necessary hardware and plumbing for a functional solar DHW system, except the rooftop installation of the water heating system; AND
2. the design and installation must be signed-off by a solar DHW contractor; AND
3. the roof must have a minimum of 450 square feet of south-facing area that is oriented appropriately for solar applications; AND
4. the occupant manual must have detailed information about the system, so as to enable future occupants to easily install an active solar DHW system.

Case 2: Multi-Family

Option 1: PV Ready - this credit cannot be earned if the building installs a PV system that earns credit within EA 1. For each unit, meet all of the following requirements:

1. have all necessary hardware and a chaseway for electrical work for a functional PV system, AND
2. the design and installation must be signed-off by a PV contractor; AND
3. the roof must have a minimum of 450 square feet of south-facing area that is oriented appropriately for solar applications; AND

4. the occupant manual must have detailed information about the system, so as to enable future occupants to easily install an active PV system.

AND/OR

Option 2: Solar DHW Ready – this credit cannot be earned if the building installs a solar DHW system that earns credit within EA 1 or EA 8 Option 3.

For each domestic water heater, meet all of the following requirements:

1. have all necessary hardware and plumbing for a functional solar DHW system, except the rooftop installation of the water heating system; AND
2. the design and installation must be signed-off by a solar DHW contractor; AND
3. the roof must have a minimum of 450 square feet of south-facing area that is oriented appropriately for solar applications; AND
4. the occupant manual must have detailed information about the system, so as to enable future occupants to easily install an active solar DHW system.

MID-RISE

Option 1: PV Ready - this credit cannot be earned if the building installs a PV system that earns credit within EA 1. For each unit, meet all of the following requirements:

5. have all necessary hardware and a chaseway for electrical work for a functional PV system, AND
6. the design and installation must be signed-off by a PV contractor; AND
7. the roof must have a minimum of 450 square feet of south-facing area that is oriented appropriately for solar applications; AND
8. the occupant manual must have detailed information about the system, so as to enable future occupants to easily install an active PV system.

AND/OR

Option 2: Solar DHW Ready – this credit cannot be earned if the building installs a solar DHW system that earns credit within EA 1 or EA 8 Option 3.

For each domestic water heater, meet all of the following requirements:

5. have all necessary hardware and plumbing for a functional solar DHW system, except the rooftop installation of the water heating system; AND
6. the design and installation must be signed-off by a solar DHW contractor; AND
7. the roof must have a minimum of 450 square feet of south-facing area that is oriented appropriately for solar applications; AND
8. the occupant manual must have detailed information about the system, so as to enable future occupants to easily install an active solar DHW system.

PRESCRIPTIVE PATHWAY

EA CREDIT: EFFICIENT HOT WATER DISTRIBUTION SYSTEM

HOMES

See performance path

EA CREDIT: SOLAR READY DESIGN

HOMES

See performance path

EA CREDIT: BUILDING ORIENTATION FOR SOLAR DESIGN

This credit applies to:

- Homes

Intent

Reduce energy consumption and greenhouse gas emissions by designing to maximize opportunities for solar design.

Requirements

HOMES

Design the building such that all of the following requirements are met:

1. 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.
2. The east-west axis of the building is within 15 degrees of due east-west.
3. At least 90% of the glazing on the south-facing wall is completely shaded (using shading, overhangs, etc.) at solar noon on June 21 and unshaded at noon on December 21.

EA CREDIT: AIR INFILTRATION

This credit applies to:

- Homes

Intent

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

Requirements

HOMES

Case 1: Single Family
Meet the air leakage requirements shown in the Table 1 below. The air leakage rate must be tested and verified by an energy rater.

Case 2: Multi-Family
Meet the air leakage requirements shown in the Table 1 below. The air leakage rate must be tested and verified by an energy rater.

Envelope leakage to outside the conditioned envelope shall be met for each dwelling unit, with the exception of whole buildings that can be entirely and sufficiently depressurized by a blower door(s).

Table 1. Air Leakage Requirements

Performance requirements (in ACH50)	

IECC Climate Zones 1-2	*IECC Climate Zones 3-4*	*IECC Climate Zones 5-7*	*IECC Climate Zone 8*	*Points*
4.25	3.5	2.75	2.0	
3.0	2.5	2.0	1.5	

EA CREDIT: ENVELOPE INSULATION

This credit applies to:

- Homes

Intent

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

Requirements

HOMES

Meet the following requirements:

1. Install insulation that exceeds the R-value requirements listed in Chapter 4 of the 2009 International Energy Conservation Code by the percentages shown in the table below:

% Improvement from IECC 2009	Points
10%	
20%	

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.

2. Install insulation to meet the Grade I specifications set by the RESNET Home Energy Rating Standard (Table 1). Installation must be verified by an energy rater or Green Rater conducting a predrywall thermal bypass inspection.

Table 1. 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.

EA CREDIT: WINDOWS

This credit applies to:

- Homes

Intent

Maximize the energy performance of windows.

Requirements

HOMES

Design and install windows, skylights and glass doors that have NFRC ratings that exceed the window requirements in the ENERGY STAR for Homes national Builder Option Package as shown in the tables below.

All decorative glass and skylight window areas count towards the total window area to above grade conditioned floor area (WFA) ratio. For homes that have a WFA ratio of 15% or more, the following additional requirements apply:

1. Homes in Climate Zones 4 – 8 that have a total window-to-floor area ratio (WFA) of 15% or more must meet a more stringent U-factor requirement:

   U-factor = [0.15 / WFA] * [U-factor from Table 1]

2. Homes in Climate Zones 1 – 3 that have a total window-to-floor area ratio (WFA) of 15% or more must meet a more stringent solar heat gain coefficient (SHGC) requirement:

   SHGC = [0.15 / WFA] * [SHGC from Table 1]

Notes:

For Projects that earn credit in EA Credit 5: Building Orientation for Solar Design, the requirements for south facing windows for this credit are waived.

To earn credit, the average window, skylight and exterior door must all meet the requirements for X points. However, up to 0.75% WFA may be used for decorative glass that is not considered in the requirements below.

Table 1. Requirements for Windows

Points	***Metric***	***Climate Zones***				***% Improvement from ENERGY STAR BOP***
		1,2	***3***	***4***	***5-8***	
	U-factor	≤ 0.60	≤ 0.35	≤ 0.29	≤ 0.27	10%
	SHGC	≤ 0.24	≤ 0.27	≤ 0.40	Any	

	U-factor	≤ 0.60	≤ 0.35	≤ 0.26	≤ 0.24	20%
	SHGC	≤ 0.22	≤ 0.24	≤ 0.40	Any	
	U-factor	≤ 0.60	≤ 0.35	≤ 0.20	≤ 0.19	40%
	SHGC	≤ 0.17	≤ 0.19	≤ 0.40	Any	

Table 2. Requirements for Skylights

Points	***Metric***	***Climate Zones***				***% Improvement from ENERGY STAR BOP***
		1,2	***3***	***4***	***5-8***	
	U-factor	≤ 0.70	≤ 0.57	≤ 0.50	≤ 0.50	10%
	SHGC	≤ 0.27	≤ 0.27	≤ 0.40	Any	
	U-factor	≤ 0.70	≤ 0.57	≤ 0.44	≤ 0.44	20%
	SHGC	≤ 0.24	≤ 0.24	≤ 0.40	Any	
	U-factor	≤ 0.70	≤ 0.57	≤ 0.35	≤ 0.35	40%
	SHGC	≤ 0.19	≤ 0.19	≤ 0.40	Any	

Table 3. Requirements for Doors

Metric	***Opaque***	***≤ 1/2 lite:***	***> 1/2 lite***
U-factor	0.21	0.27	0.32
SHGC	N/A	0.30	0.30

EA CREDIT: SPACE HEATING & COOLING EQUIPMENT

This credit applies to:

- Homes

Intent

Reduce energy consumption associated with the heating and cooling system.

Requirements

HOMES

Meet all of the following requirements:

1. Design and install HVAC equipment that is substantially better than the equipment required by the ENERGY STAR v3 Prescriptive Pathway (Table 1).
2. 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.
3. Refrigerant piping shall be R-6 or greater on the AC mode suction line / HP mode discharge line.
4. Third party verification that the installed HVAC system meets ACCA 5 QI Standard.

Table 1. HVAC Requirements

Climate Zones 4-8

Points	End use	HVAC equipment					
		Central AC and air source heat pumps	Gas Furnace	Boilers or Oil Furnace (gas, oil, diesel or propane)	Ground-source heat pumps: Open loop	Ground-source heat pumps: Closed loop	Ground-source heat pumps: Direct expansion
	Cooling	≥ 14 SEER			≥ 17.8 EER	≥ 15.5 EER	≥ 16.5 EER
	Heating	≥ 10 HSPF	≥ 92 AFUE	≥ 87 AFUE	≥ 4.0 COP	≥ 3.6 COP	≥ 3.9 COP
	Cooling	≥ 15 SEER			≥ 19.4 EER	≥ 17 EER	≥ 18 EER
	Heating	≥ 10.5 HSPF	≥ 94 AFUE*	≥ 90 AFUE	≥ 4.3 COP	≥ 4.0 COP	≥ 4.2 COP

Climate Zones 1-3

Points	End use	HVAC equipment					
		Central AC and air source heat pumps	Gas Furnace	Boilers or Oil Furnace (gas, oil, diesel or propane)	Ground-source heat pumps: Open loop	Ground-source heat pumps: Closed loop	Ground-source heat pumps: Direct expansion
	Cooling	≥ 15.5 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
	Cooling	≥ 16.5 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

Note: Maximum credit is granted for projects that do not install heating and cooling equipment if the project can demonstrate that heating and cooling loads do not require heating or cooling equipment per ACCA Manual J or equivalent calculation.

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EA CREDIT: HEATING & COOLING DISTRIBUTION SYSTEMS

This credit applies to:

- Homes

Intent

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

Requirements

HOMES

Single Family

Case 1: Forced-Air Systems.

Path 1: Homes larger than 1200 ft2. Limit duct air leakage rate 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

Path 2: Homes smaller than 1200 ft2. 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.

OR

Path 3: Ductwork in conditioned space. Duct leakage testing is waived if the following conditions are met:

1. Air-handler unit and all ductwork are located entirely within conditioned spaces (i.e., no ductwork hidden in walls, chases, floors, or ceilings)
2. Envelope is airtight; in EAcX Air Infiltration maximum points are achieved.

Ductless mini-split systems qualify.

Note: Maximum credit is granted for projects that do not install heating and cooling equipment if the project can demonstrate that heating and cooling loads do not require heating or cooling equipment per ACCA Manual J or equivalent calculation.

Case 2: Hydronic Systems.

1. Keep the system (including boiler and distribution pipes) entirely within the conditioned envelope. (X points)

2. Install outdoor reset control (i.e., controls that modulate distribution water temperature based on outdoor air temperature). (XX points)

Multi-Family

Meet the above requirements.

Path 3 is not available for projects that have ductwork that runs through interstitial spaces between units, as this is considered outside the thermal envelope of the unit.

EA CREDIT: ENERGY RECOVERY VENTILATION

This credit applies to:

- Homes

Intent

Reduce energy consumption associated with outdoor air ventilation.

Requirements

HOMES

Case 1: Single Family

Install an ENERGY STAR Qualified heat-recovery ventilator (HRV) or energy-recovery ventilator (ERV) that meets the following requirements:

- 90% of the volume of whole house ventilation air required by ASHRAE 62.2-2010 must be met by the ENERGY STAR Qualified ERV or HRV.
- Program the ERV or HRV to be within 10% of the whole house ventilation requirements of ASHRAE 62.2.-2010.

Case 2: Multi-Family

Install an ENERGY STAR Qualified heat-recovery ventilator (HRV) or energy-recovery ventilator (ERV) in each unit that meets the following requirements:

- 90% of the volume of whole house ventilation air required by ASHRAE 62.2-2010 must be met by the ENERGY STAR Qualified ERV or HRV.
- Program the ERV or HRV to be within 10% of the whole house ventilation requirements of ASHRAE 62.2.-2010.

EA CREDIT: EFFICIENT DOMESTIC HOT WATER EQUIPMENT

This credit applies to:

- Homes

Intent

Reduce energy consumption associated with the domestic hot water system by improving the efficiency of the hot water system.

Requirements

HOMES

Design and install energy-efficient water heating equipment. Select one measure from Table 1 below.

Table 1. High-Efficiency Water Heating Equipment

Water heater type and efficiency requirement	***Description***	***Points***
Gas water heaters		
EF ≥ 0.8	Storage or tankless water heater	
CAE ≥ 0.8	Combination water and space heaters	
Electric water heaters		
EF ≥ 0.99	Storage or tankless water heater	
EF ≥ 2.0	Heat pump water heater	
Solar water heaters		
≥ 40% of annual DHW load	With preheat tank	
≥ 60% of annual DHW load	With preheat tank	

EF = Energy factor.
CAE = Combined annual efficiency.

EA CREDIT: LIGHTING

This credit applies to:

- Homes

Intent

Reduce energy consumption associated with interior and exterior lighting.

Requirements

HOMES

Option 1. Indoor Lighting (XX points). Select and install one or both of the following measures:

1. **Improved Indoor Lighting** (X points). Install ENERGY STAR labeled light fixtures or ENERGY STAR labeled compact fluorescent light bulbs, or LEDs, in at least 80% of high-use rooms (kitchen, dining room, living room, family room, hallways).

2. Note: Ceiling fans are not included as fixtures, and are covered in EA Credit 13: High Efficiency Appliances.

   OR

3. **Advanced Lighting Package** (X 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).

AND/OR

Option 2. Exterior Lighting (X points). 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.

EA CREDIT: HIGH EFFICIENCY APPLIANCES

This credit applies to:

- Homes

Intent

Reduce appliance energy consumption.

Requirements

HOMES

Install appliances from the list below. (XX points) To receive points for one type (e.g., refrigerator), every appliance of that type must meet the applicable requirement below.

- ENERGY STAR labeled refrigerator(s) (X points).
- ENERGY STAR labeled ceiling fans (at least one in living or family room *and* one per bedroom) (X points).
- ENERGY STAR labeled dishwasher(s) (X points)

EA CREDIT: RENEWABLE ENERGY

This credit applies to:

- Homes

Intent

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

Requirements

Homes
Design and install a renewable electricity generation system. Receive X points for every 500 kWh produced per year by the system. For every X points earned in the rest of the EA category, X points is available in this credit.

Annual kWh Produced	Required Points in rest of EA	Points
500		
1000		
1500		
2000		
2500		
3000		
3500		
4000		
4500		
5000		

MATERIALS AND RESOURCES (MR)

Point Floor: At least 10% of total points available in the MR section must be earned.

MR PREREQUISITE: CERTIFIED TROPICAL WOOD

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

To encourage environmentally responsible forest management.

Requirements

HOMES, MID-RISE

If tropical wood is intentionally used (i.e., specified in purchasing documents), use only *USGBC Forest Certification Benchmark Level II* 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.

MR PREREQUISITE: DURABILITY MANAGEMENT

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

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

Requirements

HOMES

Complete all of the following:

1. ENERGY STAR Water Management System. Meet the requirements of the ENERGY STAR v3 Water Management System Builder Checklist and Water Management System Rater Checklist.
2. Interior Moisture Control Measures. Install all of the applicable indoor moisture control measures listed in Table 1.

Table 1. Moisture Control Measures

Location or equipment	*Required moisture control measure*
Tub, showers, and spa areas (within 2 feet of tub, shower or spa) – exposed walls or areas behind fiberglass enclosures	Use nonpaper-faced backer board or a paper-faced product or coating over wallboard that meets the standard ASTM D 3273.
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.

MID-RISE

Install all of the applicable indoor moisture control measures listed in Table 1.

Table 1. Moisture Control Measures

Location or equipment	*Required moisture control measure*
Tub, showers, and spa areas (within 2 feet horizontally of tub, shower or spa) – exposed walls or areas behind fiberglass enclosures	Use nonpaper-faced backer board or a paper-faced product or coating over wallboard that meets the standard ASTM D 3273.
Tub, showers, and spas – walls and/or ceilings behind tile	Use nonpaper-faced backer board on walls and/or ceiling behind tile.
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.

MR CREDIT: MATERIAL-EFFICIENT FRAMING

This credit applies to:
- Homes
- Mid-Rise

Intent

Optimize the use of framing materials.

Requirements

HOMES, MID-RISE

Implement advanced framing techniques for 90% of each component.

1. Implement optimum value engineering measures in exterior walls and common walls (X points). Install only one horizontal 2x top plates on walls by aligning studs with joists and roof rafters. Projects using SIPs walls automatically earn this point.

2. Implement any 2 of the following for all interior and exterior walls (X points):
   - ☐ Size headers for actual loads
   - ☐ Use ladder blocking or drywall clips
   - ☐ Use *2-stud corners/California corners*

3. Stud spacing greater than 16" o.c. for interior walls (X points).

MR CREDIT: ENVIRONMENTALLY PREFERABLE PRODUCTS

This credit applies to:
- Homes
- Mid-Rise

Intent

Increase demand for products or building components that minimize material consumption through recycled and recyclable content, reclamation, or overall reduced lifecycle impacts.

Requirements

HOMES, MID-RISE

Use building component materials that meet one or more of the criteria below. Except as specifically noted, a material must make up 90% of the component, by weight or volume. A single component that meets OPTION 1 and OPTION 2can earn points for each.

OPTION 1: Local production Use products that were extracted, processed, and manufactured within 500 miles of the building, OR products reclaimed within 500 miles of the building.

a. Framing

b. Concrete/Cement & Aggregate
c. Drywall/Interior Sheathing

AND/OR

OPTION 2: Environmentally preferable products Use products that meet at least one of the following criteria (points will not be awarded for meeting more than one of the criteria with a single component):

a. 25 % Reclaimed material
b. Composed of at least 25% postconsumer or 50% postindustrial products,
c. Meet USGBC certified wood benchmark, or
d. At least 50% rapidly renewable material (a material that regenerates within 10 years such as bamboo, cork, etc.)

Component	Max. Points Available
Flooring	½ for flooring or 1 for using no floor covering material above base floor (i.e. sealed concrete)
All Insulation*	
Sheathing	
Framing	
Drywall/Interior Finish	
Concrete/Cement & Aggregate **	
Roofing	
Siding	

* excluding HVAC and pipe insulation
** at least 30% fly ash or slag used as a cement substitute, and 50% recycled content or reclaimed aggregate OR 100% recycled content or reclaimed aggregate.

Table 1. 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	NA	Eligible
Exterior wall	Siding or masonry	Recycled content, reclaimed, or FSC-certified	NA	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: ½ point if all carpet complies with Carpet & Rug Institute (CRI) Green Label Plus program and all pad complies with CRI Green Label program. Hard flooring: ½ point if 90% of the floor area is hard-surface flooring. Hard flooring: ½ point for using a product that is SCS FloorScore certified for 90% of floor area.	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	NA	Eligible
Foundation	Aggregate	NA	NA	Eligible
Foundation	Cement	Use 30% fly ash or slag	NA	Eligible
Interior wall	Framing	FSC-certified or reclaimed	NA	Eligible
Interior walls AND ceilings	Gypsum board	NA	NA	Eligible
Interior walls AND ceilings AND millwork	Paints and coatings	Recycled paint that meets Green Seals standard GS-43	Use products that comply with all applicable standards in Table 2.	Not eligible
Landscape	Decking or patio material	Recycled content, FSC-certified, or reclaimed	NA	Eligible
Other	Cabinets	Recycled content, FSC-certified, or reclaimed AND composite materials must contain no added urea-formaldehyde resins	NA	Eligible
Other	Counters (kitchens and bathrooms)	Recycled content, FSC-certified, or reclaimed AND composite materials must contain no added urea-formaldehyde resins	NA	Eligible
Other	Doors (not including garage or insulated doors)	Recycled content, FSC-certified, or reclaimed	NA	Eligible
Other	Interior trim	Recycled content, FSC-certified, or reclaimed AND composite materials must contain no added urea-formaldehyde resins	NA	Eligible
Other	Adhesives and sealants	NA	Use products that comply with all applicable standards in Table 3.	Not eligible
Other	Window framing	Recycled content, FSC-certified, or reclaimed	NA	Eligible
Roof	Framing	FSC-certified	NA	Eligible
Roof	Roofing	Recycled content	NA	Eligible
Roof AND floor AND wall	Cavity insulation (i.e., not rigid foam 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/ehib/AQ/VOCS/Practice.htm	Eligible
Roof, floor, wall (2 of 3)	Sheathing	Recycled content, FSC-certified, or reclaimed	NA	Eligible

MR CREDIT: CONSTRUCTION WASTE MANAGEMENT

This credit applies to:

- Homes
- Mid-Rise

Intent

Reduce waste generation to a level below the industry norm and then reuse and recycle debris that is produced.

Requirements

HOMES

Reduce or divert waste generated from new construction activities from landfills and incinerators to a level below the industry norm. Credit is awarded for reducing the total waste, or by diverting a large percentage, according to the point allocation equation in Table 1.

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

Projects with a conditioned floor area greater than the LEED Reference Home may only earn credit through the reduced construction waste method.

Table 1. Point Allocation Equation:

Reduced Construction Waste		% Waste Diverted from Landfills & Incinerators	Points
Pounds of construction waste / ft^2 (of LEED reference home)*	Cubic yards/1000ft^2 (of LEED reference home)		
3	6	30%	
2.5	5	50%	
2	4	70%	
1.5	3	90%	
1	2		
0.5	1		

*Pounds of on-site construction waste is calculated as:

Construction waste = Waste to landfill + (Waste diverted * 0.75)

Table 2. LEED Reference Home Size

Bedrooms	Condition Floor Area of LEED Reference Home
1	1,000
2	1,600
3	2,200

4	2,800
5	3,400
6	4,000
7	4,600

For buildings with more than 7 bedrooms, reference home size = 400 + (600 x # of bedrooms)

The point allocation equation table uses a 500 pounds / cubic yard of waste factor for mixed construction waste. Projects may elect to use a more detailed waste calculation based on specific weights of waste products using the conversion table below:

Table 3.

Construction & Demolition Debris Weight Conversion Table			
MATERIAL	LBS/CY	TONS/CY	CY/TON
Aluminum (scrap, whole)	175 lbs/cy	0.09 tons/cy	11.1 cy/ton
Asphalt	1,380 lbs/cy	0.69 tons/cy	1.4 cy/ton
Brass (scrap)	906 lbs/cy	0.45 tons/cy	2.2 cy/ton
Brick (common hard)	3,024 lbs/cy	1.50 tons/cy	0.67 cy/ton
Cardboard (uncompacted)	100 lbs/cy	0.05 tons/cy	20 cy/ton
Carpet & Padding (loose)	84.4 lbs/cy	0.04 tons/cy	25 cy/ton
Concrete	1,855 lbs/cy	0.92 tons/cy	1.4 cy/ton
Copper (scrap)	1,094 lbs/cy	0.56 tons/cy	1.8 cy/ton
Dirt (loose, dry)	1,890 lbs/cy	0.94 tons/cy	1.1 cy/ton
Drywall	500 lbs/cy	0.25 tons/cy	4 cy/ton
Glass (broken)	2,160 lbs/cy	1.10 tons/cy	0.91 cy/ton
Metal (scrap)	906 lbs/cy	0.45 tons/cy	2.2 cy/ton
Mixed C&D Debris	900 lbs/cy	0.45 tons/cy	2.2 cy/ton
Mixed Waste/Trash	350 lbs/cy	0.17 tons/cy	5.9 cy/ton
Rock (loose)	2,570 lbs/cy	1.28 tons/cy	0.78 cy/ton
Roofing (wood shake, shingle)	435 lbs/cy	0.22 tons/cy	4.5 cy/ton
Tree Limbs & Stumps	1,080 lbs/cy	0.54 tons/cy	1.9 cy/ton
Wood (scrap, loose)	330 lbs/cy	0.17 tons/cy	5.9 cy/ton
Yard Trimmings (mixed)	108 lbs/cy	0.05 tons/cy	20 cy/ton

Source: Centra Contra Costa Waste Authority

MID-RISE

Reduce or divert waste generated from construction activities from landfills and incinerators to a level below the industry norm using one of the following options:

Case 1: Project Scope includes Demolition

Recycled, reused, or salvaged at least 75% of the deconstruction and construction waste as shown in the table below:

- Heavy materials, defined as ABC (asphalt, brick and concrete) reused or recycled can be counted

in this calculation up to but no more than 75% of the diverted total.

Table .

Percentage Diverted	Points
75%	
95%	

OR

Case 2: Project Scope is only New Construction

Minimize new construction waste to landfills or incenerators by recycling, reusing, or salvaging material to meet the requirements in Table below:

- Heavy materials, defined as ABC (asphalt, brick and concrete) reused or recycled can be counted in this calculation up to but no more than 75% of the diverted total.

Table .

Total Construction Waste to Landfill or Incinerator	Percentage Diverted	Points
2.5 lbs/ft^2	50%	
1.5 lbs/ft^3	75%	

MR CREDIT: DESIGN FOR ADAPTABILITY

This credit is available in the Pilot Credit Library

This credit applies to:

- Homes
- Mid-Rise

Intent

To reduce the materials needed for and waste produced from future maintenance, repair, renovation and rehabilitation through structural, mechanical, and user-induced design.

Requirements

HOMES, MID-RISE

Note: Multi-family projects required to meet the Fair Housing Amendments Act (FHAA) (e.g., a building with ≥ 4 residential units and an elevator) are not eligible to receive points for zero step main entrance or accessible passage but may earn points for the other measures in Option 1 or under Options 2 & 3.

Option 1: Universal Design Features (X point for three or more of the following):

1. Zero-Step Main Entrance
2. Accessible Doorway
3. Accessible Passage.
4. Adaptable bathroom**.**
5. Environmental controls.
6. Basic gripping features. Throughout the home, include all of the following features:
    a. Lever hardware on doors
    b. Lever faucets
    c. D-pull-type or C-pull-type cabinet hardware
7. Kitchen, bedroom features. **(5 or more of the following features):**
    a. A kitchen sink with knee-space below
    b. A cooktop or stove with controls at the front and with knee space below or beside it.
    c. Accessible storage shelves.
    d. A bedroom with an area to accommodate a bed with 5' diameter turning circle. The bed cannot encroach into the turning circle.
    e. Accessible clothes closet.
    f. Adjustable height kitchen countertops
    g. 5' diameter turning circle in kitchen
    h. 5' diameter turning circle in bathroom
8. Stacked closets.

AND/OR

OPTION 2: Open building structural systems (X point for the use of three or more of the following throughout the home)

Flexible floor plans that permit easy redefining of rooms with minimal structural renovation:

1. Centralized "clear-span" primary structural elements in core or envelope
2. Flexible interior partitions or partition and infill alternatives
3. Structural, plumbing and mechanical rough-ins for unfinished spaces that may be expanded or used later

Flexible ceiling and floor systems that permit easy redefining of rooms with minimal mechanical renovation:

4. Hung or suspended ceilings
5. Open web floor trusses
6. Raised floor above joists or other raised floor technologies
7. Underfloor plenum systems
8. Easily removable flooring and floor coverings

Standardized measurements and component interfaces that allow for easy replacement or expansion

9. Grid-based overall design plan following a consistent incremental measurement
10. Use of industry-common standard-sized panels or modules

AND/OR

Option 3. Organized and accessible MEP systems (X point for the use of three or more of the following throughout the home)

1. Stacked plumbing, electrical and mechanical design
2. Separation of MEP systems from structural members (attic ducts, plenum trusses, sealed crawlspaces, dropped ceilings)
3. Wireless thermostat, lighting controls or alarm systems
4. HVAC: high velocity HVAC, underfloor air distribution systems, or ductless HVAC (like radiant heating, radiant panels, mini-split systems)
5. Plumbing: flexible water piping, plumbing manifolds, tankless water heaters, modular plumbing connections
6. Electrical: prefabricated electrical wiring chases, integrated raceways, flat wiring

INDOOR ENVIRONMENTAL QUALITY (EQ)

Point Floor: At least 20% of total points available in the EQ section must be earned.

EQ PREREQUISITE: ENERGY STAR FOR HOMES HVAC CHECKLISTS

This prerequisite applies to:

- Homes

Intent

Ensure that the HVAC system was designed and installed properly for improved efficiency and comfort of the occupants.

Requirements

HOMES

Complete the requirements of ENERGY STAR for Homes v3, including:

a. HVAC System Quality Installation Contractor Checklist
b. HVAC System Quality Installation Rater Checklist

EQ PREREQUISITE: VENTILATION

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

Reduce moisture and exposure to indoor pollutants from kitchens and bathrooms and other sources by exhausting pollutants to outside and ventilating with outdoor air.

Requirements

HOMES

Case 1: Single Family

Meet all of the following requirements for local exhaust and outdoor air ventilation including the requirements of ASHRAE 62.2 – 2010, sections 4, 5 and 7 and Section 1504.4 of the 2009 International Residential Code (IRC).

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 Sections 5 and 7 of ASHRAE Standard 62.2-2010. Sample requirements that relate to minimum intermittent local exhaust flow rates are shown in Table 1, below.

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

c. Use ENERGY STAR labeled bathroom exhaust fans. Exhaust fans serving multiple bathrooms and bathrooms with an HRV or ERV must meet ENERGY STAR ventilation fan requirements for efficacy level (cfm/Watt) and sound (sones).

d. Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m3/s) shall be provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

Table 1. 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

AND

Basic Outdoor Air Ventilation. Design and install a whole building ventilation system that complies with ASHRAE Standard 62.2-2010. A summary of alternatives is provided below, but the HVAC contractor should review and follow the requirements of ASHRAE Standard 62.2-2010, Sections 4 and 7.

a. Continuous ventilation. Meet the ventilation requirements in Table 2 below.

b. Intermittent ventilation. Use Equation 4.2 of ASHRAE Standard 62.2-2010 to demonstrate adequate ventilation air flow.

c. 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 2.

Table 2. 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

Case 2: Multi-Family

Design and install a whole-unit ventilation system for each individual dwelling unit that complies with the requirements of ASHRAE Standard 62.2-2010 (with errata but without addenda). Major components of the standard are summarized below.

- Outdoor air must be provided to each unit directly from the outdoors. Projects using exhaust ventilation systems must specify how outside air is delivered at the flow rate required by ASHRAE 62.2-2010. Systems that rely on transfer air from pressurized hallways or corridors, adjacent dwelling units, attics, etc. are prohibited.
- For continuous ventilation systems, meet the requirements of ASHRAE 62.2-2010, which is summarized in Table 16-1 or Equation 16-1 below. Continuous in unit ventilation fans must be rated for sound at a maximum of 1.0 sone per ASHRAE 62.2 Section 7.2.1.
- For intermittent ventilation systems, install fans to meet ASHRAE Standard 62.2. The requirement states that the fan flow rate is equal to the outdoor air flow requirements provided in Table 16-1 or Equation 16-1 below multiplied by the fan flow rate multiplier shown in Table 16-2. The system must be designed so that it can operate automatically based on a timer. Fans must be rated for sound at a maximum of 1.0 sone.
- As applicable, follow the restrictions on system types for Hot, Humid Climates and Very Cold Climates. In hot, humid climates, whole-house mechanical net exhaust flow shall not exceed 7.5 cfm per 100$ft^2$of conditioned floor area. Mechanical supply-only systems exceeding 7.5 cfm per 100ft^2 shall not be used in very cold climates. See ASHRAE 62.2 Section 4.5 and Section 8 for more details and a list of applicable climates.
- Air inlets that are part of the ventilation design shall be located a minimum of 10 feet from known sources of contamination such as a stack, vent, exhaust hood, or vehicle exhaust. The intake shall be placed so that entering air is not obstructed by snow, plantings, or other material. Forced air inlets shall be provided with rodent/insect screens (mesh not larger than ½ inch). See ASHRAE 62.2 Section 6.8 for more details and a list of exceptions.

AND

For all non-unit spaces, meet the minimum requirements of Sections 4 through 7 of ASHRAE Standard 62.1-2010, Ventilation for Acceptable Indoor Air Quality (with errata but without addenda), and:

1. **Mechanically Ventilated Spaces** must be designed using the ventilation rate procedure or the applicable local code, whichever is more stringent.
2. **Naturally Ventilated Spaces** must comply with ASHRAE Standard 62.1-2010, Paragraph 5.1 (with errata but without addenda[1]).

MID-RISE

Design and install a whole-unit ventilation system for each individual dwelling unit that complies with the requirements of ASHRAE Standard 62.2-2010 (with errata but without addenda). Major components of the standard are summarized below.

- Outdoor air must be provided to each unit directly from the outdoors. Projects using exhaust ventilation systems must specify how outside air is delivered at the flow rate required by ASHRAE 62.2-2010. Systems that rely on transfer air from pressurized hallways or corridors, adjacent dwelling units, attics, etc. are prohibited.
- For continuous ventilation systems, meet the requirements of ASHRAE 62.2-2010, which is summarized in Table 16-1 or Equation 16-1 below. Continuous in unit ventilation fans must be rated for sound at a maximum of 1.0 sone per ASHRAE 62.2 Section 7.2.1.
- For intermittent ventilation systems, install fans to meet ASHRAE Standard 62.2. The requirement states that the fan flow rate is equal to the outdoor air flow requirements provided in Table 16-1 or Equation 16-1 below multiplied by the fan flow rate multiplier shown in Table 16-2. The system must be designed so that it can operate automatically based on a timer. Fans must be rated for sound at a maximum of 1.0 sone.
- As applicable, follow the restrictions on system types for Hot, Humid Climates and Very Cold Climates. In hot, humid climates, whole-house mechanical net exhaust flow shall not exceed 7.5 cfm per 100ft^{2}of conditioned floor area. Mechanical supply-only systems exceeding 7.5 cfm per 100ft^2 shall not be used in very cold climates. See ASHRAE 62.2 Section 4.5 and Section 8 for more details and a list of applicable climates.
- Air inlets that are part of the ventilation design shall be located a minimum of 10 feet from known sources of contamination such as a stack, vent, exhaust hood, or vehicle exhaust. The intake shall be placed so that entering air is not obstructed by snow, plantings, or other material. Forced air inlets shall be provided with rodent/insect screens (mesh not larger than ½ inch). See ASHRAE 62.2 Section 6.8 for more details and a list of exceptions.

AND

For all non-unit spaces, meet the minimum requirements of Sections 4 through 7 of ASHRAE Standard 62.1-2010, Ventilation for Acceptable Indoor Air Quality (with errata but without addenda), and:

3. **Mechanically Ventilated Spaces** must be designed using the ventilation rate procedure or the applicable local code, whichever is more stringent.
4. **Naturally Ventilated Spaces** must comply with ASHRAE Standard 62.1-2010, Paragraph 5.1 (with errata but without addenda[1]).

EQ PREREQUISITE: COMBUSTION VENTING

This prerequisite applies to:

- Homes

- Mid-Rise

Intent

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

Requirements

HOMES, MID-RISE

Meet all the following requirements.

1. No unvented combustion appliances (e.g., decorative logs) are allowed.
2. A carbon monoxide (CO) monitor must be installed on each floor, and hard-wired with a battery backup. In multi-family buildings, CO monitors must be installed on each floor of each unit.
3. All fireplaces and woodstoves located inside the building must have doors that seal when closed, or a solid glass enclosure.
4. All fireplaces and woodstoves located inside the house must pass a backdraft potential test to ensure that depressurization of the combustion appliance zone is less than 5 Pa.
5. Space and water heating equipment that involves combustion must meet one of the following.
    a) it must be designed and installed with closed combustion (i.e., sealed supply air and exhaust ducting);
    b) it must be designed and installed with power-vented exhaust; or
    c) it must be located in a detached utility building or open-air facility.

Conducting a Back-Draft Potential Test

From BPI Building Analyst Standard:

1. Measure the Base Pressure. Start with all exterior doors, windows, and fireplace damper(s) closed. Set all combustion appliances to the pilot setting or turn off the service disconnect, including: boiler, furnace, space-heaters, and water heater. Open all interior doors. With the home in this configuration, measure and record the base pressure of the combustion appliance zone (CAZ) WRT outside.

2. Establish the Worst Case. Turn on the dryer and all exhaust fans. Close interior doors that make the CAZ pressure more negative. Turn on the air handler, if present, and leave on if the pressure in the CAZ becomes more negative, then recheck the door positions. Measure the net change in pressure from the CAZ to outside, correcting for the base pressure. Record the “worst case depressurization”.

EQ PREREQUISITE: GARAGE POLLUTANT PROTECTION

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

Reduce occupant exposure to indoor pollutants originating from an adjacent garage.

Requirements

HOMES, MID-RISE

Meet both of the following:

1. **No HVAC in Garage.** Place all air-handling equipment and ductwork outside the fire-rated envelope of the garage.

    - An air handler unit may be not be located in a room that only opens into the garage unless it is fully isolated from the garage by being directly connected to the living space (or outdoors) and the door to the garage is sealed, gasketed, and 3rd party verified that it has less than 2 Pa of connection to the garage when the house is depressurized to 50 Pa.

    AND

2. **Minimize Pollutants from Garage.** Tightly seal shared surfaces between garage and conditioned spaces, including all of the following:

    a. In conditioned spaces above the garage:
        - seal all penetrations;
        - seal all connecting floor and ceiling joist bays; and

    b. In conditioned spaces next to the garage:
        - weather-strip all doors;
        - place carbon monoxide detectors in adjacent rooms that share a door with the garage;
        - seal all penetrations; and
        - seal all cracks at the base of the walls.

EQ PREREQUISITE: RADON RESISTANT CONSTRUCTION

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

Reduce occupant exposure to radon gas and other soil gas contaminants.

Requirements

HOMES, MID-RISE

Case 1: New 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 Building Radon Out; NFPA 5000, Chapter 49; International Residential Code, Appendix F; CABO, Appendix F; ASTM E1465;or some equivalent code or standard. The requirements listed in Indoor airPLUS, 2.1 shall be verified on the recently constructed (within 3 years) portions of the project. These include:

- A capillary break following the requirements of 1.2 of the Indoor airPLUS specifications;
- Electrical outlet near vent piping in the attic to facilitate future fan installation; AND
- A 3 or 4 inch diameter gas-tight vertical vent pipe, connected to an open T-fitting in the aggregate layer, extending up through the conditioned spaces and terminating a minimum of 12 inch above the roof opening.

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 enclosed vented crawlspace does not qualify. An open-air garage under a building is an acceptable alternative.

Case 2: Renovation Of Existing Building

In High-Risk Areas: If the home is in EPA Radon Zone 1, and no slab work is being performed (ie no demolition of existing slab, and no new slab floor is being built), test the building for radon. If the results are greater than 4 pCi/L, install an active ventilation system. If the results are less than 4 pCi/L, no radon-resistant construction techniques are required.

EQ PREREQUISITE: AIR FILTERING

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

Reduce particulate matter from the air supply system.

Requirements

HOMES, MID-RISE

Meet all of the following requirements:

1. Install air filters with a minimum efficiency reporting value (MERV) ≥ 8 on all recirculating space conditioning systems per ASHRAE 62.2-2010 and ensure that air handlers can maintain adequate pressure and air flow. Air filter housings must be airtight to prevent bypass or leakage. Note: Non-ducted and systems with less than 10 feet of ductwork are exempt.
2. Install air filters ≥ MERV 6 for mechanically supplied outdoor air for systems with 10 feet of ductwork or more per ASHRAE 62.2-2010 Section 6.7.

EQ PREREQUISITE: ENVIRONMENTAL TOBACCO SMOKE

This prerequisite is available in the Pilot Credit Library

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

To prevent or minimize exposure of building occupants, indoor surfaces and ventilation air distribution systems to environmental tobacco smoke (ETS).

Requirements

HOMES, MID-RISE

This prerequisite is for Multi-Family projects only

Implement rules and restrictions to achieve ALL of the following:

1. Prohibit smoking in all common areas of the building. The prohibition must be communicated in building rental/lease agreements or condo/coop association covenants and restrictions, and provisions for enforcement must be included.
2. Locate any exterior designated smoking areas, including balconies where smoking is permitted, at least 25 feet from entries, outdoor air intakes and operable windows opening to common areas.
3. Prohibit on-property smoking within 25 feet of entries, outdoor air intakes and operable windows. Provide signage to allow smoking in designated areas, prohibit smoking in designated areas or prohibit smoking on the entire property.

EQ PREREQUISITE: COMPARTMENTALIZATION

This prerequisite is available in the Pilot Credit Library

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

To limit the exposure of building occupants to indoor air pollutants by minimizing the transfer of air between units.

Requirements

HOMES, MID-RISE

This prerequisite is for Multi-Family projects only

Each unit must be compartmentalized, to prevent excessive leakage between units. Meet both of the following:

1. Weather-strip all exterior doors and operable windows in the residential units to minimize leakage from outdoors. Minimize uncontrolled pathways for ETS and other indoor air pollutant transfer between individual residential units by sealing penetrations in walls, ceilings and floors in the residential units and by sealing vertical chases (including utility chases, garbage chutes, mail drops, and elevator shafts) adjacent to the units. Weather-strip all doors in the residential units leading to common hallways to minimize air leakage into the hallway. .
2. Demonstrate acceptable sealing of residential units by a blower door test. Follow the procedure described in the ENERGY STAR Testing and Verification Protocols for multifamily high-rise buildings, with an allowable maximum leakage of 0.30 cfm50 per square foot of enclosure (i.e. all surfaces enclosing the apartment, including exterior and party walls, floors, ceiling) or 1.50 square inches of leakage (ELA @ 4 Pascals) per 100 square feet of enclosure.

PERFORMANCE PATH

EQ CREDIT: EPA INDOOR AIRPLUS – REQUIRED FOR THIS PATHWAY

This credit applies to:

- Homes

Intent

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

Requirements

HOMES

Complete all the requirements of the U.S. Environmental Protection Agency's Indoor airPLUS.

Note: Only ENERGY STAR certified homes are eligible to earn the Indoor airPLUS label.

EQ CREDIT: ENHANCED VENTILATION

This credit applies to:

- Homes
- Mid-Rise

Intent

Reduce moisture and exposure to indoor pollutants from kitchens and bathrooms and other sources by exhausting pollutants to outside and ventilating with outdoor air.

Requirements

HOMES

Case 1: Single Family

Option 1: Enhanced Local Exhaust (X points). Use one of the following strategies in every bathroom with a shower, bathtub, or spa (i.e., half-baths are excluded) to control the use of the local exhaust fan:

- An occupancy sensor.
- An automatic humidistat controller.
- A continuously operating exhaust fan.
- An automatic timer to operate the fan for a timed interval after occupant leaves the room.

AND/OR

Option 2: Enhanced Whole House Ventilation. (X points) meet both of the following requirements

1. Install a balanced whole house ventilation system (not just exhaust only) that meets the minimum ventilation requirements of ASHRAE Standard 62.2-2010, Sections 4 and 7

2. Program the whole house ventilation system so that it does not exceed the requirements of ASHRAE 62.2.-2010 by more than 10%.

AND/OR

Option 3: Performance Testing. Meet both of the following requirements:

1. **Local Exhaust.** Perform a third-party test of each exhaust air flow rate for compliance with the requirements of Section 5 of ASHRAE Standard 62.2-2010.
2. **Outdoor Air Ventilation.** Have a third-party test the flow rate of air brought into the home, and verify that the requirements of ASHRAE Standard 62.2-2010 are met. In exhaust-only ventilation systems, install exhaust ducts according to Table 7.1 of ASHRAE Standard 62.2-2010, 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.

Case 2: Multi-Family

The above requirements must only be met for in-unit residential spaces.

Non-unit spaces are encouraged, but not required, to meet the requirements.

MID-RISE

The below requirements are only required for in-unit residential spaces.
Non-unit spaces are encouraged, but not required, to meet the requirements.

Option 1: Enhanced Local Exhaust (X points). Use one of the following strategies in every bathroom with a shower, bathtub, or spa (i.e., half-baths are excluded) to control the use of the local exhaust fan:

- An occupancy sensor.
- An automatic humidistat controller.
- A continuously operating exhaust fan.

AND/OR

Option 2: Enhanced Whole House Ventilation. (X points) meet both of the following requirements

1. Install a balanced whole house ventilation system (not just exhaust only) that meets the minimum ventilation requirements of ASHRAE Standard 62.2-2010, Sections 4 and 7

2. Program the whole house ventilation system so that it does not exceed the requirements of ASHRAE 62.2.-2010.

AND/OR

Option 3: Performance Testing. Meet both of the following requirements:

3. **Local Exhaust.** Perform a third-party test of each exhaust air flow rate for compliance with the requirements of Section 5 of ASHRAE Standard 62.2-2010.
4. **Outdoor Air Ventilation.** Have a third-party test the flow rate of air brought into the home, and verify that the requirements of ASHRAE Standard 62.2-2010 are met. In exhaust-only ventilation systems, install exhaust ducts according to Table 7.1 of ASHRAE Standard 62.2-2010, 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.

EQ CREDIT: AIR FILTERING

This credit applies to:

- Homes
- Mid-Rise

Intent

Reduce particulate matter from the air supply system.

Requirements

HOMES, MID-RISE

Meet all of the following:

1. Install air filters with the MERV level shown in the table below on all space conditioning systems. This includes both space heating/cooling systems, as well as whole house ventilation supply air.
2. Ensure that air handlers can maintain design air flow.
3. Air filter housings must be airtight to prevent bypass or leakage.

Table 1. Filter MERV Point Achievement

Filter MERV	Points
≥ MERV 10	
≥ MERV 13	

EQ CREDIT: CONTAMINANT CONTROL

This credit applies to:

- Homes
- Mid-Rise

Intent

Reduce occupants' exposure to indoor airborne contaminants through source control and removal.

Requirements

HOMES

Case 1: Single Family

Option 1. Walk-off Mats. 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). Permanent walk-off mats are only required for the primary entryways, but non-permanent walk-off mats are strongly recommended for other entryways.

AND/OR

Option 2. Shoe Removal and Storage. 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.

AND/OR

Option 3. Central Vacuum. Install a central vacuum system with exhaust to the outdoors. Ensure that the exhaust is not within 10 feet of any ventilation air intake (or 3 feet for air inlets on the roof). Exhaust to unconditioned spaces, such as attics or attached garages is not permitted.

Case 2: Multi-Family

Select from the measures below:

Option 1: Walk off Mats. Complete both of the following:

1. For individual units with primary entrances that lead to the outdoors, 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).

2. For common entryways, employ permanent entryway systems at least 10 feet long in the primary direction of travel to capture dirt and particulates entering the building at regularly used exterior entrances. Acceptable entryway systems include permanently installed grates, grill s and slotted systems that allow for cleaning underneath. Roll-out mats are acceptable only when maintained on a weekly basis by a contracted service organization. Qualifying entryways are those that serve as regular entry points for building users, and that are directly connected to the outdoors.

AND/OR

Option 2: Shoe Removal and Storage. In each unit, design a space near entryway for removing and storing shoes that is 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 2 pairs of shoes per bedroom.

AND/OR

Option 3: Central Vacuum. Install a central vacuum system in each unit with exhaust to the outdoors. Ensure exhaust is not near ventilation air intake.

MID-RISE

Select from the measures below:

Option 1: Walk off Mats. Complete both of the following:

3. For individual units with primary entrances that lead to the outdoors, 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).

4. For common entryways, employ permanent entryway systems at least 10 feet long in the primary direction of travel to capture dirt and particulates entering the building at regularly used exterior entrances. Acceptable entryway systems include permanently installed grates, grill s and slotted systems that allow for cleaning underneath. Roll-out mats are acceptable only when maintained on a weekly basis by a contracted service organization. Qualifying entryways are those that serve as regular entry points for building users, and that are directly connected to the outdoors.

AND/OR

Option 2: Shoe Removal and Storage. In each unit, design a space near entryway for removing and storing shoes that is 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 2 pairs of shoes per bedroom.

AND/OR

Option 3: Central Vacuum. Install a central vacuum system in each unit with exhaust to the outdoors. Ensure exhaust is not near ventilation air intake.

EQ CREDIT: BALANCING OF HEATING & COOLING DISTRIBUTION SYSTEMS

This credit is available in the Pilot Credit Library

This credit applies to:

- Homes
- Mid-Rise

Intent

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

Requirements

HOMES, MID-RISE

Case 1: Forced-Air Systems:

Option 1: Multiple Zones. Have at least two distinct space conditioning zones with independent thermostatic controls. In houses with both a heating and cooling system, both must have at least two zones.

AND/OR

Option 2: Third-Party Performance Test. Have the total supply air flow rates and temperatures 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.
- Measured air supply temperatures must meet the measured supply air temperature difference tolerances listed in Table 1.
- Multi-rate or multi-speed HVAC systems will be tested at full capacity. Supply air flow requirements must meet the higher of the cooling or heating designed air flow for each room.
- Ductless systems qualify for this credit.

Table 1. Temperature Difference Tolerances

Supply Air	Tolerance
Heating (Non-Condensing Furnace)	15.0°F
Heating (Condensing Furnace)	10.0°F
Heating (Heat pump)	10.0°F

Cooling	3.0°F
Return Air	**Tolerance**
Heating R/A TD	3.0°F
Cooling R/A TD	3.0°F

1. Plenum temperatures will be measured using a thermometer and sampled following standard duct traverse procedures approved by AABC, ACCA, ASHRAE, NCI, NEBB, or TABB.
2. Air temperatures at the duct terminal will be measured using a thermometer or temperature sensor in an air capture hood, vane anemometer, or hot-wire anemometer.
3. All thermometers must be calibrated and used in accordance with the manufacturer's instructions

Case B: Radiative Systems (e.g., Hydronic Systems):

Option 1: Multiple Zones (X points). Install nonducted HVAC system with at least two distinct zones with independent thermostat controls. Independent zones must include separate loops and separate pumps controlled automatically by a thermostat control. Simply having flow control valves on each radiator does not constitute separate zones.

OR

Option 2: Room-by-Room Controls (X points). Design the HVAC system with flow control valves on every radiator.

PRESCRIPTIVE PATH

EQ Credit: Ventilation

EQ Credit: Air Filtering

EQ Credit: Contaminant Control

EQ Credit: Balancing of Heating & Cooling Distribution Systems

EQ CREDIT: CONTAMINANT CONTROL DURING CONSTRUCTION

This credit applies to:

- Homes
- Mid-Rise

Intent

Reduce occupants' exposure to indoor airborne contaminants through source control and removal.

Requirements

HOMES

Case 1: Single Family

During Construction/Prior to Occupancy (X points). Complete both of the following:

1. **Seal Ducts.** Upon installation, seal all permanent ducts and vents to minimize contamination during construction. Remove any seals after all phases of construction are completed.
2. **Preoccupancy Flush.** Flush the home with fresh air, according to the following guidelines:
    a. Remove any dust and debris from ducts prior to flush.
    b. Flush prior to occupancy but after all phases of construction are completed.
    c. Flush the entire home, keeping all interior doors open.
    d. Flush for 48 total hours; the hours may be nonconsecutive, if necessary.
    e. 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.

Case 2: Multi-Family

Meet the above requirements. The Preoccupancy Flush credit can be awarded if the requirements are only met for all in-unit spaces.

MID-RISE

During Construction/Prior to Occupancy (X points). Complete both of the following:

1. **Seal Ducts.** Upon installation, seal all permanent ducts and vents to minimize contamination during construction. Remove any seals after all phases of construction are completed.
2. **Preoccupancy Flush.** Flush the home with fresh air, according to the following guidelines:
    a. Remove any dust and debris from ducts prior to flush.
    b. Flush prior to occupancy but after all phases of construction are completed.
    c. Flush the entire home, keeping all interior doors open.
    d. Flush for 48 total hours; the hours may be nonconsecutive, if necessary.
    e. 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.

The Preoccupancy Flush credit can be awarded if the requirements are only met for all in-unit spaces.

EQ CREDIT: COMBUSTION VENTING

This credit applies to:

- Homes
- Mid-Rise

Intent

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

Requirements

HOMES, MID-RISE

Option 1: Install no fireplace or woodstove

OR

Option 2: Design and install a fireplace or woodstove according to the requirements in Table 1.

Table 1. Fireplace and Stove Combustion-Venting Requirements

Fireplace or stove	Enhanced combustion-venting measures
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.
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.
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.
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 and has an electronic 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” and is power vented or direct vented.

EQ CREDIT: GARAGE POLLUTANT PROTECTION

This credit applies to:

- Homes
- Mid-Rise

Intent

Reduce occupant exposure to indoor pollutants originating from an adjacent garage.

Requirements

HOMES

Case 1: Single Family

OPTION 1: Exhaust Fan in Garage (X points). Install an ENERGY STAR qualified exhaust fan , rated for continuous use, in the garage. The fan must vent directly to the outdoors, and meet one of requirements listed below. 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

OPTION 2: Detached Garage or No Garage or Carport (X points). If a garage is constructed, it may not share a wall with the home. A carport is defined as an open-air space with only one complete wall, which is shared with the home.

Case 2: Multi-Family

OPTION 1: Exhaust Fan in MULTI-CAR Garage. Follow the requirements laid out in ASHRAE 62.1-2010 for projects with garages that hold more than 3 cars. Exhaust the garage sufficiently to create negative pressure with respect to adjacent spaces with the doors to the room closed. Provide self-closing doors and deck to deck partitions or a hard lid ceiling. The exhaust rate shall be at least 0.75 cfm/ ft2, with no air recirculation, provided continuously.

OR

OPTION 2: Exhaust Fan in Garage (X points). For garages that hold 3 or fewer cars, install an ENERGY STAR exhaust fan, rated for continuous use, in the garage. The fan must vent directly to the outdoors, and meet one of requirements listed below. 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

OPTION 3: Detached Garage or No Garage or Carport (X points). If a garage is constructed, it may not share a wall with the home. A carport is defined as an open-air space with only one complete wall, which is shared with the home.

MID-RISE

OPTION 1: Exhaust Fan in MULTI-CAR Garage. Follow the requirements laid out in ASHRAE 62.1-2010 for projects with garages that hold more than 3 cars. Exhaust the garage sufficiently to create negative pressure with respect to adjacent spaces with the doors to the room closed. Provide self-closing doors and deck to deck partitions or a hard lid ceiling. The exhaust rate shall be at least 0.75 cfm/ ft2, with no air recirculation, provided continuously.

OR

OPTION 2: Exhaust Fan in Garage (X points). For garages that hold 3 or fewer cars, install an ENERGY STAR exhaust fan, rated for continuous use, in the garage. The fan must vent directly to the outdoors, and meet one of requirements listed below. 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

OPTION 3: Detached Garage or No Garage or Carport (X points). If a garage is constructed, it may not share a wall with the home. A carport is defined as an open-air space with only one complete wall, which is shared with the home.

EQ CREDIT: RADON RESISTANT CONSTRUCTION

This credit applies to:

- Homes
- Mid-Rise

Intent

Reduce occupant exposure to radon gas and other soil gas contaminants.

Requirements

HOMES, MID-RISE

Case 1: Radon Resistant Construction in High-Risk Areas: (X points) If the building is in EPA Radon Zone 1, test the building for radon. If the results are greater than 4 pCi/L, install and run an active ventilation system.

Case 2: Radon-Resistant Construction in Moderate-Risk Areas: (X points). Meet the following requirements:

Option 1. Radon-Resistant Construction Techniques.

1. If the building is outside EPA Radon Zone 1, design and build the building with radon-resistant construction techniques as prescribed by EPA Building Radon Out; NFPA 5000, Chapter 49; the International Residential Code, Appendix F; CABO, Appendix F; ASTM E1465; or some equivalent code or standard. The requirements listed in Indoor airPLUS, 2.1 shall be verified. These include:

    - A capillary break following the requirements of 1.2 of the Indoor airPLUS specifications;
    - Electrical outlet near vent piping in the attic to facilitate future fan installation;
    - A 3 or 4 inch diameter gas-tight vertical vent pipe, connected to an open T-fitting in the aggregate layer, extending up through the conditioned spaces and terminating a minimum of 12 inch abo ve the roof opening,

    AND

2. Test the building for radon. If the results are greater than 4 pCi/L, install and run an active ventilation system.

    OR

Option 2. Elevated Structure. 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 enclosed vented crawlspace does not qualify. An open-air garage under a building is an acceptable alternative.

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.

EQ CREDIT: MOISTURE CONTROL

This credit applies to:

- Homes
- Mid-Rise

Intent

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

Requirements

HOMES, MID-RISE

Install dehumidification equipment with sufficient latent capacity to maintain relative humidity at or below 60%. This must be achieved through one of the following:

OPTION 1: Additional dehumidification system(s).

OR

OPTION 2: Complete both of the following:

1. Install a central HVAC that actively dehumidifies in response to a space humidity control. The control must be set to allow no more than 3 deg F of overcooling during periods of active dehumidification,
2. Ducts must be in conditioned space.

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.

EQ CREDIT: LOW EMISSIONS PRODUCTS

This credit applies to:

- Homes
- Mid-Rise

Intent

Reduce occupant exposure to VOCs through product selection.

Requirements

HOMES, MID-RISE

Low emissions (X point per component). Use products that meet the emissions specifications listed below from the California Department of Public Health 2010 Standard Method:

- paints and coatings – 50g/L or less or meet South Coast Air Quality Management District (SCAQMD)Rule 1113-July 13, 2007 (to be updated to most current version of rule when available)
- composite wood products – meet requirements for low formaldehyde emissions equivalent to the California Air Resources Board ATCM for formaldehyde Phase 2. Composite woods exempt from formaldehyde emission testing requirements because they are documented as having no added formaldehyde or ultra low formaldehyde emitting resins are considered to be compliant.
- flooring – meet CA Section 01350
- insulation – meet CA Section 01350

EQ CREDIT: BAN ENVIRONMENTAL TOBACCO SMOKE

This credit applies to:

- Homes
- Mid-Rise

Intent

To prevent or minimize exposure of building occupants, indoor surfaces and ventilation air distribution systems to environmental tobacco smoke (ETS).

Requirements

HOMES, MID-RISE

This credit is available for Multi-Family projects only

Prohibit smoking throughout the building including within living units. The prohibition must be communicated in building rental/lease agreements or condo/coop association covenants and restrictions, and provisions for enforcement must be included.

EQ CREDIT: ENHANCED COMPARTMENTALIZATION

This credit applies to:

- Homes
- Mid-Rise

Intent

To limit the exposure of building occupants to indoor air pollutants by minimizing the transfer of air between units.

Requirements

HOMES, MID-RISE

This credit is available for Multi-Family projects only

Perform a compartmentalization blower door test according to ENERGY STAR Testing and Verification Protocols for multifamily high-rise buildings, with an allowable maximum leakage of 0.225 cfm50 per square foot of enclosure (i.e. all surfaces enclosing the apartment, including exterior and party walls, floors, ceiling) or 1.125 square inches of leakage (ELA @ 4 Pascals) per 100 square feet of enclosure to ensure that smoke transfer is minimized.

PERFORMANCE (PF)

PF PREREQUISITE: METERING

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

To provide monitoring and reconciliation of energy and water use at the whole building level and provide for the ongoing accountability of building utility consumption over time.

Requirements

HOMES

Case 1: Single Family

Complete both of the following:

1. Install a whole house electric and gas meter (if applicable) and a whole house water meter.
2. Commit to informing and encouraging homeowners or tenants to participate in the USGBC Building Performance Partnership (BPP)

Note: Single family attached homes may share a whole building water meter if:

1. Landscaping is commonly managed
2. There is a separate meter for any group of homes that will not achieve LEED certification

Case 2: Multi-Family

Complete both of the following:

1. Install an electric meter for each residential unit and a whole building gas (if applicable) and water meter. Single room occupancy units, transitional/temporary housing, and designated supportive housing buildings do not need to install an energy meter in each unit, but must install a whole building energy meter.
2. Commit to informing and encouraging homeowners or tenants to participate in the USGBC Building Performance Partnership (BPP).

MID-RISE

Complete both of the following:

1. Install an electric meter for each residential unit and a whole building gas (if applicable) and water meter. Single room occupancy units, transitional/temporary housing, and designated

supportive housing buildings do not need to install an energy meter in each unit, but must install a whole building energy meter.

2. Commit to informing and encouraging homeowners or tenants to participate in the USGBC Building Performance Partnership (BPP).

PF PREREQUISITE: EDUCATION OF THE HOMEOWNER/TENANT

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

Maintain the performance of the home by educating the occupants about the operations and maintenance of the home's LEED features and equipment.

Requirements

HOMES, MID-RISE

Basic Operations Training. Provide the following to all individuals or organizations responsible for ongoing maintenance of the home, including occupants, building managers, maintenance contractors, etc:
An operations and maintenance manual, binder or CD that includes all the following items:

a. The completed checklist of LEED for Homes features.
b. A copy of each signed Accountability Form.
c. A copy of all ENERGY STARv3 checklists.
d. The product manufacturers' manuals for all installed equipment, fixtures, and appliances.
e. General information on efficient use of energy, water, and natural resources.
f. Operations and maintenance guidance for any 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.
g. 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.
h. Educational information on local "green power" options.
i. Information on enrolling in USGBC's Building Performance Partnership

A minimum one-hour walkthrough of the home with the occupant(s). For buildings with building managers, the building manager must be included in a walkthrough. Walkthrough must feature the following:

a. Identification of all installed equipment.
b. Instruction in how to use the measures and operate the equipment.
c. Information on how to maintain the measures and equipment.

PF CREDIT: ADVANCED UTILITY TRACKING

This credit is available in the Pilot Credit Library

This credit applies to:

- Homes
- Mid-Rise

Intent

To provide advanced monitoring and reconciliation of energy and water use at the whole building and end use levels. To provide for the ongoing accountability of building utility consumption over time.

Requirements

HOMES

Case 1: Single Family

Option 1: Energy & Water

1. Install an advanced energy monitoring system that meets the following requirements:
   - Meters must be permanently installed,
   - Record at intervals of 1 hour or less
   - Transmit data to the homeowner or occupant at a remote location (e.g, computer, in house display).
   - Separate energy usage information for at least four end uses such as space conditioning, water heating, and major plug loads.

2. Irrigation Meter. If an automatic in-ground irrigation system is part of the home project and the landscape irrigated area is larger than 1000 square feet, a sub-meter must be installed to monitor all irrigation system components.

AND/OR

Option 2: Building Performance Partnership

Homeowner must enroll in the USGBC Building Performance Partnership (BPP) for all applicable utility accounts, prior to submitting for LEED Certification.

Case 2: Multi-Family

Option 1: Energy & Water

1. Install an advanced energy monitoring system for each unit that meets the following requirements:
   - Meters must be permanently installed,
   - Record at intervals of 1 hour or less
   - Transmit data to the homeowner or occupant at a remote location (e.g, computer, in house display).

- Separate energy usage information for at least four end uses such as space conditioning, water heating, and major plug loads.

2. Irrigation Meter. If an automatic in-ground irrigation system is part of the home project and the landscape irrigated area is larger than 1000 square feet, a sub-meter must be installed to monitor all irrigation system components.

AND/OR

Option 2: Building Performance Partnership

Path 1: Whole Building Master Meter: Building owner must enroll in the USGBC Building Performance Partnership (BPP) for all applicable utility accounts, prior to submitting for LEED Certification.

OR

Path 2: Individual Unit Meters: At least 50% of unit owners or occupants must enroll in the USGBC Building Performance Partnership (BPP) for all applicable utility accounts, prior to submitting for LEED Certification.

MID-RISE

Option 1: Energy & Water

3. Install an advanced energy monitoring system for each unit that meets the following requirements:
   - Meters must be permanently installed,
   - Record at intervals of 1 hour or less
   - Transmit data to the homeowner or occupant at a remote location (e.g, computer, in house display).
   - Separate energy usage information for at least four end uses such as space conditioning, water heating, and major plug loads.

4. Irrigation Meter. If an automatic in-ground irrigation system is part of the home project and the landscape irrigated area is larger than 1000 square feet, a sub-meter must be installed to monitor all irrigation system components.

AND/OR

Option 2: Building Performance Partnership

Path 1: Whole Building Master Meter: Building owner must enroll in the USGBC Building Performance Partnership (BPP) for all applicable utility accounts, prior to submitting for LEED Certification.

OR

Path 2: Individual Unit Meters: At least 50% of unit owners or occupants must enroll in the USGBC Building Performance Partnership (BPP) for all applicable utility accounts, prior to submitting for LEED Certification.

INNOVATION (IN)

IN CREDIT: INNOVATION

This credit applies to:

- Homes
- Mid-Rise

Intent

To provide projects the opportunity to achieve exceptional performance above the requirements set by the LEED Green Building Rating System and/or innovative performance in categories not specifically addressed by the LEED Green Building Rating System.

Requirements

HOMES, MID-RISE

Credit can be achieved through any combination of the Innovation in Design and Exemplary Performance paths as described below:

OPTION 1. Innovation

Achieve significant, measurable environmental performance using a strategy not addressed in the LEED Green Building Rating System.

One point is awarded for each innovation achieved. No more than 5 points under IDc1 may be earned through OPTION 1—Innovation.

Identify the following in writing:

- The intent of the proposed innovation credit.
- The proposed requirement for compliance.
- The proposed submittals to demonstrate compliance.
- The design approach (strategies) used to meet the requirements.

OPTION 2. Exemplary Performance

Achieve exemplary performance in an existing LEED 2009 prerequisite or credit that allows exemplary performance as specified in the LEED Reference Guide 2009 Edition. An exemplary performance point is typically earned for achieving double the credit requirements and/or achieving the next incremental percentage threshold of an existing credit in LEED.

One point is awarded for each exemplary performance achieved. No more than 3 points under IDc1 may be earned through OPTION 2— Exemplary Performance.

REGIONAL PRIORITY (RP)

RP CREDIT: REGIONAL PRIORITY

This credit applies to:

- Homes
- Mid-Rise

Intent

To provide an incentive for the achievement of credits that address geographically specific environmental, social equity, and public health priorities.

Requirements

HOMES, MID-RISE

Earn up to four of the six Regional Priority credits. These credits have been identified by the USGBC regional councils and chapters as having additional regional importance for the project's region. A database of Regional Priority credits and their geographic applicability is available on the USGBC website, http://www.usgbc.org.

One point is awarded for each Regional Priority credit achieved, up to a maximum of four.

FOR REFERENCE ONLY, NOT PART OF PUBLIC COMMENT

Glossary

above grade Any floor that is above the level of the surrounding ground on which the structure is built.

Accessible clothes closet A clothes closet with a door that provides a clear opening of at least 32 inches, and with an adjustable hanging rod. At least half (by area) of the storage shelves in the closet must be pull down shelves, height-adjustable shelves, or located no higher than 48 inches (measured to the top surface of a shelf).

Accessible Doorway The entrance must include a door which provides a clear opening of no less than 32 inches. A maximum threshold height of ½ inch is permitted. Thresholds between ¼ and ½ inch must be beveled no greater than 1:2 on both sides. The width of a "clear opening" is measured between the face of the door and the opposing stop with the door open 90°. A 32" clear opening can generally be provided with a 34" or 36" width door.

Accessible Passage Provide a minimum 36-inch wide path of travel through the floor of the home which contains the central living area. The path of travel may be reduced to no less than 32 inches at user passage doors. The path of travel may include level changes which do not exceed ½ inch. Level changes between ¼ and ½ inch must be beveled no greater than 1:2.

Accessible storage shelves At least one-third (by volume) of storage shelves and cabinets must be, pull-down shelves, or located no higher than 48 inches above the finished floor (measured to the top of the shelf or cabinet).

Adaptable bathroom A powder room or full bathroom must be provided on the floor of the home which contains the central living area. A clear floor space of at least 30" x 48" must be provided within the adaptable bathroom. The toilet, counter, and door swing may not encroach into the 30" x 48" clear floor space. Provide knee space beneath the lavatory (this may be met by installing removable base cabinets or fold-back or self-folding doors). Mount the lavatory countertop at no more than 34-inches AFF or variable-height countertop. Provide long mirror with the bottom mounted no more than 36-inches AFF and the top mounted at least 72" AFF. Provide a hand-held shower in the tub or shower. Walls located around the toilet, tub, and showers must be reinforced to facilitate the later installation of grab bars. Document the location of the reinforced walls in the operations and maintenance manual required under AE 1.1.

adapted vegetation a groundcover, perennial, shrub, or tree that, once established, reliably grows well in a given habitat with minimal winter protection, pest protection, irrigation, or fertilization. Adapted plants are considered to be low maintenance but not invasive.

air leakage rate A measure of the rate of infiltration around a window or a skylight in the presence of a strong wind, expressed in units of cubic feet per minute per foot.

airborne dust solid airborne particulate matter emitted from any source other than a stack or chimney

Albedo surface reflectivity. High-albedo materials are very reflective.

alternative-fuel Any materials or substances that can be used as fuels, other than conventional fuels. Conventional fuels include: fossil fuels (petroleum (oil), coal, propane, and natural gas), and nuclear materials such as uranium.

attic in LEED for Homes, an unfinished, unconditioned and/or non-habitable space found directly below the roof.

automatic in-ground irrigation system a collection of pipes, tubing, valves, sprinkler heads, and circuitry used to irrigate a landscape. Automatic valves (also called stations or zones), which control the flow of water to different parts of the landscape, open and shut upon a signal from the controller.

bedroom in LEED for Homes, A room or space 70 square feet or greater, at least 6’ 8” ceiling height, with egress window and permanently installed closet, used or intended to be used for sleeping. A "den." "library," "home office" with a closet, egress window, and 70 square feet or greater or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.**berm** in LEED for Homes, a level space, shelf, or raised barrier separating two areas designed to reduce the velocity of the water, or direct water to areas that are not susceptible to erosion.

borate a wood preservative that is nontoxic to humans but highly toxic to wood-boring insects, such as termites.

Brownfield real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or possible presence of a hazardous substance, pollutant, or contaminate.

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.

building footprint the outline of the total area of a lot or site that is surrounded by the exterior walls of a building or portion of a building, exclusive of courtyards. In the absence of surrounding exterior walls, the building footprint shall be the area under the horizontal projection of the roof.

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.

capillary break A space between two surfaces which is purposely made wide enough to prevent the movement of moisture through the space by capillary action, or a physical barrier to prevent moisture transfer. (Capillary action is moisture transfer through which water is sucked into tiny spaces in and between building materials, caused by the attraction of water molecules to each other and to other substances.)

carbon monoxide A colorless, odorless poison gas produced by incomplete combustion of organic matter. Carbon monoxide may be produced in lethal quantities in automobile exhaust, faulty home heating systems, improperly used portable gas stoves and heaters, improperly vented wood stoves and fireplaces, and in many industrial situations.

cavity A wall constructed in two separate thicknesses with an air space between; provides thermal insulation. Also known as hollow wall.

Central business district A central business district (CBD) is a metropolitan center for financial, commercial, professional, and cultural activities. It has very high traffic flow, very high land valuation and is often zoned specifically as a “central business district”.

Central manifold distribution system a hot water system in which hot water enters a kind of small holding tank (manifold) near the hot water heater from which many small lines go out directly to each hot water fixture in the home.

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.

Chaseway A concealed passage in which services can run from ground to roof and floor to floor. A hollow wall that serves as a vertical chase can often perform som horizontal distribution functions as well.

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 zones the climate of a project’s location can have a significant effect on environmental design and construction (particularly in terms of heating and cooling); thus the LEED for Homes rating system awards credit to projects that include sustainable goals appropriate for the local climate.

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 appliances any appliance that burns fuel for heating, cooking or decorative purposes

combustion 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.

compartmentalization blower door test A diagnostic tool to determine air leakage of the unit's walls, floor, doors, ceilings to both the outside and to other units, following RESNET's protocol for blower door test.

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.

compost blankets a coarse woody product, not the fine, screened compost product used as a soil amendment.

common walls walls that separate two units, also called party wall.

conditioned floor area interior area with at least 6’ 8” ceiling height that includes the rooms inside your home that are heated and/or cooled or *could be* heated/cooled, measured in square feet. This will generally include the main living space, and any basement area, finished or unfinished. It should not include a garage, attic, or crawlspace.

conditioned space interior volume that utilizes any method of air-conditioning or heating to control temperature and/or humidity levels, usually measured in cubic feet.

conventional turfgrass grass, typically a monoculture, that requires considerable watering, mowing, and/or fertilizers. What is considered conventional turf may vary by region.

Crawlspace In LEED for Homes, a shallow space below the living quarters of a house, normally enclosed by the foundation wall and having a dirt floor.

demand-controlled circulation the automatic circulation of water, triggered by a switch or motion 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.

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. Also known as community.

diatomaceous earth a product made from tiny fossilized water plants. It is used as a barrier to control adult flea beetles, sawfly, coddling moth, twig borer, thrips, mites, cockroach, slugs, snails and many other insects.

domestic hot water system a device to provide water used, in any type of building, for domestic purposes, principally drinking, food preparation, sanitation and personal hygiene (but not including space heating, swimming pool heating, or use for processes such as commercial food preparation or clothes washing)

drywall clip a device that supports drywall at a corner with minimal contact with the studs. Drywall clips eliminate the need for heavy lumber framing.

Durability the ability of a building component to perform its function over a long period without extra maintenance or unanticipated repair.

dwelling unit living quarters intended for long-term occupancy that provide facilities for cooking, sleeping, and sanitation.

energy meter a device that measures the amount of electrical energy consumed by a residence, business, or an electrically-powered device

ENERGY STAR An international program to promote high efficiency products, designated by a label on qualifying products.

ENERGY STAR Qualified Homes a dwelling built to a high standard of energy efficiency (at least 15% more efficient than the International Energy Conservation Code).

energy-recovery ventilator a type of mechanical equipment that features a heat exchanger combined with a ventilation system for providing controlled ventilation into a building. Energy recovery ventilators also transfer the humidity level of the exhaust air to the intake air.

Envelope see thermal envelope.

Environmental controls Light switches, thermostats, security system controlsand breaker boxes must be no higher than 48” above the finished floor, measured to the top of the control. Electrical receptacles must be located no less than 18” above the finished floor, measured to the bottom of the lowest receptacle. Thermostats, breaker boxes, and security system controls, if provided, must be located on the floor of the home which contains the central living area.

environmental tobacco smoke Mixture of smoke exhaled by a smoker and the smoke from the burning end of the smoker’s cigarette, pipe, or cigar. Also known as secondhand smoke. Environmental tobacco smoke is an important indoor air pollutant.

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.

erosion blankets a preformed protective blanket of plastic fibers, straw or other plant residue designed to protect soil from the impact of precipitation and overland flow, and retain moisture to facilitate establishment of vegetation

exterior walls In LEED for Homes, any wall that separates indoor space from ambient air.

filter socks A tubular stormwater sediment control and filtration device, consisting of a mesh tube filled with a filter material (e.g. compost, sawdust, straw), used to intercept and filter runoff.

floodplain Any land area susceptible to being inundated by floodwaters from any source.

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.

framing a building technique based around structural members, usually called studs, which provide a stable frame to which interior and exterior wall coverings are attached, and covered by a roof comprising horizontal ceiling joists and sloping rafters (together forming a truss structure) or manufactured pre-fabricated roof trusses—all of which are covered by various sheathing materials to give weather resistance.

glazing area Total area of the glazed fenestration measured using the rough opening and including sash, curbing or other framing elements that enclose conditioned space. Glazing area includes the area of glazed fenestration assemblies in walls bounding conditioned basements. For doors where the daylight opening area is less that 50 percent of the door area, the glazing area is the daylight opening area. For all other doors, the glazing area is the rough opening area for the door including the door and the frame.

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 power Power generated from environmentally friendly sources or in ways that do not degrade the environment (eg, wind, solar).

Greenfield Land that has not previously been developed and is presumed free of contamination.

Ground-source heat pumps a central heating and/or cooling system that pumps heat to or from the ground. It uses the earth as a heat source (in the winter) or a heat sink (in the summer)

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.

heat-recovery ventilator an energy recovery ventilation system, using equipment known as a heat recovery ventilator, heat exchanger, air exchanger or air-to-air exchanger, that employs a counter-flow heat exchanger between the inbound and outbound air flow. heat-recovery ventilator provide fresh air and improved climate control, while also saving energy by reducing the heating (or cooling) requirements.

HERS Index a scoring system established by the Residential Energy Services Network (RESNET) in which a home built to the specifications of the HERS Reference Home (based on the 2006 International Energy Conservation Code) scores a HERS Index of 100, while a net zero energy home scores a HERS Index of 0. The lower a home’s HERS Index, the more energy efficient it is in comparison to the HERS Reference Home. Each 1-point decrease in the HERS Index corresponds to a 1% reduction in energy consumption compared to the HERS Reference Home. Thus a home with a HERS Index of 85 is 15% more energy efficient than the HERS Reference Home and a home with a HERS Index of 80 is 20% more energy efficient.

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.

IECC Climate Zones International Energy Conservation Code, Published by the International Council, sets forth compliance methods for energy-efficient construction of both residential and nonresidential construction. The Code requirements vary by region. The regions are determined based on the climate and, hence, are called "climate zones." Each county in the country is sorted into one of eight climate zones and sub-categorized based on climate type (moist, dry and marine).

indoor airborne contaminants compounds released into a confined space by various materials, particulates, combustion gases, outdoor pollution, mold, and microbial contaminants, affecting air quality within and around buildings and structures, especially as it relates to the health and comfort of building occupants

Insulation in a home is any material that slows heat loss. A well-insulated home will provide year-round comfort, and cost less to heat and cool. Insulation also helps to reduce noise levels and condensation

integrated photovoltaic cells photovoltaic materials that are used to replace conventional building materials in parts of the building envelope such as the roof, skylights, or facades

interior walls walls that are contained within the shell of the building. Walls that are not considered interior are common walls and exterior walls.

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.

Irrigation Meter a water meter that exclusively meters water used for outdoor watering and irrigation.

ladder blocking a method of framing in which interior partition walls meet and are reinforced by exterior walls, without framing.

land trust A private nonprofit organization, under § 501 (c)(3) of the federal tax code, that may receive donations of money, property or development rights, and may use its assets to purchase property or development rights.

Landscaped Area The designed area of landscape excluding the footprint of the home and permanent hardscape areas such as driveways, sidewalks, and patios. Septic drainage fields and public right-of-ways should also be excluded from this calculation..

Landscaping any activity that modifies the visible features of an area of land, including: living elements such as flora or fauna; natural elements such as landforms, terrain shape and elevation. Items not considered landscaping include: structures and hardscapes.

latent capacity The capacity of an air conditioner is measured by the amount of cooling it can do when running continuously. The total capacity is the sum of the latent capacity (ability to remove moisture from the air) and sensible capacity (ability to reduce the dry-bulb temperature). Each of these capacities is rated in BTUs per hour (Btu/h). The capacity depends on the outside and

inside conditions. As it gets hotter outside (or cooler inside) the capacity drops. (dry-bulb temperature: the temperature measured by a standard thermometer)

LEED for Neighborhood Development LEED for Neighborhood Development (LEED-ND) integrates the principles of smart growth, New Urbanism and green building into the first national rating system for neighborhood design and was developed by the U.S. Green Building Council (USGBC) in partnership with the Congress for the New Urbanism (CNU) and the Natural Resources Defense Council (NRDC).

LEED MMBtu Target The LEED MMBtu Target modifies the following from the ENERGY STAR Qualified Homes HERS Index Target Procedure For National Program Requirements, Version 3.0.

1. The Size Adjustment Factor is always 1
2. Foundation: The LEED Reference Home Size is a slab-on-grade ranch, with floor area equal to Benchmark Home conditioned floor area.
3. Floors over unconditioned spaces: none
4. Gross exterior wall area: equal to square footage in table below:

Bedrooms in Home to be Built	1	2	3	4	5	6	7
Exterior wall area of Reference Home	1,300	1,667	1,957	2,200	2,411	2,600	2,773

For homes with more than 7 bedrooms, add 150 ft^2 to the exterior wall area of the reference home.

5. Exterior doors: 2 half-lite doors, unshaded, one on South wall, one on West wall
6. Glazing: 15% of the floor area of the Reference Home
7. Ceiling area: Insulated, and gross area equal to the Benchmark Home conditioned floor area
8. Service water heating equipment efficiency: Storage water heater with 0.59 EF for gas, 0.92 EF for electric
9. Thermal distribution system: 100% in the attic, above insulation
10. The LEED MMBtu Target shall be displayed in MMBtu/year.
11. Any permanently installed plug loads not covered by RESNET, including heated driveways, pools, spas, and heated garages, must be added to the annual MMbtu/year of the Rated Home.

Lot the individual building lot where the qualifying LEED Home is to be built.

low-emitting and fuel-efficient vehicles vehicles that are either classified as Zero Emission Vehicles (ZEV) by the California Air Resources Board or have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.

microclimates Localized climate conditions within an urban area or neighborhood

MULTI-FAMILY buildings A building that is designed to house more than one family.

MULTI-FAMILY HIGH RISE in LEED for Homes, a building comprised of at least 2 units, with a total of 1 to 3 stories.

MULTI-FAMILY LOW-RISE, in LEED for Homes, a building comprised of at least 2 units, with a total of 4 stories or more.

native plant a plant that occurs naturally in a particular region, state, ecosystem, or habitat. Note: Native plants are not by definition drought tolerant.

NFRC (National Fenestration Rating Council) ratings performance ratings on energy efficiency of windows, doors, and skylights, administered by National Fenestration Rating Council

no-disturbance zone an area that is preserved during construction.

particulate matter Solid material that escapes from combustion processes and can be inhaled, causing potential health problems.

Passive ventilation The use of convective airflows that result from the tendency of warm air to rise and cool air to sink, while also taking advantage of prevailing winds.

patios In LEED for Homes, an outdoor hardscape on grade generally used for dining or recreation that often adjoins a residence.

plug loads the energy consumed by any electronic device that's plugged into a socket.

postconsumer products material generated by households or by commercial, industrial and institutional facilities that can no longer be used for its intended purpose. 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).

postindustrial products Materials created from waste or recycled materials from industrial processes, as opposed to post-consumer products, materials created from waste or recycled items once used by consumers.

power-vented exhaust a system that uses active exhaust to pull combustion gases out of the home. Combustion equipment with power venting can use indoor air as the combustion supply air.

Preferred parking the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped) or parking passes provided at a discounted price.

previously developed having preexisting paving, construction or landscape alteration. This does not apply to altered landscapes resulting from current agricultural use, forestry use, or use as preserved natural area.

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.

Radon a radioactive gas that naturally vents from the ground. 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 reduce the volume of water entering storm drains and replenish groundwater.

rain water harvesting The gathering, or accumulating and storing, of rainwater, capturing from the roofs of buildings on residential property. Harvested rainwater can be used for indoor needs at a residence, irrigation, or both, in whole or in part.

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 salvage.

Recycling the collection, reprocessing, marketing and use of materials that were diverted or recovered from the solid waste stream.

reflective roofing a roofing system that can deliver high solar reflectance (the ability to reflect the visible, infrared and ultraviolet wavelengths of the sun, reducing heat transfer to the building) and high thermal emittance (the ability to radiate absorbed, or non-reflected solar energy)

Refrigerant a fluid that absorbs heat from a reservoir at low temperatures and rejects heat at higher temperatures.

RESIDENTIAL UNIT see Dwelling unit.

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 ratio of the temperature difference across an insulator and the heat flow per unit area under uniform conditions . It is typically given in quare-

metre kelvins per watt or $m^2 \cdot K/W$ (or equivalently to $m^2 \cdot °C/W$). R-value is the inverse of U- value (i.e., R = 1/U).

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.

sheathing material Material, usually plywood or oriented strand board (OSB), but sometimes wooden boards, installed on the exterior of wall studs, rafters, or roof trusses; siding or roofing installed on the sheathing—sometimes over strapping to create a rainscreen. sheet goods

SINGLE FAMILY A building that contains a single residential unit. Or, an attached single family building has its own entrance to outside and only shares walls with adjacent units – not ceilings or floors – such as town homes.

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.

Skylights Any opening in the roof surface which is glazed with a transparent or translucent material.

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. The lower the SHGC, the better the thermal performance of the window.

solar reflectance index a measure of the roof's ability to reject solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100.

Stacked closets If the home has a 2nd floor that is conditioned, vertically align a closet on the 1st floor with a closet on the 2nd floor to allow for future installation of an elevator.

Structured plumbing system Structured plumbing puts the water heater at the center of the house instead of on one side in the garage, as with a lot of new construction, and usually uses a pump that comes on at the touch of a button. There is also a 3/4-inch recirc return, or maybe even a one-inch main line, that runs throughout a home, never more than 10 feet from any fixture, and back to the water heater, but with 3/8-inch branches to each fixture instead of half-inch.

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 enclosure created by the building exterior and insulation.

Topsoil the uppermost layer of soil, containing high levels of nutrients and organic matter. Healthy topsoil promotes plant growth.

total site area The entire lot considered by a LEED for Homes project, including all disturbed area (landscaping, hardscapes and the built environment) and undisturbed lot area in which credit is earned.

trades Installation contractors, such as electricians, plumbers, carpenters, and HVAC installers. The builder or project manager is not considered a trade

U.S. Environmental Protection Agency's Indoor airPLUS EPA created Indoor airPLUS to help builders meet the growing consumer preference for homes with improved indoor air quality. EPA developed additional construction specifications to help improve indoor air quality in new homes. Construction specifications include the careful selection of and installation of moisture control systems; heating, ventilating, and air-conditioning systems; combustion-venting systems; radon resistant construction; and low-emitting building materials.

U-factor a measure of thermal conductivity that is the inverse of R-value. A lower U-value means a more energy-efficient window. Also known as U-factor.

USGBC Forest Certification Benchmark a collection of criteria against which regional, national, and global forest certification schemes will be evaluated to determine which gain recognition in the LEED green building certification system

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.

VOCs Volatile organic compounds which have significant vapor pressures and which can affect the environment and human health. VOCs are numerous, varied, and ubiquitous. Although VOCs include both man-made and naturally occurring chemical compounds, it is the anthropogenic VOCs that are regulated, especially for indoors where concentrations can be highest. VOCs are typically not acutely toxic but have chronic effects.

Voluntary Cleanup Program A program designed to promote voluntary cleanup of contaminated sites including inactive hazardous waste sites, hazardous substance sites, petroleum contaminated sites and solid waste disposal sites.

Walk-off Mat an interior pad designed to trap dust and debris.

water meter A mechanical device that measures the amount of water used by a customer.

WaterSense a U.S. Environmental Protection Agency program designed to encourage water efficiency in the United States through the use of a special label on consumer products.

waterway sedimentation The flow of solid material into a body of water, often resulting in contamination of water sources with pollutants.

weather-strip the process of sealing openings such as doors, windows, and trunks from the elements. The goal of weatherstripping is to prevent rain and water from entering by either blocking it outright or by blocking most of it and returning or rerouting it. A secondary goal of weatherstripping is to keep interior air in, thus saving energy with heating and air conditioning.

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.

Zero-Step Main Entrance The zero-step entrance provides access to the floor of the home which contains the central living area and must be connected to the public street or sidewalk, or to the driveway, by a path of travel which does not include a running slope in excess of 1:12 (8.33%), and a cross slope not to exceed 1:50 (2%). The path of travel may include level changes which do not exceed ½ inch. Level changes between ¼ and ½ inch must be beveled at no greater than 1:2. (Consider locating the entrance at the front or side of the home.)