



**LEED Rating System
2nd Public Comment Draft
July 2011**

HOMES

Includes:

*Homes (Single Family and Low-Rise Multifamily)
Mid-Rise (Multifamily)*

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INTEGRATIVE PROCESS (IP)

IP PREREQUISITE: PRELIMINARY RATING

This prerequisite applies to:

- Homes
- Mid-Rise

Intent

Maximize opportunities for integrative, 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](#)

1 point

This credit applies to:

- Homes (1 point)
- Mid-Rise (1 point)

Intent

Maximize opportunities for integrative, 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 requirements of a green building. Include at least the following trades in the training:

- Plumbing
- Mechanical systems
- Insulation
- Framing
- Air Sealing

The builder's site supervisor must be present for the entirety of the training(s), so they can better perform their quality control duties on the relevant LEED and green building best practice items.

Each trade is not required to be in the training for 8 hours, but the site supervisor must be there for the entirety of the training. The requirement is for a total of 8 hours of training over any number of days for the cumulative trades training for the building project.

IP CREDIT: LEED AP FOR HOMES

1 point

This credit applies to:

- Homes (1 point)
- Mid-Rise (1 point)

Intent

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

Requirements

HOMES

Meet both of the following requirements:

At least one (1) principal participant of the project team shall be a LEED AP Homes. The credential must be earned prior to the preliminary rating meeting. A principal participant is defined as the builder, architect, or green building consultant who has design and/or product specifying responsibilities and is an active participant in the Integrative Project Team or Design Charette. Members of the verification team are not considered principal participants.

AND

Meet the requirements of either Option 1. Integrative Project Team or Option 2. Design Charette.

OPTION 1. Integrative Project Team

Assemble and involve a project team to meet the three criteria below:

a) Include team members, in addition to the builder and Verification Team, whose capabilities include at least three of the following skill sets:

- architecture or residential building design;
- mechanical or energy engineering;
- building science or performance testing;
- green building or sustainable design; and
- civil engineering, landscape architecture, habitat restoration, or land use planning.

b) Actively involve all team members referenced above in at least three of the following phases of the home design and construction process:

- conceptual or schematic design;
- LEED planning;
- preliminary design;
- energy and envelope systems analysis or design;
- design development;
- final design, working drawings or specifications; and
- construction.

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

OR

OPTION 2. Design Charette

No later than the design development phase and preferably during schematic design, conduct at least one full-day integrative design workshop with the project team defined in Option 1. Use the workshop to integrate green strategies across all aspects of the building design, drawing on the expertise of all participants.

The design charette may also be two 4 hour workshops.

MID-RISE

Meet both of the following requirements:

At least one (1) principal participant of the project team shall be a LEED AP Homes. The credential must be earned prior to the preliminary rating meeting. A principal participant is defined as the builder, architect, or green building consultant who has design and/or product specifying responsibilities and is an active participant in the Integrative Project Team or Design Charette. Members of the verification team are not considered principal participants.

AND

Using an integrative process, complete the following analyses:

Energy Load Reduction

During pre-design, analyze the following parameters (variables) for the building:

- Massing and orientation;
- Solar gain on facades, and roof;
- Insulation
- Glazing characteristics
- Window-to-wall ratio (aperture percentage)
- Lighting power density
- Operational parameters
- Thermal comfort ranges

Include adjacent site conditions in the analysis; it is not necessary to include parameters or energy efficiency measures that are independent of the building form (this may mean HVAC system selection, renewable energy systems, and other mechanical and efficiency based parameters). Select at least five load reduction parameters and run at least two scenarios in addition to the baseline case used for EAp1 and EAc1. Provide a narrative report explaining the relationships among the above elements on the project site and how these features influenced the project design.

Water Systems

Perform a water balance analysis that quantifies all water input and output to and from the building and site. Identify strategies for water use that reduce burden on municipal supply and wastewater treatment systems, increase local aquifer recharge, and address impacts and benefits of any water leaving the site. Provide a narrative explaining the relationships among the above elements on the project site and how these features influenced the project design.

Site Assessment

Conduct a site analysis that considers the criteria outlined in SSc1 Site Assessment. Identify strategies that will improve the health of the living aspects of the site. These aspects may include soil health, plant and animal health, plant and animal interrelationships to increase diversity and resiliency, reduced water use, more effective ground water recharge, reduced erosion, improved microclimate as appropriate for the context ecosystem, improved human habitat, and so on. Provide a narrative report explaining the healthy relationships among the above aspects and how these features influenced the site and project design.

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

15 points

This credit applies to:

- Homes (15 points)
- Mid-Rise (17 points)

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 PREREQUISITE: SENSITIVE LAND PROTECTION

This credit applies to:

- Homes
- Mid-Rise

Intent

To avoid the development of inappropriate sites.

Requirements

HOMES, MID-RISE

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

- a. Land whose elevation is at or below the elevation of the 100-year flood as defined by the Federal Emergency Management Agency (FEMA)
- b. Land that prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (park authority projects are exempt).

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

LT CREDIT: ENHANCED SITE SELECTION

1-2 points

This credit applies to:

- Homes (1 point)
- Mid-Rise (2 points)

Intent

To avoid the development of inappropriate sites and reduce the environmental impact from the location of a building on a site.

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. Previously developed buildings and hardscapes are exempt:

- 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);
- Prime or unique soils, or soils of state significance, as identified in a Natural Resources Conservation Service state soils survey; Land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by the Federal Emergency Management Agency (FEMA);
- Land specifically identified as habitat for any species or ecological communities on federal or state threatened or endangered lists;
- 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;
- 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;

The following features are not considered wetlands, water bodies, or buffer land that must be protected for the purposes of this credit:

- a. previously developed land;
- b. man-made water bodies (such as industrial mining pits, concrete-lined canals, or stormwater retention ponds) that lack natural edges and floors or native ecological communities in the water and along the edge;
- c. man-made linear wetlands that result from the interruption of natural drainages by existing rights-of-way; and
- d. wetlands that were man-made incidentally and have been rated "poor" for all measured wetland functions (the wetland quality assessment must be performed by a qualified biologist using a method that is accepted by state or regional permitting agencies).

Projects in one of the following high-priority redevelopment areas automatically earn this credit:

- a) an infill location in a *historic district*;
- b) an area documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment or local voluntary clean-up program);
- c) a brownfield (as defined by a local, state, or federal government agency);
- d) a site listed by the EPA National Priorities List, Federal Empowerment Zone, Federal Enterprise Community, Federal Renewal Community, Department of Justice Weed and Seed Strategy Community, Department of the Treasury Community Development Financial Institutions Fund Qualified Low-Income Community (a subset of the New Markets Tax Credit Program), or the U.S. Department of Housing and Urban Development's Qualified Census Tract (QCT) or Difficult Development Area (DDA).

LT CREDIT: PREFERRED LOCATIONS

0.5-3 points

This credit applies to:

- Homes (0.5-3 points)
- Mid-Rise (0.5-3 points)

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.

Requirements

HOMES, MID-RISE

OPTION 1. Infill (1.5 points)

Select a lot where at least 75% of the land $\frac{1}{2}$ mile from the project boundary is *previously developed* land. Water bodies and publicly owned parks are not included in the calculation (excluded from both the numerator and denominator).

AND/OR

OPTION 2. Previously Developed (1 point)

Select a lot where at least 75% of the total *buildable land* is previously developed.

In the case of a multihome new development, each home in the development is awarded this point if at least 75% of the development site is built on previously developed land at the time of groundbreaking for the entire development.

AND/OR

OPTION 3. Brownfield Development (0.5 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

1-3 points

This credit applies to:

- Homes (1-3 points)
- Mid-Rise (1-3 points)

Intent

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

Requirements

HOMES

Construct or renovate a building that meets 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	1
≥ 12 dwelling units/acres of buildable land	2
≥ 20 dwelling units/acres of buildable land	3

Exemplary performance is available for projects with a density of ≥ 35 DU/acre

MID-RISE

Construct or renovate a building that meets the dwelling unit per acre of *buildable land area density* defined in Table 1:

Table 1.

Average Housing Density (dwelling units/acre)	Points
≥ 30 dwelling units/acres of buildable land	1
≥ 55 dwelling units/acres of buildable land	2
≥ 80 dwelling units/acres of buildable land	3

No exemplary performance is available.

LT CREDIT: COMMUNITY RESOURCES

0.5-1 point

This credit applies to:

- Homes (0.5-1 point)
- Mid-Rise (0.5-1 point)

Intent

Encourage the building of LEED homes in development patterns that encourage daily walking and biking and to reduce *vehicle miles traveled* (VMT) and automobile dependence.

Requirements

HOMES, MID-RISE

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

The building's main entrance is within 1/2 mile *walk distance* from the building entrance of the following number of diverse uses (see below for list of diverse uses)

Diverse Uses	Points
4-7	0.5
8+	1

The following restrictions apply:

- 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).
- 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 in a single building.
- 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).
- One of the establishments must be in the Food Retail category.
- Diverse uses must include at least one use from two separate use category groups, exclusive of the building's primary use.
- The diverse uses outside the project boundary must be in place upon occupation of the project.
- For mixed-use projects, up to half of the counted diverse uses may be within the project boundary, provided they are open to the public.

Exemplary performance is available for projects that have 15 or more qualifying resources within 1/2 mile walk distance.

Note: For new multi building developments, the 1/2 mile walk distance can be measured from the center of the community as long as the distance from the center of the community to the farthest building does not exceed 1/4 mile. Using this approach, whole communities can qualify for this credit. For any buildings farther than 1/4 mile from the center of the community, distances must be recalculated for each building.

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

0.5-2 points

This credit applies to:

- Homes (0.5-2 points)
- Mid-Rise (0.5-2 points)

Intent

To reduce pollution and land development impacts from automobile use.

Requirements

HOMES, MID-RISE

Locate the project within a $\frac{1}{4}$ -mile *walk distance* of bus or streetcar stops, or within a $\frac{1}{2}$ -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 or Table 2.

- 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 $\frac{1}{4}$ -mile.
- A single stop that serves as the terminal for a transit route can also be counted.
- Trips in opposite directions are counted separately.
- 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	Weekend trips	Points
60	40	0.5
110	70	1
170	110	1.5
260	150	2.0

Table 2. Minimum daily transit service for projects with commuter rail or ferry service only

Weekday trips	Weekend trips	Points
24	6	.5
40	8	1
60	12	1.5

For multi-building projects, at least 50% of *dwelling units* must be within a $\frac{1}{4}$ -mile *walk distance* of bus or streetcar stops, or within a $\frac{1}{2}$ -mile walk distance of *bus rapid transit* stops, light or heavy rail stations, or ferry terminals.

Exemplary performance is available for projects that double the maximum trip credit requirements.

LT CREDIT: STREET NETWORK

[This credit is available in the Pilot Credit Library](#)

1-3 points

This credit applies to:

- Homes (1-2 points)
- Mid-Rise (1-3 points)

Intent

To promote *projects* that are well connected to the community at large. To encourage development within *existing* communities that minimizes vehicle miles traveled.

Requirements

HOMES, MID-RISE

Locate the project in an area of high intersection density. High intersection density is defined as an area with existing streets and sidewalks with a density of at least 300 intersections per square mile. Water bodies and publicly owned parks are not included in the calculation (excluded from both the numerator and denominator).

- All streets and *sidewalks* that are counted as an intersection 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* (i.e. a sidewalk through a city park).
- Publicly accessible *alleys* may be counted.
- The closest intersection to a dead end or cul-de-sac is not counted.

CASE 1. Projects with a single building

Demonstrate an intersection density of at least 300 intersections/square mile by having at least 60 intersections within $\frac{1}{4}$ mile radius of the building's primary entrance.

Number of intersections within $\frac{1}{4}$ mile radius	Points Homes	Points Mid-Rise
60	1	1
80	2	3

CASE 2. Multiple building projects on less than 5 acres

Demonstrate an intersection density of at least 300 intersections/square mile by having at least 60 intersections within $\frac{1}{4}$ mile radius from the geographic center of the buildings.

Number of intersections within $\frac{1}{4}$ mile radius	Points Homes	Points Mid-Rise
60	1	1

80	2	3
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CASE 3. Multiple building projects 5 acres or greater

Have at least 300 intersections per square mile from within $\frac{1}{4}$ mile of the boundary of the project.

Intersection density within $\frac{1}{4}$ mile of project boundary (intersections/square mile)	Points Homes	Points Mid-Rise
300	1	1
400	2	3

LT CREDIT: HOUSING AND JOBS PROXIMITY

[This credit is available in the Pilot Credit Library](#)

1-2 points

This credit applies to:

- Homes (1-2 points)
- Mid-Rise (1-2 points)

Intent

To reduce automobile dependence by locating projects near employment opportunities.

Requirements

HOMES, MID-RISE

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

Number of jobs within ½ mile	Points
2500	1
5000	2

LT CREDIT: BICYCLE NETWORK AND STORAGE

[This credit is available in the Pilot Credit Library](#)

1 point

This credit applies to:

- Homes (1 point)
- Mid-Rise (1 point)

Intent

To promote bicycling and transportation efficiency and reduce vehicle miles traveled (VMT) and to improve public health by encouraging utilitarian and recreational physical activity.

Requirements

HOMES, MID-RISE

Meet both of the following requirements:

BICYCLE NETWORK

Design or locate the *project* such that the building entrance and/or bicycle storage is within a 200-yard walk distance from at least one of the following:

- a. An *existing bicycle network* that connects to a *school or employment center* within 3 miles bicycling distance from the project boundary; or
- b. An *existing bicycle network* that connects to at least 10 *community resources* within 2 miles bicycling distance from the project boundary.

If the requirements border the project boundary, a safe, all-weather route must exist between the bicycle network and the project's bicycle storage and/or main entrance.

Planned and funded bicycle trails or lanes may be counted if they are funded and designated for completion within the fiscal year that the constructing organization finalizes the plans.

AND

BICYCLE STORAGE

Provide at least one secure, enclosed bicycle storage space per occupant for 25% of all building occupants. Expect 2 persons for a studio or 1-bedroom apartment with one additional person per additional bedroom.

Bicycle storage areas must be locked, located under roof and easily accessible to residents. For multi-family buildings with more than 10 units, provide informational signage on using the storage facilities. Bicycle storage capacity may not be double counted; storage that is fully allocated to the occupants of non-project facilities cannot also serve project occupants.

A single family dwelling unit with enclosed garage meets the bicycle storage requirement.

SUSTAINABLE SITES (SS)

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

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.

MID-RISE

Create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan must conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit¹ OR local standards and codes, whichever are more stringent. The plan must describe the measures implemented to accomplish the following:

- prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse;
- prevent sedimentation of storm sewers or receiving streams; and
- prevent pollution of the air with dust and particulate matter.

¹ While the permit only applies to construction sites greater than 1 acre, the requirements are applied to all projects for the purposes of this prerequisite.

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, the National Association of Exotic Pest Plant Councils, or local Cooperative Extension Service or state agencies' exotic pest lists for plants in natural areas and wildlands. Not all nonnative species are considered invasive.

SS CREDIT : SITE DEVELOPMENT-PROTECT OR RESTORE HABITAT

2 points

This credit applies to:

- Homes (2 points)
- Mid-Rise (2 points)

Intent

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

Requirements

HOMES, MID-RISE

Preserve and protect 40% of all portions of the site identified as *greenfield* from all development and construction activity.

AND

Meet one of the following options:

OPTION 1. Onsite Restoration (2 points)

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

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, the National Wildlife Federation's Certified Wildlife Habitat, or local Cooperative Extension Service or state agencies.

OR

OPTION 2. Financial Donation/ Support (2 points)

Provide financial support equivalent to \$1 psf for 30% of all portions of the site identified as previously developed to support one of the following:

1. Land management and restoration of native habitat;
2. Watershed management and protection within the same watershed as the project site;
3. Public urban greenspace restoration or revitalization.

Financial support is to be provided to a nationally or locally- recognized land trust within the same EPA Level III Ecoregion or the project's state.

SS CREDIT: HEAT ISLAND REDUCTION

This credit is available in the [Pilot Credit Library](#)

1-2 points

This credit applies to:

- Homes (1-2 points)
- Mid-Rise (1-2 points)

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), but not including *common roads* that serve multiple buildings, on the project site meet one or a combination of the following requirements:

OPTION 1. Shading (2 points)

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

OR

OPTION 2. Non-Absorptive Materials (1-2 points)

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

- white concrete which when *weathered* will maintain an SRI of greater than 29 (grey concrete is not included);
- ENERGY STAR qualified roof products used in appropriately sloped application;
- Vegetated roofing;
- 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:

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

% Hardscapes Shaded or Non- Absorptive	Points
50-75%	1
75%+	2

SS CREDIT: RAINWATER MANAGEMENT

1-3 points

This credit applies to:

- Homes (1-3 points)
- Mid-Rise (1-3 points)

Intent

To restore or maintain the natural hydrology and water balance of the site based on historical conditions and undeveloped ecosystems in the region.

Requirements

HOMES, MID-RISE

If projects are required to comply with local National Pollutant Discharge Elimination System (NPDES) post-construction stormwater management requirements, follow Case 1. Otherwise, follow Case 2.

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

CASE 1. NPDES Projects

In a manner best replicating natural site hydrology² processes, manage onsite³ the runoff from the developed site for the percentile of regional or local rainfall events listed in Table 1 below using Low Impact Development (LID)⁴ and green infrastructure⁵.

Use daily rainfall data and the methodology in the United States Environmental Protection Agency's *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act* to determine the percentile amount.

Table 1. Percentile Rainfall Events

Percentile Rainfall Events	Points
90th	1
95th	2
98th	3

OR

² **Natural Site Hydrology** is defined as the pre-Columbian function of water occurrence, distribution, movement, and balance.

³ **Manage Onsite** refers to capturing and retaining the specified volume of rainfall to mimic natural hydrologic runoff characteristics. This includes, but is not limited to, strategies that manage volume through evapotranspiration, infiltration, or capture and reuse.

⁴ **Low Impact Development (LID)** is defined as an approach to managing stormwater runoff that emphasizes on-site natural features to protect water quality by replicating the pre-development hydrologic regime of watersheds and addressing runoff close to its source. Examples include better site design principles such as minimizing land disturbance, preserving vegetation, minimizing impervious cover, and design practices like rain gardens, vegetated swales and buffers, permeable pavement, and soil amendments. These are engineered practices that may require specialized design assistance.

⁵ **Green infrastructure** is a soil and vegetation-based approach to wet weather management that is cost-effective, sustainable, and environmentally friendly (US EPA).

CASE 2. Non-NPDES Projects

Use Low Impact Development (LID) techniques to design the lot such that at least 50% of the lot is permeable or an impermeable surface that is directing all water to an appropriate onsite catchment or infiltration feature. Acceptable techniques include, but are not limited to, the following:

- Areas of native plant material (e.g. trees, shrubs);
- Vegetated roof;
- Permeable paving. A Permeable paving system must include porous above-ground materials (e.g., open pavers, engineered products) and an appropriate sub-base. This base layer must be designed to ensure proper drainage away from the home; and Permanent infiltration features (e.g., vegetated swale, rain garden, or rainwater cistern) that can handle 100% of the runoff from the site for a 2 year, 24 hour storm.

Consider employing experienced, licensed landscape architects, engineering professionals, and contractors to design and install the LID techniques described above, including porous paving systems.

Table 1. Permeable Area

Percentage of lot(including area under roof) that is permeable or directed to onsite catchment or infiltration feature	Points
50–64%	1
65%-79%	2
80%+	3

SS CREDIT: NON-TOXIC PEST CONTROL

0.5-1 point

This credit applies to:

- Homes (0.5-1 point)
Mid-Rise (0.5-1 point)

Intent

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

Requirements

HOMES, MID-RISE

Do not use any chemical pesticides for termite control, and implement one or more of the measures below. (½ point each, except where noted below), maximum 1 point). In addition, develop an integrative pest management (IPM) policy and, as part of that, develop resident guidance related to pesticide use, housekeeping, and prompt reporting of pest problems to be included in the Homeowner Education manual for cockroaches, rodents, and bedbugs.

- a. Install a steel mesh barrier termite control system. (1 point)
- b. Use solid concrete foundation walls, masonry walls with a course of solid block bond beam, or concrete-filled block.
- c. Install post-tension slabs and top feed utilities.
- d. Seal all external cracks, joints, penetrations, edges, and entry points with appropriate caulking. Install rodent- and corrosion-proof screens (e.g., copper or stainless steel mesh), on all openings greater than ¼ inch, except where code prohibits their installation (e.g. dryer vents).
- e. Treat all cellulosic material (e.g., wood framing) with a borate product to a minimum of 3 feet above the foundation.
- f. Install a physical termite barrier system approved by code (e.g. basaltic rock).

Exemplary performance is available for projects that meet more than two measures.

SS CREDIT: SITE DEVELOPMENT— OPEN SPACE

1 point

This credit applies to:

- Mid-Rise

Intent

To create exterior open space that encourages interaction with the environment, social interaction, passive recreation, and/or physical activities.

Requirements

MID-RISE

Provide outdoor space equal to 30% of the total site area (including building footprint). A minimum of 25% of the outdoor space must be vegetated at the ground plane (not including turf grass, excluding athletic fields) and have overhead vegetated canopy. The outdoor space must be physically accessible and be one of the following:

- pedestrian-oriented hardscape area with physical site elements that accommodate outdoor dining, meetings, classes, or other social activities;
- recreation-oriented area with physical site elements that encourage physical activity, such as playgrounds, athletic courts, or fields, and linkages to off-site pedestrian or bike paths;
- garden space with a diversity of vegetation types and species that provide passive recreation opportunities and/or year-around visual interest;
- garden space dedicated to communal food growing; or
- preserved or created habitat that meets the criteria of SS Credit: Protect or Restore Habitat and includes elements of human interaction, such as trail access, viewing platforms, or interpretive signage.

For projects that have a density of at least 30 dwelling units per acre (see LT Credit, Compact Development for more information), physically accessible, extensive, vegetated green roofs can be used toward the minimum 25% vegetation requirement, and qualifying roof-based physically accessible hardscape areas can be used toward credit compliance.

Wetlands or naturally designed ponds may count as open space if the side slope gradients average 1:4 (vertical: horizontal) or less and are vegetated.

WATER EFFICIENCY (WE)

Point Floor: At least 4 points available in the WE section must be earned.

PERFORMANCE PATH

WE CREDIT: TOTAL WATER USE

1-12 points

This credit applies to:

- Homes (1-12 points)
- Mid-Rise (1-12 points)

Intent

Reduce demand for water through high efficiency fixtures and efficient landscaping practices.

Requirements

Total Water Use Reduction (1-12 points)

Reduce total indoor and outdoor water consumption by at least 15% over standard practices.

To calculate outdoor water savings of the landscaped area, use EPA's WaterSense Water Budget Tool to calculate the baseline water consumption and the designed landscape water consumption. Designed landscape water consumption can be further reduced through captured or reclaimed water.

To calculate indoor water savings, use the LEED Water Consumption Tool, which calculates the baseline indoor water consumption and the designed indoor water consumption.

AND

The water pressure in the building must be ≤ 60 psi, and there must be no detectable water leaks.

AND

Water Softeners must be demand initiated.

Percent Reduction	LEED Points
10%	1
15%	2
20%	3
25%	4
30%	5
35%	6

40%	7
45%	8
50%	9
55%	10
60%	11
65%	12

Exemplary performance is available for projects that reduce their water use by at least 70%.

Outdoor Water Use Calculation.

Use the U.S. Environmental Protection Agency's WaterSense Water Budget Tool to calculate the project's outdoor water baseline, Landscape Water Requirement (LWR) and Landscape Water Allowance (LWA). Employ strategies in landscape and irrigation design that reduce irrigation water to or below the landscape water allowance (LWA), defined as 30% below baseline for the site's peak watering month.

The budget is based on calculations of:

- total landscape area (in square feet),
- average monthly reference evapotranspiration (ET_o) for the peak watering month at the site (determined by postal zip code and obtained from the Water Budget Data Finder),
- average monthly rainfall for the peak watering month at the site (determined by postal zip code and obtained from the Water Budget Data Finder), and
- landscape area (in square feet) for each vegetation hydrozone (vegetation type) and means of irrigation.

Credit can be granted from the Landscape Water Requirement (LWR) for implementing the following measures. The reduction associated with each strategy implemented should be added to the reduction taken from the LWR as calculated in the Water Budget Tool:

- installation of smart scheduling technology using either a soil moisture sensor control system or a weather-based irrigation control system, limited to 30% reduction if 100% of the landscape water use is controlled by this type of irrigation control system;
- use of captured rainwater;
- use of reclaimed water;
- use of water treated on site or conveyed by a public agency specifically for nonpotable uses (naturally occurring surface water bodies, such as streams and rivers, and groundwater, such as well water, are excluded); or
- absence of a permanent irrigation system.

Indoor Water Use Calculation.

To calculate indoor water savings, use the water reduction calculator to determine the average flush/flow rate for each fixture type, and multiply by the daily usage. The difference between the baseline usage and the proposed indoor water usage is the indoor water savings.

The baseline water consumption figures for indoor water use are shown in Table 1 below:

Table 1. Baseline Consumption (per person per day)

Fixture	Baseline Flush/Flow Rate⁶	Estimated Fixture Usage	Estimated Water Usage
Shower Compartment	2.5 gpm	6.15 minutes	15.4 gallons
Faucet	2.2 gpm	5.0 minutes	11 gallons
Toilet	1.6 gpf	5.05 flushes	8 gallons
Clothes Washer	9.5 WF	0.37 cycles @ (3.5 ft ³)	15.1 gallons
Dishwasher	6.5 gpc	0.1 cycles	0.7 gallons

PRESCRIPTIVE PATH

WE CREDIT: INDOOR WATER USE

4 points

This credit applies to:

- Homes (4 points)
- Mid-Rise (4 points)

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 WE c 1: Total Water Reduction.

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

- Lavatory Faucets: Each faucet or faucet aerator must be WaterSense Certified AND meet an average rated flow volume of ≤ 1.5 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 ≤ 1.1 gallons per flush (gpf) across all toilets.
- Clothes Washer: Each clothes washer must be ENERGY STAR qualified.

AND

The water pressure in the house must be ≤ 60 psi, and there must be no detectable water leaks.

CASE 2. Multi-Family and Mid-Rise

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.

WE CREDIT: OUTDOOR WATER USE

2 points

This credit applies to:

- Homes (2 points)
- Mid-Rise (2 points)

Intent

Reduce water consumption from landscape through efficient landscaping practices.

Requirements

HOMES, MID-RISE

Meet both of the following: (2 points)

- No more than 40% of the landscaped area may be *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, the North American Native Plant Society or local Cooperative Extension Service or state agencies.

Project with pools and other outdoor water features must use WE c 1: Total Water Reduction.

BOTH PATHS

WE CREDIT: WATERSENSE FOR NEW HOMES

[This credit is available in the Pilot Credit Library](#)

1 point

This credit applies to:

- Homes (1 point)
- Mid-Rise (1 point)

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:

- All fixtures and fittings must meet the Water-Efficiency Criteria of the U.S. Environmental Protection Agency's WaterSense Specification for Single-Family New Homes
- Hot Water Delivery System_– To minimize water wasted while waiting for hot water, the hot water distribution system shall be field tested to 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
- Meet the performance testing requirements of WaterSense for New Homes, which include field verifying that all faucets and shower heads are performing at or below their rated volume, building water pressure is below 60 psi, no leaks are detectable in the plumbing supply system, and toilets are not leaking

MID-RISE

Meet all of the following:

- All fixtures and fittings must meet the Water-Efficiency Criteria of the U.S. Environmental Protection Agency's WaterSense Specification for Single-Family New Homes
- Hot Water Delivery System_– To minimize water wasted while waiting for hot water, the hot water distribution system shall be field tested to 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.
- Meet the performance testing requirements of WaterSense for New Homes, which include field verifying that all faucets and shower heads are performing at or below their rated volume, building water pressure is below 60 psi, no leaks are detectable in the plumbing supply system, and toilets are not leaking.

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 builderchecklist*;
 - 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.

3. All plenums and duct runs must be fully ducted, (i.e. building cavities may not be used as ducts).

* Projects must meet at least one of the following: 2.2 (Duct Design Method) on the HVAC System Quality Installation Contractor Checklist; or 10.1 (Air Balance) on the HVAC System Quality Installation Contractor Checklist. Projects are also encouraged but not required to meet 4.1 (Total Duct Leakage) on the HVAC System Quality Installation Rater Checklist, but they must have a tested total duct leakage of less than 12 cfm 25 / 100 s.f. of conditioned floor area.

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 LEED reference home	1,000	1,600	2,200	2,800	3,400	4,000	4,600

For homes with more than 7 bedrooms, add 600 ft² to the conditioned floor area of the reference home.

Certified Passive House projects automatically meet the ENERGY STAR v3 Thermal Enclosure System Rater Checklist requirement.

Any existing portion of an existing home are given the following allowances:

Thermal Enclosure System Rater Checklist

- 2.1 – slab insulation is strongly encouraged, but not required to meet or exceed 2009 IECC levels
- 4.4.5e – advanced framing is not required on existing framed walls
- 5.2.1 – existing sill plates on top of concrete is not required to be placed on foam gasket

Water-Managed Site and Foundation

- 1.3 – capillary break under slab is not required for existing slabs, unless there are visible signs of moisture damage on the slab floor
- 1.5 – exterior below-grade walls are not required to be damp-proofed on the exterior surface, unless there are visible signs of moisture damage on the interior of the wall
- 2 & 3 – Water-Managed Wall and Roof Assembly requirements are not required for existing walls/roofing, unless there are visible signs of moisture damage on the wall or roof

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 builderchecklist*;

- 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.

4. All plenums and duct runs must be fully ducted, (i.e. building cavities may not be used as ducts).

* Projects are encouraged but not required to meet item 2.2 (Duct Design Method) on the HVAC System Quality Installation Contractor Checklist. Projects must meet only one of the following: 10.1 (Air Balance) on the HVAC System Quality Installation Contractor Checklist; or 4.1 (Total Duct Leakage) on the HVAC System Quality Installation Rater Checklist.

Certified Passive House projects automatically meet the ENERGY STAR v3 Thermal Enclosure System Rater Checklist requirement.

Any existing portion of an existing home are given the following allowances:

Thermal Enclosure System Rater Checklist

2.1 – slab insulation is strongly encouraged, but not required to meet or exceed 2009 IECC levels

4.4.5e – advanced framing is not required on existing framed walls

5.2.1 – existing sill plates on top of concrete is not required to be placed on foam gasket

Water-Managed Site and Foundation

1.3 – capillary break under slab is not required for existing slabs, unless there are visible signs of moisture damage on the slab floor

1.5 – exterior below-grade walls are not required to be damp-proofed on the exterior surface, unless there are visible signs of moisture damage on the interior of the wall

2 & 3 – Water-Managed Wall and Roof Assembly requirements are not required for existing walls/roofing, unless there are visible signs of moisture damage on the wall or roof

MID-RISE

1. Whole Building Energy Simulation

Demonstrate a percentage improvement of 10% compared with the baseline building performance rating.

Energy Cost Savings.

Demonstrate a percentage improvement in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to EPA's Multifamily High-Rise Simulation Guidelines building performance rating method, which is modeled off of

ANSI/ASHRAE/IESNA Standard 90.1-2010, Appendix G (with errata but without addenda), using a computer simulation model for the whole building project.

Source Energy Use Intensity (EUI) reduction.

Demonstrate a percentage improvement in the proposed building source energy compared with the baseline building performance. Calculate the building source energy for both cases by converting the energy consumption for each energy type to source energy, using national average source energy conversion factors.

The total percentage improvement is the average of the project's energy cost savings and source EUI reduction.

The proposed design must meet the following criteria:

- compliance with the mandatory provisions of ANSI/ASHRAE/IESNA Standard 90.1-2010 (with errata but without addenda);
- compliance with EPA's Multifamily High-Rise Simulation Guidelines;
- inclusion of all the energy consumption and cost within and associated with the building project; and
- comparison against a baseline building that complies with Standard 90.1-2010, Appendix G (with errata but without addenda).

Document the energy modeling input assumptions for unregulated loads. Unregulated loads should be modeled accurately to reflect the actual expected energy consumption of the building.

Typically, unregulated loads must be identical for both the baseline and the proposed building performance rating. However, project teams may follow the exceptional calculation method (ANSI/ASHRAE/IESNA Standard 90.1-2010, G2.5) to document measures that reduce unregulated loads. Documentation of unregulated load energy savings must include a list of the assumptions made for both the baseline and the proposed design, with theoretical or empirical information supporting these assumptions.

Projects that are connected to district energy systems (DES) must follow LEED's DES requirements and modeling guidelines.

In addition, project teams using Option 1 must record the source EUI of their proposed and baseline case buildings. The source EUI for both models must be recorded on an efficiency ratio scale where 100 equals the average adjusted source energy consumption and 0 equals net zero source energy consumption.

2. Commissioning

OPTION 1. Meet the EPA Multifamily High-Rise Testing and Verification protocols.

OR

OPTION 2. Meet all of the following:

- A. Reduced Heating and Cooling Distribution System Losses for in-unit HVAC. Limit duct air leakage rate to outside the envelope of the unit. The tested duct leakage rate must be ≤ 5.0 cfm 25 Pascals per 100 square feet of conditioned floor area (for each installed system), verified by a qualified energy rater. Testing is waived if the air-handler unit and all ductwork are visibly within the unit's envelope (i.e., no ductwork hidden in walls, chases, floors, or ceilings).

- B. Fundamental Commissioning of Central HVAC Systems. Meet the performance testing requirements of PF Prerequisite 1 of 2012 LEED for New Construction for central commercial heating, cooling, water heating and ventilation systems.

The following commissioning process activities must be completed by the project team:

1. Designate an individual as the commissioning authority (CxA) to lead, review and oversee the completion of the commissioning process activities.
 - The CxA must have documented commissioning authority experience in at least 2 building projects.
 - The individual serving as the CxA must be independent of the project design and construction management, though the CxA may be an employee of any firm providing those services. The CxA may be a qualified employee or consultant of the owner.
 - The CxA must report results, findings and recommendations directly to the owner.
 - For projects smaller than 50,000 gross square feet, the CxA may be a qualified person on the design or construction team who has the required experience.
 2. The owner must document the owner's project requirements. The design team must develop the basis of design. The CxA must review these documents for clarity and completeness. The owner and design team must be responsible for updates to their respective documents.
 3. Develop and incorporate commissioning requirements into the construction documents.
 4. Develop and implement a commissioning plan.
 5. Verify the installation and performance of the systems to be commissioned.
 6. Complete a summary commissioning report.
 7. Prepare and maintain a Current Facilities Requirements and Operations and Maintenance Plan documenting information necessary for efficient building operations. These documents must include, at a minimum:
 - Sequence of operations for the building
 - Building occupancy schedule
 - Equipment run-time schedule
 - Set points for all HVAC equipment
 - Set lighting levels throughout the building
 - Minimum outside air requirements
 - Any changes in schedules or set points for different seasons, days of the week and times of the day
 - Systems narrative describing the mechanical and electrical systems and equipment in the building
 - Preventative maintenance plan for building equipment described in the systems narrative
 - An ongoing commissioning process program to include:
 - Periodic commissioning requirements
 - Ongoing commissioning tasks
 - Continuous tasks for critical facilities
- C. Construction Document Specifications. Include the following details in construction and bid documents:
1. Include a list of elements to be sealed in construction documents. This list should include all elements identified in ASHRAE 90.1-2007, Section 5.4.3.1, or applicable state codes, in addition to any site-specific elements identified during plan review, and must include the items in the LEED for Homes Multifamily Mid-Rise Thermal Enclosure Inspection checklist. Bid documents must include locations to be sealed as well as acceptable methods and materials.
 2. Include an air barrier sheet in the bid documents that shows the air barrier continuity through the various conditions of the exterior enclosure, and can serve as an index to relevant details.

3. Include a “compartmentalization” sheet in the bid documents that shows the continuity of fire and smoke barriers around each apartment and between various areas (corridors, stairs, common areas), and can serve as an index to relevant details.

LEED for Home Multifamily Mid-Rise Thermal Enclosure Inspection Checklist. Have a third party qualified energy rater verify each item is met from the checklist, which is taken from the ENERGY STAR Qualified Homes, Version 3 (Rev. 02) Thermal Enclosure Rater Checklist, sections 2, 3 and 5.

Certified Passive House projects automatically meet the LEED for Home Multifamily Mid-Rise Thermal Enclosure Inspection Checklist requirement.

EA PREREQUISITE: MAXIMUM ANNUAL ENERGY USE

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 AND a HERS 70 or lower.

In the LEED MMBtu calculation, for this prerequisite 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.

LEED MMBtu Target The LEED MMBtu Target uses a LEED Reference Home which 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 is a slab-on-grade ranch, with floor area equal to ENERGY STAR Reference Home conditioned floor area.
3. Floors over unconditioned spaces: none
4. Gross exterior wall area: equal to square footage in table below:

Bedrooms in LEED Reference Home	1	2	3	4	5	6	7
Exterior wall area of LEED 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 ft² 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 LEED Reference Home
7. Ceiling area: Insulated, and gross area equal to the LEED Reference 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, and is based on source energy.

11. Any permanently installed plug loads not covered by the energy model, including heated driveways, pools, spas, and heated garages, must be added to the annual MMBtu/year of the Rated Home.

EA CREDIT: MINIMIZE ANNUAL ENERGY USE

1-29 points

This credit applies to:

- Homes (1-29 points)
- Mid-Rise (1-30 points)

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 modeled annual energy usage compared to the LEED MMBtu Target.

Points can be earned as follows:

Energy Savings Above LEED MMBtu Target	Points
1%	1
2%	2
3%	3
4%	4
5%	5
6%	6
7%	7
8%	8
9%	9
10%	10
12%	11
14%	12
16%	13
18%	14
20%	15
22%	16
24%	17
26%	18
28%	19
30%	20
32%	21
34%	22
37%	23
40%	24

50%	25
60%	26
70%	27
80%	28
90%	29

Exemplary performance is available for projects that have 100% or greater energy reduction.

MID-RISE

Follow the criteria detailed in the EA Prerequisite: Performance for Energy Star Homes to demonstrate a percentage improvement in the proposed building performance rating compared with the baseline building performance rating.

Energy Savings Above ASHRAE 90.1-2010	LEED for Homes Mid-Rise Points
12%	2
14%	3
16%	4
18%	5
20%	6
22%	7
24%	8
26%	9
28%	10
30%	11
32%	12
34%	13
36%	14
38%	15
40%	16
42%	17
44%	18
46%	19
48%	20
50%	21
52%	22
54%	24
56%	26
58%	28
60%	30

EA CREDIT: EFFICIENT HOT WATER DISTRIBUTION SYSTEM

3 points

This credit applies to:

- Homes (3 points)

Intent

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

Requirements

HOMES

OPTION 1. Efficient Hot Water Distribution (1 point)

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 $\frac{1}{2}$ -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. In a multi-story home, the maximum allowable branch length differs for each story. Branches to 1st floor fixtures may not exceed 20 feet; branches to 2nd story fixtures may not exceed 20 feet + 1x the story height; branches to 3rd story fixtures may not exceed 20 feet + 2x the story height. Basements are not considered a story.
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. In a multi-story home, the maximum allowable branch length differs for each story. Branches to 1st floor fixtures may not exceed 20 feet; branches to 2nd story fixtures may not exceed 20 feet + 1x the story height; branches to 3rd story fixtures may not exceed 20 feet + 2x the story height. Basements are not considered a story.
 - d. Branch lines from the manifold must be a maximum of $\frac{1}{2}$ -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. In a multi-story home, the maximum allowable branch length differs for each story. Branches to 1st floor fixtures may not exceed 20 feet; branches to 2nd story fixtures may not exceed 20 feet + 1x the story height; branches to 3rd story fixtures may not exceed 20 feet + 2x the story height. Basements are not considered a story.
 - b. Branch lines from the central header to each fixture must be a maximum of $\frac{1}{2}$ -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
$\frac{3}{8}$	1.06	0.97	0.84	N/A	1.17	0.63	0.63	0.64
$\frac{1}{2}$	1.69	1.55	1.45	1.25	1.89	1.31	1.31	1.18
$\frac{3}{4}$	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 $\frac{1}{4}$	8.70	8.36	8.09	6.61	9.66	8.49	8.49	5.81
1 $\frac{1}{2}$	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. Performance Test (1 point)

Diagnostically verify that no more than 0.5 gallons of water are stored in any piping/manifold between the hot water source and any hot water fixture. Follow EPA WaterSense testing procedures, which state that no more than 0.6 gallons of water can be collected from the hot water fixture before hot water is delivered.

AND/OR

OPTION 3. Pipe Insulation (1 point)

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

1 point

This credit applies to:

- Homes (1 point)

Intent

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

Requirements

HOMES

OPTION 1. PV Ready (.5 points)

This credit cannot be earned if the home installs a PV system that earns credit within EA 1.

Meet EPA's Renewable Energy Ready Home Solar Photovoltaic specifications and 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 (.5 points)

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

Meet EPA's Renewable Energy Ready Home Solar Water Heating specifications, and the occupant manual must have detailed information about the system, so as to enable future occupants to easily install an active solar DHW system.

EA CREDIT: HVAC COMMISSIONING

1 point

This credit applies to:

- Homes (1 point)

Intent

Reduce energy consumption by ensuring that the heating and cooling system is operating at its peak efficiency.

Requirements

HOMES

Have a qualified 3rd party (not the installation contractor), commission all heating, cooling and heat or energy recovery ventilation equipment, and complete the ENERGY STAR v3 HVAC System Quality Installation Contractor Checklist for each piece of HVAC equipment.

PRESCRIPTIVE PATHWAY**EA CREDIT: EFFICIENT HOT WATER DISTRIBUTION SYSTEM****HOMES**

See performance path

EA CREDIT: SOLAR READY DESIGN**HOMES**

See performance path

EA CREDIT: HVAC COMMISSIONING**HOMES**

See performance path

EA CREDIT: BUILDING ORIENTATION FOR SOLAR DESIGN

3 points

This credit applies to:

- Homes (3 points)

Intent

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

Requirements

HOMES

Meet all of the following requirements:

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.
4. South facing windows should be directly coupled to thermal storage mass that has a heat capacity of $> 20 \text{ btu/ft}^3 \times \text{°F}$ and provided in a ratio of at least 3 sq. ft per sq. ft. of south facing fenestration. Generally, thermal mass materials will be at least 2" thick.

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.

In areas south of 25 degrees of latitude or where topography significantly impacts insolation, orientation may be adjusted to meet local conditions provided that the team provides documentation to demonstrate that its building orientation decision is based upon solar and meteorological data for the site.

EA CREDIT: AIR INFILTRATION

1-2 points

This credit applies to:

- Homes (1-2 points)

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 or Table 2 below. The air leakage to outside rate must be tested and verified by an energy rater.

CASE 2. Multi-Family

Meet the air leakage requirements shown in the Table 1 or Table 2 below. The air leakage to outside 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).

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.

Table 1. Air Leakage Requirements (ACH50)

<i>Performance requirements (in ACH50)</i>				<i>Points</i>
<i>IECC Climate Zones 1-2</i>	<i>IECC Climate Zones 3-4</i>	<i>IECC Climate Zones 5-7</i>	<i>IECC Climate Zone 8</i>	
4.25	3.5	2.75	2.0	1
3.0	2.5	2.0	1.5	2

Table 2. Air Leakage Requirements (cfm50 / 100 s.f envelope area)

<i>Performance requirements (in ELR / 100 s.f.)</i>				<i>Points</i>
<i>IECC Climate Zones 1-2</i>	<i>IECC Climate Zones 3-4</i>	<i>IECC Climate Zones 5-7</i>	<i>IECC Climate Zone 8</i>	

19.5	16.0	12.5	9.25	1
13.75	11.5	9.25	6.75	2

EA CREDIT: ENVELOPE INSULATION

1-2 points

This credit applies to:

- Homes (1-2 points)

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 or local code, whichever is more stringent, by the percentages shown in the table below:

% Improvement from IECC 2009 or local code	Points
10%	1
20%	2

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% or 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.

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.

EA CREDIT: WINDOWS

1.5-3 points

This credit applies to:

- Homes (1.5-3 points)

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:

$$\text{U-factor} = [0.15 / \text{WFA}] * [\text{U-factor from Table 1}]$$

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:

$$\text{SHGC} = [0.15 / \text{WFA}] * [\text{SHGC from Table 1}]$$

Notes:

For Projects that earn credit in EA Credit 5: Building Orientation for Solar Design, the requirements for the SHGC of 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.

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.

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	≤ 0.32	≤ 0.30	Energy Star

	SHGC	≤ 0.27	≤ 0.30	≤ 0.40	Any	Baseline
1.5	U-factor	≤ 0.45	≤ 0.30	≤ 0.26	≤ 0.26	15%
	SHGC	≤ 0.25	≤ 0.25	≤ 0.40	Any	
3	U-factor	≤ 0.30	≤ 0.26	≤ 0.22	≤ 0.22	30%
	SHGC	≤ 0.25	≤ 0.25	≤ 0.40	Any	

Table 2. Requirements for Skylights

<i>Points</i>	<i>Metric</i>	<i>Climate Zones</i>				<i>% Improvement from ENERGY STAR BOP</i>
		<i>1,2</i>	<i>3</i>	<i>4</i>	<i>5-8</i>	
	U-factor	≤ 0.70	≤ 0.57	≤ 0.55	≤ 0.55	Energy Star Baseline
	SHGC	≤ 0.30	≤ 0.30	≤ 0.40	Any	
1.5	U-factor	≤ 0.70	≤ 0.57	≤ 0.47	≤ 0.47	15%
	SHGC	≤ 0.25	≤ 0.25	≤ 0.40	Any	
3	U-factor	≤ 0.47	≤ 0.47	≤ 0.40	≤ 0.40	30%
	SHGC	≤ 0.25	≤ 0.25	≤ 0.40	Any	

Table 3. Requirements for Doors

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

EA CREDIT: SPACE HEATING & COOLING EQUIPMENT

1-4 points

This credit applies to:

- Homes (1-4 points)

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.

Table 1. HVAC Requirements

Climate Zones 4-8

Points	End use	HVAC equipment					
		Central AC and air source	Gas Furnace	Boilers or Oil Furnace	Ground-source heat pumps		
		heat pumps		(gas, oil, diesel or propane)	Open loop	Closed loop	Direct expansion
1	Cooling	≥ 14 SEER			≥ 17.8 EER	≥ 15.5 EER	≥ 16.5 EER
1	Heating	≥ 10 HSPF	≥ 92 AFUE	≥ 87 AFUE	≥ 4.0 COP	≥ 3.6 COP	≥ 3.9 COP
2	Cooling	≥ 15 SEER			≥ 19.4 EER	≥ 17 EER	≥ 18 EER
2	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	Gas Furnace	Boilers or Oil Furnace	Ground-source heat pumps		
		heat pumps		(gas, oil, diesel or propane)	Open loop	Closed loop	Direct expansion
1	Cooling	≥ 15.5 SEER			≥ 17.8 EER	≥ 15.5 EER	≥ 16.5 EER
1	Heating	≥ 8.6 HSPF	≥ 90 AFUE	≥ 85 AFUE	≥ 4.0 COP	≥ 3.6 COP	≥ 3.9 COP
2	Cooling	≥ 16.5 SEER			≥ 19.4 EER	≥ 17 EER	≥ 18 EER
2	Heating	≥ 9.0 HSPF	≥ 92 AFUE*	≥ 87 AFUE	≥ 4.3 COP	≥ 4.0 COP	≥ 4.2 COP

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.

EA CREDIT: HEATING & COOLING DISTRIBUTION SYSTEMS

2-3 points

This credit applies to:

- Homes (2-3 points)

Intent

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

Requirements

HOMES

Single Family

OPTION 1. Forced-Air Systems.

CASE 1. Homes 1200 ft² or larger. (2 points) 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.

CASE 2. Homes smaller than 1200 ft². (2 points) 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.

CASE 3. Ductwork in conditioned space. (3 points) 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 systems having an air circulation blower qualify.

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.

OR

OPTION 2. Hydronic Systems. (3 points)

1. Keep the system (including boiler and distribution pipes) entirely within the conditioned envelope. (2 points)

OR

2. Install outdoor reset control (i.e., controls that modulate distribution water temperature based on outdoor air temperature). (3 points)

Multi-Family (3 points)

Meet the above requirements.

Option 1, Case 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: EFFICIENT DOMESTIC HOT WATER EQUIPMENT

1-3 points

This credit applies to:

- Homes (1-3 points)

Intent

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

Requirements

HOMES

Install ENERGY STAR qualified water heaters, or a solar water heater that meets at least 40% of the annual DHW load in combination with an ENERGY STAR qualified water heater.

Select one measure from Table 1 below.

Table 1. High-Efficiency Water Heating Equipment

<i>Water heater type and efficiency requirement</i>	<i>Points</i>
<i>ENERGY STAR Qualified</i>	1
<i>Solar water heaters</i>	
≥ 40% of annual DHW load	2
≥ 60% of annual DHW load	3

EA CREDIT: LIGHTING

0.5-2 points

This credit applies to:

- Homes (0.5-2 points)

Intent

Reduce energy consumption associated with interior and exterior lighting.

Requirements

HOMES

OPTION 1. Indoor Lighting (1.5 points)

Install LEDs in at least 80% of high-use rooms (kitchen, dining room, living room, family room, hallways).

AND/OR

OPTION 2. Exterior Lighting (0.5 points)

All exterior lighting must be Dark Sky qualified, and have either motion sensor controls or integrative 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

0.5-2 points

This credit applies to:

- Homes (0.5-2 points)

Intent

Reduce appliance energy consumption.

Requirements

HOMES

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

- ENERGY STAR labeled refrigerator(s) (1 points).
- ENERGY STAR labeled ceiling fans (at least one in living or family room *and* one per bedroom) (0.5 points)
- ENERGY STAR labeled dishwasher(s) (0.5 points)

Note: It is recommended that ceiling fans be installed with a motion sensor so they turn off when there are no occupants in the room.

EA CREDIT: RENEWABLE ENERGY

1-4 points

This credit applies to:

- Homes (1-4 points)

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 1 point for every 500 kWh produced per year by the system. For every 1 points earned in the rest of the EA category, 1 points is available in this credit. RECs must be retained by the building owner.

Annual kWh Produced	Required Points in rest of EA	Points
500	1	1
1000	2	2
1500	3	3
2000	4	4

Exemplary performance is available for projects that install systems that produce 2,500 kWh or more.

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 FSC-certified tropical wood products. Reused or reclaimed materials are exempt.

Note: A species of wood is considered *tropical* for the purposes of this prerequisite if it is grown in a location 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. Meet local building codes, including relevant earthquake, tornado, hurricane, and flood construction regulations.
2. ENERGY STAR Water Management System. Meet the requirements of the ENERGY STAR v3 Water Management System Builder Checklist.
3. Interior Moisture Control Measures. Install all of the applicable indoor moisture control measures listed in Table 1.

Table 1. Moisture Control Measures

<i>Location or equipment</i>	<i>Required moisture control measure</i>
Tub, showers, and spa areas (directly above bathtubs, spas and showers - extending to the ceiling) – 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, or drain pan and automatic water shut-off
Clothes washer in or over living space	Install drain and drain pan, or drain pan and automatic water shut-off.
Conventional clothes dryer	Exhaust directly to outdoors.
Condensing clothes dryer	Install drain and drain pan, or drain pan and automatic water shut-off

MID-RISE

Complete both of the following:

1. Meet local building codes, including relevant earthquake, tornado, hurricane, and flood construction regulations.
2. Install all of the applicable indoor moisture control measures listed in Table 1.

Table 1. Moisture Control Measures

<i>Location or equipment</i>	<i>Required moisture control measure</i>
Tub, showers, and spa areas (directly above bathtubs, spas and showers - extending to the ceiling) – 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, or drain pan and automatic water shut-off
Clothes washer in or over living space	Install drain and drain pan, or automatic water shut-off.
Conventional clothes dryer	Exhaust directly to outdoors.
Condensing clothes dryer	Install drain and drain pan, or automatic water shut-off

MR CREDIT: DURABILITY MANAGEMENT VERIFICATION

1 point

This credit applies to:

- Homes (1 point)

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

Have the Verification Team inspect and verify each measure listed in the Moisture Control Measures and ENERGY STAR v3 Water Management System Builder Checklist listed in the MR Prerequisite, Durability Management.

MR CREDIT: MATERIAL-EFFICIENT FRAMING

0.5-1 point

This credit applies to:

- Homes (0.5-1 point)
- Mid-Rise (0.5-1 point)

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 (1 point). Install no more than 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 (0.5 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 (0.5 points).

For renovation projects, existing components may be ignored from the calculation if they don't meet credit requirements.

Modular, panelized, or other prefabricated wall or structural systems must comply with the same framing credit options.

Exemplary performance is available to projects that earn more than 1 point.

MR CREDIT: ENVIRONMENTALLY PREFERABLE PRODUCTS

0.5-4 points

This credit applies to:

- Homes (0.5-4 points)
- Mid-Rise (0.5-4 points)

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 2 can earn points for each. (½ point per item is earned, except as specifically noted below.)

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. Composed of at least 25 % reclaimed material, including salvaged, refurbished, or reused materials,
- b. Composed of at least 25% postconsumer or 50% preconsumer (postindustrial) products, determined by weight
- c. Composed of at least 50% rapidly renewable material (a material that regenerates within 10 years such as bamboo, cork, etc.)

Component	Max. Points Available
Flooring	maximum credit for 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.

Wood by-products – including items from secondary manufacturers; felled, diseased, or dead trees from urban or suburban areas; orchard trees that are un-productive and cut for replacement; and wood recovered from landfills or water bodies can be counted as reclaimed material.

Note: For renovation projects, existing components are considered both Local for Option 1 AND Reclaimed for Option 2.

Exemplary performance is available for projects that earn more than 3 points in this credit.

MR CREDIT: MATERIALS RESOURCE MANAGEMENT

0.5-3 points

This credit applies to:

- Homes (0.5-3 points)
- Mid-Rise (2-3 points)

Intent

Reduce construction 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. An ID point is available for exemplary performance in demolition waste diversion.

Table 1. Waste Generated by LEED Reference Home

Bedrooms	Conditioned Floor Area of LEED Reference Home	Waste Generated by LEED Reference Home (lbs)
1	1,000	4,200
2	1,600	6,720
3	2,200	9,240
4	2,800	11,760
5	3,400	14,280
6	4,000	16,800
7	4,600	19,320

For buildings with more than 7 bedrooms, Waste Generated by LEED Reference Home (lbs) = Conditioned Floor Area of LEED Reference Home * 4.2

Step 1: Calculate the Waste Generated by Project

$$\text{Project construction waste (lbs)} = \text{Waste to landfill (lbs)} + (\text{Waste diverted (lbs)} * 0.75)$$

To convert from volume of waste to weight, projects may use a generic 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 2.

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: Contra Costa Waste Authority

Step 2: Calculate % Construction Waste Reduced from LEED Reference Home

Construction waste Reduction (%) = [Waste Generated by LEED Reference Home (lbs) – Project Construction waste (lbs)] / Waste Generated by LEED Reference Home (lbs)

Table 3. Point Allocation Equation:

% Construction Waste Reduced from LEED Reference Home	Points
25%	0.5
37.5%	1.0
50%	1.5
62.5%	2.0
75%	2.5
87.5%	3.0

Exemplary performance is available for projects that have greater than 95% construction waste reduced compared to the LEED reference home.

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 1.

Percentage Diverted	Points
75%	2
95%	3

OR

CASE 2. Project Scope is only New Construction

Minimize new construction waste to landfills or incinerators 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%	2
1.5 lbs/ft ³	75%	3

Exemplary performance is available for projects that have greater than 95% construction waste reduction.

MR CREDIT: DESIGN FOR ADAPTABILITY

[This credit is available in the Pilot Credit Library](#)

0.5-2 points

This credit applies to:

- Homes (0.5-2 points)
- Mid-Rise (1 point)

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

Note: Multi-family projects required to meet the Fair Housing Amendments Act (FHAA) (e.g., a building with ≥ 4 residential units and an elevator) may earn points in Option 1 if they have twice the number of accessible units that meet FHAA requirements than what is required by code. .

OPTION 1. Universal Design Features (1 point)

Meet all of the following:

1. Zero-Step Main Entrance: Entrances with no abrupt change in level must provide access to dwelling units and site amenities.
2. Accessible Doorway: A doorway must have a minimum clear width of open doorway of 32 inches and clear maneuvering space inside and outside the door.
3. Accessible Passage: An accessible route is a path that is at least 36 inches wide, smooth, as level as possible, and without hazards or obstructions.
4. Adaptable bathroom: Bathroom must have a minimum 30 inch x 48 inch clear floor space and standard accessible shower and toilet fixtures.
5. Accessible HVAC and lighting controls: Controls such as thermostats and other heating, air-conditioning, and ventilation mechanisms as well as light switches and electrical outlets must be positioned no less than 15 inches from the floor and no higher than 48 inches with no access obstructions.
6. A kitchen, dining area, living area, adaptable full bathroom, and bedroom on the accessible level.

AND/OR

OPTION 2: Open building structural systems (0.5 points)

Allow for easy redefining of rooms/floorplans with minimal renovation and material waste. Meet both of the following:

1. Centralized primary structural elements (such as "clear-span" structural design and partitions)
2. Flexible ceiling or floor systems (such as suspended ceilings, open-web floor trusses, raised or plenum floors)

AND/OR

OPTION 3. Organized and accessible MEP systems (0.5 points) (

Meet one of the following:

1. Stacked plumbing, electrical and mechanical design. Stacked or adjacent MEP layouts locate functional areas (like bathrooms, kitchens, and laundry areas for plumbing lines) vertically from floor to floor or in shared common walls on the same floor to provide access for installation and repairs, reduce redundant supply and space requirements, and ensure adaptable use of non-MEP spaces
2. Separation of MEP systems from within exterior walls and primary interior structural members

MID-RISE

Projects required to meet the Fair Housing Amendments Act (FHAA) (e.g., a building with ≥ 4 residential units and an elevator) may earn points in if they have twice the number of accessible units that meet FHAA requirements than what is required by code.

Universal Design Features (1 point) Meet all of the following:

1. Zero-Step Main Entrance: Entrances with no abrupt change in level must provide access to dwelling units and site amenities.
2. Accessible Doorway: A doorway must have a minimum clear width of open doorway of 32 inches and clear maneuvering space inside and outside the door.
3. Accessible Passage: An accessible route is a path that is at least 36 inches wide, smooth, as level as possible, and without hazards or obstructions.
4. Adaptable bathroom: Bathroom must have a minimum 30 inch x 48 inch clear floor space and standard accessible shower and toilet fixtures.
5. Accessible HVAC and lighting controls: Controls such as thermostats and other heating, air-conditioning, and ventilation mechanisms as well as light switches and electrical outlets must be positioned no less that 15 inches from the floor and no higher than 48 inches with no access obstructions.
6. A kitchen, dining area, living area, adaptable full bathroom, and bedroom on the accessible level.

INDOOR ENVIRONMENTAL QUALITY (EQ)

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

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. (Routing exhaust ducts to terminate in attics or interstitial spaces is not permitted, nor is the use of re-circulating range hoods or re-circulating over-the-range microwaves to satisfy kitchen exhaust requirements.
- c. Use ENERGY STAR labeled bathroom exhaust fans in all bathrooms (including half baths). Exhaust fans serving multiple bathrooms and bathrooms with an HRV or ERV must meet the applicable 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**

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

AND

Whole House Mechanical 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. Simplified minimum air flow requirements are shown in Table 2 below.
- b. Intermittent ventilation. Use Equation 4.2 of ASHRAE Standard 62.2-2010 to demonstrate adequate ventilation air flow.
- c. Exception for 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.

Table 2. Simplified 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

Projects that earn the EPA Indoor airPLUS label automatically meet the requirements of this prerequisite.

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), and Local Exhaust Items A, B, C and D from the Single Family section above. 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 100ft² of conditioned floor area. Mechanical supply-only systems exceeding 7.5 cfm per 100ft² 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 addenda¹).

Note: Ventilation fans may require radiation/fire dampers when fans penetrate rated assemblies to meet local building/fire codes.

MID-RISE

Design and install ventilation systems that 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 addenda¹).

Also, 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 62.1-2010. Systems that rely on transfer air from pressurized hallways or corridors, adjacent dwelling units, attics, etc. are prohibited.

Note: Ventilation fans may require radiation/fire dampers when fans penetrate rated assemblies to meet local building/fire codes.

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 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 close, or a solid glass enclosure.
4. All fireplaces and woodstoves located inside the house must pass BPI or RESNET combustion safety testing protocols 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.

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 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 using a blower door test 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.

Projects that earn the EPA Indoor airPLUS label automatically meet the requirements of this prerequisite.

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, which 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 with no bends greater than 45 degrees, 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.

Projects that earn the EPA Indoor airPLUS label automatically meet the requirements of this prerequisite.

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 design duct work and specify the central blower to account for the pressure drop across the filter. Air filter housings must be airtight to prevent bypass or leakage. Note: Non-ducted systems are exempt from minimum MERV 8 requirements, but must have an internal air filter provided in the air handling unit.
2. Install air filters \geq MERV 6 for mechanically supplied outdoor air for systems with 10 feet of ductwork or more per ASHRAE 62.2-2010 Section 6.7.

Projects that earn the EPA Indoor airPLUS label automatically meet the requirements of this prerequisite.

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 and attached Single-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 by RESNET or the ENERGY STAR Testing and Verification Protocols for multifamily high-rise buildings, with an allowable maximum leakage of 0.23 cfm50 per square foot of enclosure (i.e. all surfaces enclosing the apartment, including exterior and party walls, floors, ceiling).

EQ CREDIT: ENHANCED VENTILATION

1-3 points

This credit applies to:

- Homes (1-2 points)
- Mid-Rise (1-3 points)

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 (1 point)

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 tied to a light switch which operates the fan for at least 20 minutes after occupant leaves the room.

AND/OR

OPTION 2. Enhanced Whole House Ventilation (1 point)

Meet both of the following requirements:

1. Install a balanced whole house ventilation system (not just exhaust only or supply 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%.

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 (1 point)

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 tied to a light switch which operates the fan for at least 20 minutes after occupant leaves the room.

AND/OR

OPTION 2. Enhanced Whole House Ventilation (2 points)

Meet both of the following requirements:

1. Install a balanced whole unit ventilation system (not just exhaust only) that meets the minimum ventilation requirements of ASHRAE Standard 62.1-2010.
2. Program the whole house ventilation system so that it does not exceed the requirements of ASHRAE 62.1-2010.

EQ CREDIT: CONTAMINANT CONTROL

0.5-1 point

This credit applies to:

- Homes (0.5-1 point)
- Mid-Rise (0.5-1 point)

Intent

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

Requirements

HOMES

OPTION 1. Walk-off Mats (0.5 point)

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 from the outdoors, but non-permanent walk-off mats are strongly recommended for other entryways.

For common entryways in multi-family buildings, 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, grills 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.

OR

OPTION 2. Shoe Removal and Storage (0.5 point)

Design a shoe removal and storage space near the primary entryway, separated from living areas. This space must be a permanent architectural feature, it 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.

For multi-family buildings, a shoe removal and storage space must be available for at each residential unit's primary entrance.

AND/OR

OPTION 3. During Construction/Prior to Occupancy (0.5 points). Complete either 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.

AND

2. **Preoccupancy Flush.** Flush the homes 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.

For multi-family buildings, the Preoccupancy Flush can be awarded if the requirements are only met for all in-unit spaces.

OR

OPTION 4. Air Testing (1 point)

After construction ends and before occupancy, but under ventilation conditions typical for occupancy, conduct baseline IAQ testing using protocols consistent with the methods in the table below. Project teams must follow either the EPA Compendium of Methods or ISE and cannot use a combination of the two.

Demonstrate that the contaminant maximum concentration levels listed below are not exceeded:

Contaminant	Maximum Concentration	Maximum Concentration (Healthcare only)	EPA Compendium Method	ISO Method
Formaldehyde	27 parts per billion	20 micrograms per cubic meter	IP-6	ISO 16000-3
Particulates (PM10 for all buildings; PM 2.5 (for buildings in EPA non-attainment areas ⁷))	PM 10 - 50 micrograms per cubic meter PM 2.5 – 15 micrograms per cubic meter	20 micrograms per cubic meter	IP-10	ISO 7708
Ozone (for building in EPA non-attainment areas ¹⁷)	0.075 parts per million	0.075 parts per million		
Total volatile organic compounds (TVOCs)	500 micrograms per cubic meter	200 micrograms per cubic meter	IP-1	ISO 16000-6
Target Chemicals listed in Table 4-1 of CDPH Standard Method v1.1, except formaldehyde	CDPH Standard Method v1.1-2010 Allowable concentrations in Table 4-1	CDPH Standard Method v1.1-2010 Allowable concentrations in Table 4-1	IP-6 and IP-1	ISO 16000-3 and 16000-6

For any sampling point where the maximum concentration limits are exceeded take corrective action and retest the noncompliant concentrations. Repeat until all requirements are met. When

⁷ EPA Non-attainment areas are areas of the U.S. (by county) where air pollution levels consistently exceed the national ambient air quality standards (NAAQS) on an annualized basis. Projects outside of the U.S. must follow the EPA guideline or a local equivalent, whichever is more stringent.

retesting noncompliant building areas, it is recommended that project teams take samples from the same locations as in the first test.

Conduct the air sample testing as follows:

All measurements must be conducted before occupancy, but during normal occupied hours with the building ventilation system started at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the test.

All interior finishes, such as millwork, doors, paint, carpet, acoustic tiles, and movable furnishing such as workstations and partitions must be installed.

The number of sampling locations depends on the size of the building and number of ventilation systems. The number of sampling locations must include the entire building and all representative situations. Include areas with the least ventilation and greatest presumed source strength.

Air samples must be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum 4-hour period.

Exemplary performance is available for projects that earn more than 1 point in this credit.

MID-RISE

Select from the measures below:

OPTION 1. Walk off Mats (0.5 point)

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, grills 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 (0.5 point)

In each unit, design a space near entryway for removing and storing shoes that is separated from living areas. This space must be a permanent architectural feature, it 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. During Construction/Prior to Occupancy (0.5 point)

Complete either 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.

AND

2. **Preoccupancy Flush.** Flush the home with fresh air, according to the following guidelines:
- Remove any dust and debris from ducts prior to flush.
 - Flush prior to occupancy but after all phases of construction are completed.
 - Flush the entire home, keeping all interior doors open.
 - Flush for 48 total hours; the hours may be nonconsecutive, if necessary.
 - 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 can be awarded if the requirements are only met for all in-unit spaces.

OR

OPTION 4. Air Testing (1 point)

After construction ends and before occupancy, but under ventilation conditions typical for occupancy, conduct baseline IAQ testing using protocols consistent with the methods in the table below. Project teams must chose to follow either the EPA Compendium of Methods or ISE and cannot use a combination of the two.

Demonstrate that the contaminant maximum concentration levels listed below are not exceeded:

Contaminant	Maximum Concentration	Maximum Concentration (Healthcare only)	EPA Compendium Method	ISO Method
Formaldehyde	27 parts per billion	20 micrograms per cubic meter	IP-6	ISO 16000-3
Particulates (PM10 for all buildings; PM 2.5 (for buildings in EPA non-attainment areas ⁸))	PM 10 - 50 micrograms per cubic meter PM 2.5 – 15 micrograms per cubic meter	20 micrograms per cubic meter	IP-10	ISO 7708
Ozone (for building in EPA non-attainment areas ¹⁷)	0.075 parts per million	0.075 parts per million		
Total volatile organic compounds (TVOCs)	500 micrograms per cubic meter	200 micrograms per cubic meter	IP-1	ISO 16000-6
Target Chemicals listed in Table 4-1 of CDPH Standard	CDPH Standard Method v1.1-2010 Allowable concentrations in	CDPH Standard Method v1.1-2010 Allowable concentrations in	IP-6 and IP-1	ISO 16000-3 and 16000-6

⁸ EPA Non-attainment areas are areas of the U.S. (by county) where air pollution levels consistently exceed the national ambient air quality standards (NAAQS) on an annualized basis. Projects outside of the U.S. must follow the EPA guideline or a local equivalent, whichever is more stringent.

Method v1.1, except formaldehyde	Table 4-1	Table 4-1		
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For any sampling point where the maximum concentration limits are exceeded take corrective action and retest the noncompliant concentrations. Repeat until all requirements are met. When retesting noncompliant building areas, it is recommended that project teams take samples from the same locations as in the first test.

Conduct the air sample testing as follows:

All measurements must be conducted before occupancy, but during normal occupied hours with the building ventilation system started at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the test.

All interior finishes, such as millwork, doors, paint, carpet, acoustic tiles, and movable furnishing such as workstations and partitions must be installed.

The number of sampling locations depends on the size of the building and number of ventilation systems. The number of sampling locations must include the entire building and all representative situations. Include areas with the least ventilation and greatest presumed source strength.

Air samples must be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum 4-hour period.

EQ CREDIT: BALANCING OF HEATING & COOLING DISTRIBUTION SYSTEMS

[This credit is available in the Pilot Credit Library](#)

1-2 points

This credit applies to:

- Homes (1-2 points)
- Mid-Rise (1-2 points)

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 (1 point)

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. Single family houses with less than 800 square feet of conditioned floor area, or multi-family buildings with average unit size less than 1,200 square feet automatically earn this credit.

AND/OR

OPTION 2. Third-Party Performance Test (1 point)

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 +/- 20% (or +/- 25 cfm) of calculated values from ACCA Manual J.
- Multi-rate or multi-speed HVAC systems will be tested at the rate they were designed for. 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.

CASE 2. Radiative Systems (e.g., Hydronic Systems)

OPTION 1. Multiple Zones (1 point)

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. Houses with less than 800 square feet of conditioned floor area, or multi-family buildings with average unit size less than 800 square feet automatically meet credit requirements.

OR

OPTION 2. Room-by-Room Controls (2 points)

Design the HVAC system with flow control valves on every radiator.

EQ CREDIT: ACOUSTIC COMFORT

1 point

This credit applies to:

- Homes (1 point)
- Mid-Rise (1 point)

Intent

Provide acoustic comfort by minimizing intruding noise into and within buildings.

Requirements

Prerequisites

None.

Credits

These requirements only apply to “acoustically sensitive” rooms, such as bedrooms, dining rooms, living rooms, and studies. (“Acoustically insensitive” rooms include bathrooms, kitchens, and hallways.) Projects may also implement the measures throughout the entire home.

OPTION 1. Prescriptive noise reduction methods. (1 point)

Meet all of the following requirements:

- A. Mechanical systems must meet the following requirements:
 - i. Continuous ventilation fans shall have a maximum sound rating of 0.7 sones. Intermittent fans shall have a maximum sound rating of 1.5 sones, unless their maximum rated airflow exceeds 400 cfm. HVAC air handlers and remote-mounted fans are exempted, if the fans are mounted outside the habitable spaces, bathrooms, and hallways, and if there is at least 4 feet of ductwork between the fan and the intake grill.
 - ii. Meet the following best-practice HVAC installation measures:
 - a. Ducts are securely attached (no loose connections between sections of ductwork).
 - b. The fan housing is securely anchored.
 - c. The damper flap closes fully, with no visible airspaces around the flap.
- B. For projects that are less than a half a mile away from any significant noise source such as (but not limited to) aircraft over-flights, highways, trains, and industry, exterior assemblies must include:
 - i. Exterior windows and doors must have a minimum STC rating of 35.
 - ii. All exterior wall penetrations must be sealed with acoustical sealant, and/or otherwise treated for sound control (e.g. lined elbows on vents, lined exterior ducts where feasible).
- C. Attached single family homes and multi-family homes must also meet the following:
 - i. Party walls must have a minimum STC rating of 55.
 - ii. All party wall penetrations must be sealed with acoustical sealant.
 - iii. Floor/ceiling assemblies must have a minimum STC *and* IIC rating of 55.

AND/OR

OPTION 2. Performance-based compliance requirements (1 point)

Meet all of the following. The tested levels must be met in the acoustically sensitive room that is considered the worst case condition.

- A. The maximum background noise level in the home or unit due to exterior noise sources cannot exceed 40 dBA, based on the peak hour Leq.
- B. The maximum background noise level in the home or unit due to interior noise sources (HVAC systems, lighting, and other building services operating simultaneously) shall not exceed 40 dBA, based on the peak Leq.
- C. Party walls must have a minimum NIC rating of 50.
- D. Floor-ceiling assemblies between units must have a minimum NIC *and* FIIC rating of 50.

EQ CREDIT: BAN ENVIRONMENTAL TOBACCO SMOKE

1 point

This credit applies to:

- Mid-Rise (1 point)

Intent

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

Requirements

MID-RISE

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

1-3 points

This credit applies to:

- Homes (1 point)
- Mid-Rise (3 points)

Intent

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

Requirements

HOMES, MID-RISE

Perform a compartmentalization blower door test according to RESNET or the ENERGY STAR Testing and Verification Protocols for multifamily high-rise buildings, with an allowable maximum leakage of 0.15 cfm₅₀ per square foot of enclosure (i.e. all surfaces enclosing the apartment, including exterior and party walls, floors, ceiling).

EQ CREDIT: COMBUSTION VENTING

1-2 points

This credit applies to:

- Homes (1-2 points)
- Mid-Rise (1-2 points)

Intent

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

Requirements

HOMES, MID-RISE

OPTION 1. (2 points)

Install no fireplace or woodstove

OR

OPTION 2. (1 point)

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
Wood or pellet burning fireplaces and stoves	Install equipment that is EPA qualified and is power vented or direct vented.
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.

Projects that earn the EPA Indoor airPLUS label automatically meet the requirements of Option 2.

EQ CREDIT: GARAGE POLLUTANT PROTECTION

0.5-1 point

This credit applies to:

- Homes (0.5-1 point)
- Mid-Rise (0.5-1 point)

Intent

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

Requirements

HOMES

CASE 1. Single Family

OPTION 1. Exhaust Fan in Garage (0.5 points)

Install an ENERGY STAR qualified exhaust fan in the garage.

- a. Fan must vent directly to the outdoors, be designed with an automatic timer control linked to an occupant sensor, light switch, garage door opening-closing mechanism, carbon monoxide sensor which turns on the exhaust fan when ambient CO levels are no greater than 35 ppm, or equivalent. Direct exhaust fans must be 100 cfm or greater, and ducted exhaust fans must be 130 cfm or greater. 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 (1 point)

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 (0.5 point)

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 (0.5 point)

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. Direct exhaust fans must be 100 cfm or greater, and ducted exhaust fans must be 130 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 which turns on the exhaust fan when ambient CO levels are no greater than 35 ppm, 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 (1 point)

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 Garage (0.5 point)

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. Detached Garage or No Garage or Carport (1 point)

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

1 point

This credit applies to:

- Homes (1 point)
- Mid-Rise (1 point)

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 (1 point)

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 (1 point)

Meet the following requirements:

OPTION 1. Radon-Resistant Construction Techniques (1 point)

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 with no bends greater than 45 degrees, 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,

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 (1 point)

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

1 point

This credit applies to:

- Homes (1 point)
- Mid-Rise (1 point)

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. [Humidity controls that use the primary cooling system](#) 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.

Projects in “Warm-Humid” climates as defined by IECC Figure 301.1 that earn the EPA Indoor airPLUS label automatically meet credit requirements.

EQ CREDIT: LOW EMITTING PRODUCTS

0.5-2 points

This credit applies to:

- Homes (0.5-2 points)
- Mid-Rise (0.5-2 points)

Intent

Reduce occupant exposure to chemical contaminants in air through product selection.

Requirements

HOMES, MID-RISE

Low emissions (0.5 point per component). Use products on the interior of the home that have been tested and determined compliant in accordance with the California Department of Public Health (CDPH) Standard Method V1.1-2010. At least 90% of a component must meet the requirements below to earn credit.

- Site-applied interior paints and coatings –meet CA Section 01350
- Flooring – meet CA Section 01350
- Insulation – meet CA Section 01350
- Site-applied adhesives and sealants - meet CA Section 01350
- Composite wood products – Meet the California Air Resources Board ATCM for formaldehyde requirements for Ultra-Low-Emitting Formaldehyde (ULEF) resins or No-Added Formaldehyde based resins. Salvaged and re-used architectural millwork more than one-year old at the time of occupancy is considered compliant provided it meets the requirements for any site-applied paints, coatings, adhesives, and sealants.

Exemplary performance is available for projects that have more than 4 components that meet credit requirements.

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 whole house electric and gas meters (if applicable) and a whole house water meter (unless the building is on well water and not on a municipal 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 either a gas and water meter or sub-meter for each unit or the entire building (if applicable). 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) by including the benefits of participation in the Homeowner Education Manual.

Buildings in an exceptional situation may submit a Credit Interpretation Request to USGBC to determine if they can install whole building electric meters instead of one on each unit.

MID-RISE

Complete both of the following:

1. Install an electric meter for each residential unit and either a gas and water meter or sub-meter for each unit or the entire building (if applicable). 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) by including the benefits of participation in the Homeowner Education Manual.

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 following 2009 EPA WaterSense Single-Family New Home Specifications item 5.0 Homeowner Education.
- g. Guidance on occupant activities and choices, including the following:
 - cleaning materials, methods, and supplies;
 - water-efficient landscaping;
 - integrative pest management
 - 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

1-2 points

This credit applies to:

- Homes (1-2 points)
- Mid-Rise (1-2 points)

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 point).

Meet both of the following:

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 (1 point)

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 point)

Meet both of the following:

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 (1 point)

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 (1 point)

Meet both of the following:

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 (1 point)

PATH1. 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

1-6 points

This credit applies to:

- Homes (1-6 points)
- Mid-Rise (1-6 points)

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 a combination of Innovation, Pilot, and Exemplary Performance strategies as described below:

OPTION 1. Innovation (1 point)

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

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.

AND/OR

OPTION 2. Pilot (1 point)

Attempt and achieve one pilot credit from the USGBC's LEED Pilot Credit Library.

AND/OR

OPTION 3. Additional Strategies (1-4 points)

- **Innovation (1- 4 points)**
Defined in Option 1 above.
- **Pilot (1- 4 points)**
Defined in Option 2 above.
- **Exemplary Performance (1-2 points)**
Achieve exemplary performance in an existing LEED 2012 prerequisite or credit that allows exemplary performance as specified in the LEED Reference Guide 2012 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.

REGIONAL PRIORITY (RP)

RP CREDIT: REGIONAL PRIORITY

(1-4 points)

This credit applies to:

- Homes (1-4 points)
- Mid-Rise (1-4 points)

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 some 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, codling 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 controls and 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 than 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

integrative 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.

12. The Size Adjustment Factor is always 1
13. Foundation: The LEED Reference Home Size is a slab-on-grade ranch, with floor area equal to Benchmark Home conditioned floor area.
14. Floors over unconditioned spaces: none
15. 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 ft² to the exterior wall area of the reference home.

16. Exterior doors: 2 half-lite doors, unshaded, one on South wall, one on West wall
17. Glazing: 15% of the floor area of the Reference Home
18. Ceiling area: Insulated, and gross area equal to the Benchmark Home conditioned floor area
19. Service water heating equipment efficiency: Storage water heater with 0.59 EF for gas, 0.92 EF for electric
20. Thermal distribution system: 100% in the attic, above insulation
21. The LEED MMBtu Target shall be displayed in MMBtu/year.
22. 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 land is land that is altered by paving, construction, and/or land use that would typically have required regulatory permitting to have been initiated (alterations may exist now or in the past). Previously developed land includes a platted lot on which a building was constructed if the lot is no

more than 1 acre; previous development on lots larger than 1 acre is defined as the *development footprint* and land alterations associated with the footprint. This does not apply to altered landscapes resulting from current agricultural use, forestry use, or use as preserved natural area.

Previously undeveloped land includes both land that is not previously developed, as well as altered landscapes resulting from current or historical clearing or filling, agricultural or forestry use, or preserved natural area use. The date of previous development permit issuance constitutes the date of previous development, but permit issuance in itself does not constitute previous development.

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 buildings 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 square-metre kelvins per watt or $\text{m}^2\cdot\text{K}/\text{W}$ (or equivalently to $\text{m}^2\cdot^\circ\text{C}/\text{W}$). 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.)