

Green Communities Criteria 2008





About Green Communities

Green Communities is the first national green building program focused entirely on affordable housing. Launched by Enterprise in fall 2004, Green Communities is designed to help developers, investors, builders and policymakers make the transition to a greener future for affordable housing. www.greencommunitiesonline.org



About Enterprise

Enterprise is a leading provider of the development capital and expertise it takes to create decent, affordable homes and rebuild communities. For 25 years, Enterprise has pioneered neighborhood solutions through public-private partnerships with financial institutions, governments, community organizations and others that share our vision. Enterprise has raised and invested more than \$9 billion in equity, grants and loans and is currently investing in communities at a rate of \$1 billion a year. www.enterprisecommunity.org or www.enterprisecommunity.com

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Introduction

Green Communities is transforming the way America thinks about, designs and builds affordable communities. Green building integrates materials and methods that promote environmental quality, economic vitality and social benefits through design, construction and operation of the built environment. Green Communities aligns affordable housing investment strategies with environmentally responsive building practices.

As a community of affordable housing providers, we have an opportunity to use green building strategies that significantly reduce the impact on water quality, air pollution, global warming and the depletion of natural resources – while simultaneously lowering operating costs and maintenance needs. More importantly, people, not buildings, are the real focus of our work. Adopting green building practices will redouble our contribution to the physical health and well-being of people.

LEED for Homes

The 2008 version of the Green Communities Criteria is purposefully aligned with the United States Green Building Council's Leadership in Energy and Environmental Design's Rating System for Homes. The Green Communities Criteria were developed specifically for developers of all types of affordable housing to be a rigorous yet holistic approach to deliver housing that will provide significant health, economic and environmental benefits. In this updated version of the Green Communities Criteria, we hope it is clear how Green Communities and LEED for Homes are aligned so that participation in both programs if desired is possible. For more information on the LEED for Homes rating system please go to www.usgbc.org.



Green Communities Criteria: An Overview

The Green Communities criteria promote smart growth, public health, energy conservation, operational savings and sustainable building practices in affordable housing design. As a result, the methods and materials referenced in the following pages enhance affordable housing and communities as a whole.

In addition to increasing resource efficiency and reducing environmental impacts, green building practices can yield cost savings through long-term reduction in operating expenses. The benefits include improved energy performance and comfort, a healthier indoor environment, increased durability of building components, and simplified maintenance requirements that can lead to financial efficiencies for property managers and owners. Green building practices improve the economics of managing affordable housing while enhancing quality of life for residents. When green building practices inform the location of affordable housing – placing homes near community amenities such as public transportation to create walkable, livable neighborhoods – the benefits for residents and communities expand to include fewer sprawl-related impacts.

Guiding principles behind the Green Communities criteria ensure that homes must be cost effective to build, and durable and practical to maintain. In addition, the principles work together to help produce green affordable housing that:

- Results in a high-quality, healthy living environment
- Lowers residents' utility costs
- Enhances residents' connection to nature
- Protects the environment by conserving energy, water, materials and other resources
- Advances the health of local and regional ecosystems

To be eligible for Green Communities grants, loans and tax credit equity through Enterprise, a project must comply with all of the mandatory provisions of the Green Communities criteria. In addition, new construction projects must earn 35 points from the Optional Criteria, while moderate rehabilitation projects must earn 30 points from the Optional Criteria. The Green Communities Grants Approval Committee may waive compliance with specific criteria if the grant applicant can demonstrate that the criterion creates a substantial hardship or is inadvisable for a specific project, and that the alternative meets the intent of the criteria. Projects applying for funding should include at least 15 single-family homes occupied by households with incomes at or below 80 percent of area median income or at least 25 rental apartments occupied by households at or below 60 percent of area median income.

Green Communities Criteria Checklist

Developer Name: _____

Project Name: _____

Address (Street/City/State): _____

Please note that partial points are not awarded, unless specifically noted for a criterion.

Distinguishing between types of rehab

For the purposes of this criteria, substantial rehabilitation is defined as rehabilitation where major systems, especially the HVAC system, are being replaced. In addition to HVAC systems, this also includes plumbing and electrical systems. Moderate rehabilitation is rehabilitation that does not include major system replacement.

LH= Aligned with LEED for Homes credit. For more information on the LEED for Homes rating system, please go to www.usgbc.org.

MAXIMUM POINTS

YES	NO	?			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		Integrated Design	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1.1 LH	Green Development Plan Submit Green Development Plan outlining the integrated design approach used for this development that demonstrates involvement of the entire development team.	Mandatory
				Site, Location and Neighborhood Fabric	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.1a LH	Smart Site Location - Proximity to Existing Development: New Construction Provide site map demonstrating that the development is located on a site with access to existing roads, water, sewers and other infrastructure within or contiguous (having at least 25 percent of the perimeter bordering) to existing development.	Mandatory (except infill site or rehabs)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.1b LH	Smart Site Location - Protecting Environmental Resources: New Construction Do not locate new development within 100 feet of wetlands, critical slope areas, land identified as habitat for a threatened or endangered species; or on land previously used as public park land, land identified as prime farmland, or with elevation at or below the 100-year floodplain.	Mandatory (except infill site or rehabs)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.1c LH	Smart Site Location - Proximity to Services: New Construction Locate projects within one-quarter mile of at least two, or one-half mile of at least four community and retail facilities.	Mandatory (except infill site or rehabs)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.2	Compact Development: New Construction Achieve densities for new construction of at least six units per acre for detached/semi-detached houses; 10 for town homes; 15 for apartments.	Mandatory (except rehabs)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.3	Walkable Neighborhoods: Sidewalks and Pathways Connect project to the pedestrian grid. Include sidewalks or other all-weather pathways within a multifamily property or single-family subdivision linking residential development to public spaces, open spaces and adjacent development.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.4a LH	Smart Site Location: Passive Solar Heating/Cooling Orient building to make the greatest use of passive solar heating and cooling.	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.4b LH	Smart Site Location: Grayfield, Brownfield or Adaptive Reuse Site Locate the project on a grayfield, brownfield or adaptive reuse site.	10
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.5 LH	Compact Development Increase average minimum densities to meet or exceed: seven units per acre for detached/semi-detached; 12 units for town homes; and 20 units for apartments.	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.6	Walkable Neighborhoods: Connections to Surrounding Neighborhoods Provide a site plan demonstrating at least three separate connections from the development to sidewalks or all-weather pathways in surrounding neighborhoods.	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.7 LH	Transportation Choices Locate project within one-quarter mile radius of adequate public transit service, or one-half mile radius from an adequate fixed rail or ferry station.	12

YES	NO	?	Site Improvements		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3.1	Environmental Remediation Conduct a Phase I Environmental Site Assessment and provide a plan for abatement if necessary.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3.2 LH	Erosion and Sedimentation Control Implement EPA's Best Management Practices for erosion and sedimentation control during construction referring to the EPA document, Storm Water Management for Construction Activities.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3.3 LH	Landscaping Provide a tree or plant list certified by the architect or landscape architect that the selection of new trees and plants are appropriate to the site's soils and microclimate and do not include invasive species. Locate plants to provide shading in the summer and allow for heat gain in the winter.	Mandatory <i>(if providing landscaping)</i>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3.4 LH	Surface Water Management Capture, retain, infiltrate and/or harvest the first one-half inch of rain that falls in a 24-hour period.	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3.5	Storm Drain Labels Label all storm drains or storm inlets to clearly indicate where the drain or inlet leads.	2
			Water Conservation		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4.1a LH	Water-Conserving Appliances and Fixtures: New Construction Install water-conserving fixtures with the following minimum specifications: toilets – 1.3 GPF; showerheads – 2.0 GPM; kitchen faucets – 2.0 GPM; bathroom faucets – 2.0 GPM	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4.1b LH	Water-Conserving Appliances and Fixtures: Moderate Rehabilitation Install water-conserving fixtures with the following minimum specifications for toilets and shower heads and follow requirements for other fixtures wherever and whenever they are replaced: toilets – 1.3 GPF; showerheads – 2.0 GPF; kitchen faucets – 2.0 GPM; bathroom faucets – 2.0 GPM.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4.1c LH	Water-Conserving Appliances and Fixtures Install water-conserving fixtures with the following minimum specifications: toilets – 1.1 GPF; showerheads – 1.75 GPM; kitchen faucets – 2.0 GPM; bathroom faucets – 1.5 GPM	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4.2 LH	Efficient Irrigation If irrigation is necessary, use recycled gray water, roof water, collected site runoff, water from a municipal recycled water system, or a highly efficient irrigation system including all the following: system designed by EPA Water Sense professional; plant beds with a drip irrigation system; separately zoned turf and bedding types; a watering zone timer/controller; moisture sensor controller.	Mandatory <i>(if irrigation is necessary)</i>
			Energy Efficiency		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.1 LH	Efficient Energy Use: New Construction Meet Energy Star standards (single family and low rise residential); exceed ASHRAE 90.1-2004 by 15 percent; California-exceed Title 24 by 15 percent; Oregon, Washington, Idaho and Montana--meet Northwest Energy Star	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.1b	Efficient Energy Use: Moderate and Substantial Rehabilitation Perform an energy analysis of existing building condition, estimate costs of improvements, implement measures that will improve building energy performance by 15 percent from pre-renovation figures.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.2 LH	Energy Star Appliances If providing appliances, install Energy Star clothes washers, dishwashers and refrigerators.	Mandatory <i>(if providing appliances)</i>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.3a	Efficient Lighting: Interior Install the Energy Star Advanced Lighting Package in all interior units and use Energy Star or high-efficiency commercial grade fixtures in all common areas and outdoors.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.3b LH	Efficient Lighting: Exterior Install daylight sensors or timers on all outdoor lighting, including front and rear porch lights in single family homes.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.4	Electricity Meter Install individual or sub-metered electric meters.	Mandatory <i>(see full criteria for exceptions)</i>

YES NO ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

5.5 LH	Additional Reductions in Energy Use Exceed the relevant Energy Star HERS score for low-rise residential buildings or exceed other standards by increased percentages.	Optional (see full criteria)
5.6a LH	Renewable Energy Install PV panels, wind turbines or other renewable energy source to provide at least 10 percent of the project's estimated electricity demand.	15
5.6b LH	Photovoltaic (PV) Ready Site, design, engineer and wire the development to accommodate installation of PV in the future.	2
Materials Beneficial to the Environment		
6.1 LH	Construction Waste Management Develop and implement a construction waste management plan to reduce the amount of material sent to the landfill by at least 25 percent.	5
6.2 LH	Recycled Content Material Use materials with recycled content; provide calculation for recycled content percentage based on cost or value of recycled content in relation to total materials for project. Minimum recycled material must be 5 percent.	14
6.3 LH	Certified, Salvaged and Engineered Wood Commit to using at least 25 percent (by cost) wood products and materials that are salvaged wood, engineered framing materials or certified in accordance with the Forest Stewardship Council.	5
6.4a LH	Water-Permeable Walkways Use water-permeable materials in 50 percent or more of walkways.	5
6.4b LH	Water-Permeable Parking Areas Use water-permeable materials in 50 percent or more of paved parking areas.	5
6.5a LH	Reduce Heat-Island Effect: Roofing Use Energy Star-compliant and high-emissive roofing or install a "green" (vegetated) roof for at least 50 percent of the roof area; or a combination of high-albedo and vegetated roof covering 75 percent of the roof area.	5
6.5b LH	Reduce Heat-Island Effect: Paving Use light-colored, high-albedo materials and/or an open-grid pavement with a minimum Solar Reflective Index of 60 over at least 30 percent of the site's hardscaped area.	5
6.5c LH	Reduce Heat-Island Effect: Plantings Locate trees or other plantings to provide shading for at least 50 percent of sidewalks, patios and driveways within 50 feet of a home.	5
Healthy Living Environment		
7.1 LH	Low / No Volatile Organic Compounds (VOC) Paints and Primers Specify that all interior paints and primers must comply with current Green Seal standards for low-VOC limits.	Mandatory
7.2 LH	Low / No VOC Adhesives and Sealants Specify that all adhesives must comply with Rule 1168 of the South Coast Air Quality Management District. Caulks and sealants must comply with Regulation 8, Rule 51 of the Bay Area Air Quality Management District.	Mandatory
7.3 LH	Urea Formaldehyde-free Composite Wood Use particleboard and MDF that is certified compliant with the ANSI A208.1 and A208.2. If using nonrated composite wood, all exposed edges and sides must be sealed with low-VOC sealants.	Mandatory
7.4 LH	Green Label Certified Floor Coverings Do not install carpets in below grade living spaces, entryways, laundry rooms, bathrooms, kitchens or utility rooms. If using carpet, use the Carpet and Rug Institute's Green Label certified carpet, pad and carpet adhesives.	Mandatory (if providing floor coverings)
7.5a LH	Exhaust Fans – Bathroom: New Construction and Substantial Rehabilitation Install Energy Star-labeled bathroom fans that exhaust to the outdoors and are connected to a light switch and are equipped with a humidistat sensor or timer, <i>or</i> operate continuously.	Mandatory

YES NO ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

7.5b LH	Exhaust Fans – Kitchen: New Construction and Substantial Rehabilitation Install power vented fans or range hoods that exhaust to the exterior.	Mandatory
7.5c	Exhaust Fans – Kitchen: Moderate Rehabilitation Install power vented fans or range hoods that exhaust to the exterior.	5
7.6a LH	Ventilation: Except for Moderate Rehabilitation Install a ventilation system for the dwelling unit, providing adequate fresh air per ASHRAE 62.1-2007 for residential buildings above three stories or ASHRAE 62.2 for single family and low-rise multifamily dwellings.	Mandatory
7.6b	Ventilation: Moderate Rehabilitation Install a ventilation system for the dwelling unit, providing adequate fresh air per ASHRAE 62.1-2007 for residential buildings above three stories or ASHRAE 62.2 for single family and low-rise multifamily dwellings.	10
7.7 LH	HVAC Sizing Size heating and cooling equipment in accordance with the Air Conditioning Contractors of America Manual, Parts J and S, ASHRAE handbooks, or equivalent software.	Mandatory
7.8	Water Heaters: Mold Prevention Use tankless hot water heaters or install conventional hot water heaters in rooms with drains or catch pans with drains piped to the exterior of the dwelling and with non-water sensitive floor coverings.	Mandatory
7.9a	Materials in Wet Areas: Surfaces In wet areas, use materials that have smooth, durable, cleanable surfaces. Do not use mold-propagating materials such as vinyl wallpaper and unsealed grout.	Mandatory
7.9b	Materials in Wet Areas: Tub and Shower Enclosures Use fiberglass or similar enclosure or, if using any form of grouted material, use backing materials such as cement board, fiber cement board or equivalent (i.e., not paper-faced).	Mandatory
7.10a	Basements and Concrete Slabs: Vapor Barrier Provide vapor barrier under all slabs. For concrete floors either in basements or on-grade slab install a capillary break of 4 four inches of gravel over soil. Cover all gravel with 6-millimeter polyethylene sheeting moisture barrier with joints lapped 1 foot or more. On interior below grade walls, avoid using separate vapor barrier or below grade vertical insulation.	Mandatory
7.10b LH	Basements and Concrete Slabs – Radon: New Construction and Substantial Rehabilitation In EPA Zone 1 and 2 areas, install passive radon-resistant features below the slab along with a vertical vent pipe with junction box available, if an active system should prove necessary. For substantial rehab, introduce radon-reduction measures if elevated levels of radon are detected.	Mandatory
7.11	Water Drainage Provide drainage of water to the lowest level of concrete away from windows, walls and foundations.	Mandatory
7.12 LH	Garage Isolation Provide a continuous air barrier between the conditioned (living) space and any unconditioned garage space. In single-family houses with attached garages, install a CO alarm inside the house on the wall that is attached to the garage and outside the sleeping area, and do not install air handling equipment in the garage.	Mandatory
7.13 LH	Clothes Dryer Exhaust Clothes dryers must be exhausted directly to the outdoors.	Mandatory
7.14 LH	Integrated Pest Management Seal all wall, floor and joint penetrations with low-VOC caulking. Provide rodent-proof and corrosion-proof screens (e.g., copper or stainless steel mesh) for large openings.	Mandatory
7.15	Lead-Safe Work Practices: Rehabilitation For properties built before 1978, use lead-safe work practices during renovation, remodeling, painting and demolition.	Mandatory

YES NO ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

7.16	Healthy Flooring Materials: Alternative Sources Use non-vinyl, non-carpet floor coverings in all rooms.	5
7.17	Smoke-free Building Enforce a "no smoking" policy in all common and individual living areas in all buildings. See full criteria for "common area" definition.	2
7.18 LH	Combustion Equipment: Includes Space and Water-Heating Equipment Specify power vented or combustion sealed equipment. Install one hard-wired CO detector for each sleeping area, minimum one per floor.	Mandatory
Operations and Maintenance		
8.1 LH	Building Maintenance Manual Provide a manual that includes the following: a routine maintenance plan; instructions for all appliances, HVAC operation, water-system turnoffs, lighting equipment, paving materials and landscaping, pest control and other systems that are part of each occupancy unit; an occupancy turnover plan that describes the process of educating the tenant about proper use and maintenance of all building systems.	Mandatory
8.2 LH	Occupant's Manual Provide a guide for homeowners and renters that explains the intent, benefits, use and maintenance of green building features, along with the location of transit stops and other neighborhood conveniences, and encourages additional green activities such as recycling, gardening and use of healthy cleaning materials, alternate measures for pest control and purchase of green power.	Mandatory
8.3 LH	Homeowner and New Resident Orientation Provide a walk-through and orientation to the homeowner or new resident using the Occupant Manual from 8-2 above that reviews the building's green features, operations and maintenance along with neighborhood conveniences.	Mandatory



Section 1: Integrated Design

An integrated design process incorporates sustainability up-front, uses a holistic and total-systems approach to the development process, and promotes good health and livability through the building's life cycle. The goal is to establish a written commitment that informs the project's objectives through the building's life cycle.

Sustainable building strategies should be considered from the moment the developer initiates the project. The professional development team should include a developer, architect, engineer, landscape architect, LEED™ Accredited Professional or experienced green building design specialist, contractor, and asset and property management staff. Whenever possible, the team also should include maintenance staff and resident representatives. The team must be committed to environmentally responsive, resource conserving and healthy building principles and practices.

Section 2: Site, Location and Neighborhood Fabric

Location within existing communities – or contiguous to existing development – helps conserve land and the spread of storm water runoff to new watersheds. It also reduces travel distances. Proper site selection avoids development of inappropriate sites and damage to or loss of fragile, scarce environmental resources. The greatest savings come from developing in areas that already have infrastructure and civic amenities. Site selection is also an opportunity to clean up and redevelop brownfields, and restore the land and infill segmented communities.

Compact development encourages more resource-efficient development of land, reduces development costs and conserves energy. It also can contribute to creating more walkable, livable communities, while helping restore, invigorate and sustain livable development patterns. Making the streetscape safer and more inviting for walkers and bicyclists

encourages alternative transportation choices to the automobile. It also promotes physical activity and public health, while creating opportunities for social interaction and increased safety by bringing more eyes on public spaces.

Section 3: Site Improvements

Sustainable design and site planning integrate design and construction strategies to: minimize environmental site impacts; enhance human health; reduce construction costs; maximize energy, water, and natural resource conservation; improve operational efficiencies, and promote alternative transportation.

Section 4: Water Conservation

Water efficiency conserves finite fresh water resources and reduces utility bills. Significant water savings can be realized by specifying and installing water-efficient appliances and plumbing fixtures, implementing low-water landscape and irrigation strategies, and taking advantage of rainwater catchment and graywater sources.

Section 5: Energy Efficiency

Energy efficiency helps to maximize resident comfort and health and reduces utility bills. Conservation measures mitigate the accumulative burdens of energy production and delivery, extraction of non-renewable natural resources, degradation of air quality, global warming and the increasing concentration of pollutants.

Section 6: Materials Beneficial to the Environment

Reducing, reusing and recycling building materials conserve natural resources and reduce emissions associated with manufacturing and transporting raw materials. Many techniques and building products on the market contribute to more durable, healthy and resource-efficient buildings.

Section 7: Healthy Living Environment

The importance of a healthy living environment is a significant green building issue directly affecting residents. Creating a healthy living environment involves the use of materials that do not cause negative health impacts for residents or workers, especially for more sensitive groups such as children, seniors and individuals with existing respiratory problems and compromised immune systems.

Section 8: Operations and Maintenance

Operations and maintenance (O&M) practices impact the building owner's costs and residents' health, comfort and safety. Sustainable building O&M practices enhance resident health and operational savings. The key to successful building performance is the integration of O&M plans, education and cost-effective, low-maintenance design.

Section 1: Integrated Design

1-1	Green Development Plan
LH	MANDATORY

How

Submit a Green Development Plan that outlines the integrated design approach used for this development that demonstrates involvement of the entire development team. See the Green Development Plan template included in Appendix A or download the template at www.greencommunitiesonline.org/tools/funding/grants/charrette.asp#template.

The plan must provide the following:

- The name and role of each member of the professional design and development team
- A statement of the overall green development goals of the project and the expected intended outcomes from addressing those goals
- A description of the process that was used to select the green building strategies, systems and materials that will be incorporated into the project
- A description of how each of the mandatory and optional items will be included in the project
- Identification of which members of the design and development team are responsible for implementing the green features
- A description of follow-up measures to be taken through the completion of design, permitting, construction and operation to ensure that the green features are included and correctly installed, and that the owners or tenants receive information about the function and operation of the features

The plan must include meeting minutes or another type of documentation that captures and summarizes components of the integrated design process that have been completed at the time of application.

Indicate whether this is the first time the developer has completed a project with green features. If so, explain why the developer wants to incorporate them in this project. If this is not the first green project, the plan must include a written statement on how the integrated design approach taken for this project compares to

approaches taken for previous affordable housing designed and developed by members of the project team.

Intent

An integrated design process incorporates sustainability from the outset and connects the design to the regional climatic conditions. It takes into consideration the existing community context, and uses a holistic and total-systems approach to the development process, promoting good health and livability through the building's (or development's) life cycle. The benefits of an integrated design process can include substantially lower development costs and greater health, economic and environmental benefits for residents, property owners and communities.

It is important that the development and property management teams are committed to a written plan that they can refer to throughout the development process. This plan will continue to inform the green objectives for the project throughout its life cycle.

Things to Consider

- Projects that achieve this measure also meet the requirements for LEED for Homes credit ID 1.4 - "Design Charrette," worth 1 point toward LEED certification. Projects also may fulfill credit ID 1.2 "Integrated Project Team," worth 1 point toward LEED certification. If pursuing ID 1.2 toward LEED certification, the project team must be assembled and involved to meet three basic requirements:
 - Team members must include at least three major skill sets (as listed in the LEED for Homes Rating System).
 - All team members must be included in at least three phases of the home design and construction process.
 - Project team must conduct meetings on at least a monthly basis to review project status, responsibilities, next steps, etc.

- Enterprise offers a variety of resources to support the integrated design process. Information is available at www.greencommunitiesonline.org/tools/funding/grants/charrette.asp.
 - Conduct a green design charrette with the full development team, including professionals with expertise in the following:
 - Architecture or residential building design
 - Mechanical or energy engineering
 - Building science or performance testing
 - Green building or sustainable design
 - Civil engineering, landscape architecture, habitat restoration or land-use planning
 - Neighborhood Design Guidelines
 - Douglas Farr, *Sustainable Urbanism: Urban Design with Nature*, Hoboken: John Wiley & Sons, 2008;
 - Reid Ewing, *Best Development Practices*, Chicago: American Planning Association, 1995
 - Peter Calthorpe, *The Next American Metropolis*, New York: Princeton Architectural Press, 1993.
- These three books are full of practical guidelines for design and placement of development into a neighborhood fabric that is supportive of environmental sustainability.
- Whole Building Design Guide: www.wbdg.org/wbdg_approach.php.
This website describes the core elements of “whole building design,” which includes the combination of an integrated design approach and an integrated team process. This site helps users identify design objectives and organize their processes to meet those objectives.
 - Consider developing a durability plan. Refer to LEED for Homes ID 2: Durability Management Process to think through the development and implementation of a durability plan. This will promote the increased service life of the building envelope and its components and systems through appropriate design, materials and installation.



Section 2: Site, Location and Neighborhood Fabric

2-1a LH	Smart Site Location– Proximity to Existing Development: New Construction MANDATORY <i>Except for infill or rehabilitation projects.</i>
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How

Provide site map demonstrating that the development is located on a site with access to existing roads, water, sewers and other infrastructure within or contiguous (having at least 25 percent of the perimeter bordering) to existing development. Do not build on tracts of land that require installing a septic tank or a sanitary sewer line extension of 1,000 feet or greater from the property line of the tract being developed, or within critical potable watershed areas.

An infill site, which is exempt from 2-1, is a site that has 75 percent of its perimeter bordering existing development or roads and has access to existing infrastructure.

Intent

Location within existing communities, within or contiguous to existing development, helps conserve land and the spread of storm water runoff to new watersheds. It also reduces travel distances. Proper site selection avoids

development of inappropriate sites and damage to or loss of fragile, scarce environmental resources. The greatest savings come from developing in areas that already have infrastructure and civic amenities. Site selection is also an opportunity to clean up and redevelop brownfields and to fill in gaps within the built environment.

Things to Consider

Projects that achieve this measure also meet the requirements for LEED for Homes credit LL 3.1 “Edge Development,” worth 1 point toward LEED certification, and should also be eligible for points under credit LL 4 “Infrastructure.” Also, projects may be eligible for 1 point under credit LL 3.3 “Previously Developed,” if the project is built on a previously developed lot. And infill developments may be able to achieve credit LL 3.2 “Infill,” if at least 75 percent of the perimeter immediately borders previously developed land. LL 3.2 is worth 2 points toward LEED certification.

2-1b LH	Smart Site Location– Protecting Environmental Resources: New Construction MANDATORY <i>Except for infill sites or rehabilitation projects.</i>
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How

Do not locate new development, including buildings, built structures, roads or other parking areas, on portions of sites that meet any of the following:

- Land within 100 feet of wetlands, including isolated wetlands or streams. Maintain or establish riparian buffer using native vegetation where possible. Bike and foot paths are allowed if at least 25 feet from the wetlands boundary.

- Land within 100 feet of critical slope area
- Prime farmland
- Public parkland
- Land that is specifically identified as habitat for any species on federal or state threatened or endangered lists
- Land with elevation at or below the 100-year floodplain

An infill site, which is exempt from 2-1, is a

site that has 75 percent of its perimeter bordering existing development or roads and has access to existing infrastructure.

Intent

Proper site selection avoids development of inappropriate sites, and damage to or loss of fragile and scarce environmental resources.

Definitions

- Wetlands are defined by the U.S. Code of Federal Regulations, 40 CFR, Parts 230-233 and Part 22. New wetlands constructed as part of stormwater mitigation or other site restoration efforts are exempt from this part of the requirement.
- Critical slope area is an area within a tract of land that has a greater than 15 percent change in elevation or an erodability factor of greater than 0.4 as determined by the Natural Resources Conservation Service of the USDA.
- Prime farmland is defined here as land that contains prime soils, unique soils, or soils of state significance as identified in state Natural Resources Conservation Service soil surveys. Sites that are previously developed are exempt from this requirement.
- Critical habitat is an area that the U.S. Fish and Wildlife Service or a state or tribal authority designates as occupied by a threatened or endangered species, or essential to the conservation of a threatened or endangered species. See, for example, Endangered Species Act, 16 U.S.C. 1523(5).
- The “100-year floodplain” is defined by FEMA in the Agency’s national flood information map.

Things to Consider

- Projects that achieve this measure also meet the requirements for LEED for Homes credit LL 2, “Site Selection,” worth 2 points toward LEED certification.
- Protect existing trees. The Home Depot Foundation encourages programs that create or expand partnerships between community tree organizations and those focused on other areas of community development, such as affordable housing and programs that provide volunteer opportunities. See www.homedepotfoundation.org/support_trees.html.
- Protect habitat of potential endangered species. Use state and local lists to identify these habitats.
- U.S. Department of Energy, Building Technologies Program: www.eere.energy.gov/buildings/info/design/buildingsiting/index.html. This website addresses siting topics such as rehabilitation or infill versus undeveloped site, site planning, design to minimize impacts to site, parking and pavement, exterior water management and water efficiency.
- U.S. Department of Agriculture, Natural Resources Conservation Service’s Web Soil Survey: websoilsurvey.nrcs.usda.gov/app/.
- Digital Q3 Flood Data Availability, States Map, Federal Emergency Management Agency (FEMA), FEMA’s national flood information maps: msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogId=10001&langId=-1&content=productQ3Map&title=Q3%20Availability%20-%20State%20Map&parent=productInfo&parentTitle=Product%20Information

2-1c LH	Smart Site Location – Proximity to Services: New Construction MANDATORY <i>Except for infill or rehabilitation projects.</i>
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How

Provide a location map with exact distances indicating that the project is located within one-quarter mile of at least two, or one-half mile of at least four, of the following facilities: adequate (see definition below) public transportation, supermarket, public school, library, licensed child care center, usable park space,

bank, medical or dental office, post office, convenience store, laundry/dry cleaner, pharmacy, place of worship, community or civic center that is accessible to residents.

An infill site, which is exempt from 2-1, is a site that has 75 percent of its perimeter bordering existing development or roads and has access to existing infrastructure.

Intent

Locating projects in communities with services strengthens those communities and residents' ties to society. It also prevents leapfrog development, which carries numerous negative consequences, including fragmented ecosystems, the spread of polluted runoff to new watersheds, strain on municipal budgets that must stretch to accommodate longer service routes and infrastructure lines, and damage to landscapes that nourish the connection between humans and the natural world.

Pedestrian- and transit-oriented neighborhoods inspire smaller streets and less land relegated to the automobile, creating a more livable, efficient community. These neighborhoods offer residents a range of services, parks and employment opportunities within walking and biking distance. They also offer opportunities for a healthier quality of life while lowering residents' dependence on cars, thereby reducing the costs of owning a car and the need for garages and other parking areas.

Definitions

Adequate transportation means bus stops within one-quarter mile and rail or ferry within one-half mile radius of the development. Adequate bus service during peak periods is defined as 30 or more transit rides per weekday. Adequate fixed rail or ferry service is defined as at least hourly service during the periods of 6-9:30 a.m. and 3:30-7 p.m.

2-2 Compact Development: New Construction

MANDATORY *Except for rehabilitation projects.*

How

The project architect must complete the density calculation as defined below and certify its correctness. The minimum net density for new construction must be:

- Six units per acre for detached or semi-detached houses
- 10 for townhomes
- 15 for apartments

Net density is measured by taking the total dwelling units after construction, divided by the acreage of the entire tract down to one decimal point, minus

Things to Consider

- This criterion can help projects meet one of the requirements for LEED for Homes credit LL 5.1 "Basic Community Resources" worth 1 point toward LEED certification, if the project is located within one-half mile of transit services that offer 30 or more transit rides per weekday (combined bus, rail, and ferry). Alternatively, this point can be achieved by projects located within one-quarter mile from four community resources or one-half mile from seven community resources. Additional points toward LEED certification are available for locating a project proximate to community resources or public transportation under LL 5.
- Safe Routes to School National Partnership: www.saferoutespartnership.org/home.

The Safe Routes to School National Partnership is a network of more than 300 nonprofit organizations, government agencies, schools and professionals working together to advance the Safe Routes to School (SRTS) movement in the United States. SRTS can provide a variety of important benefits to children and their communities, including increasing physical activity, reducing traffic congestion, improving air quality and enhancing neighborhood safety.

dedicated acreage of public street rights of way, riparian and wetland buffers, and open space that has been dedicated through a conservation program.

Intent

Compact development encourages more resource-efficient development of land, reduces development costs and conserves energy. It also can contribute to creating more walkable communities, while helping restore, invigorate and sustain livable development patterns.

Things to Consider

- LEED for Homes SS 6, “Compact Development,” rewards 2 points for projects with an average density of seven or more dwelling units per acre, 3 points for an average density of 10 or more units per acre and 4 points for an average density of 20 or more units per acre.
- Congress for New Urbanism: www.cnu.org. This nonprofit organization provides tools and resources for promoting walkable, neighborhood-based development as an alternative to sprawl.
- Smart Growth Network: www.smartgrowth.org.

This website outlines smart growth principles, provides a guide through smart growth terms and technical concepts, and hosts a searchable catalogue of reports, websites, tools and case studies dating from 1997 to today.

- Urban Land Institute: www.washington.uli.org. The Urban Land Institute is a nonprofit organization based in Washington, D.C., that promotes the responsible use of land to enhance the total environment. ULI’s online bookstore includes numerous publications regarding compact and higher-density development.

2-3 Walkable Neighborhoods: Sidewalks and Pathways

MANDATORY

How

Connect the project to the pedestrian grid. Provide a site map indicating that sidewalks or other all-weather pathways exist or were created within a multifamily property or single-family subdivision to link the residential development to public spaces, open spaces and adjacent development. Projects whose building entrances open directly onto a public sidewalk meet this requirement.

Intent

Making the streetscape safer and more inviting for walkers and bicyclists encourages alternative transportation choices to the automobile. It also

promotes physical activity and public health, while creating opportunities for social interaction and increased safety by bringing more eyes on public spaces.

Things to Consider

- Use porous pavement for sidewalks and other paved surfaces to reduce storm-water runoff and the distribution of pollutants to streams, rivers and water bodies. Design sidewalks to distribute storm water to open space for recharge and to prevent flooding.
- Unimproved dirt pathways do not qualify as “all-weather” walking facilities.

2-4a Smart Site Location – Passive Solar Heating / Cooling

LH

OPTIONAL *2 or 4 points, depending on whether all or the maximum extent feasible of the buildings are oriented for passive solar heating and cooling.*

How

Orient building to make the greatest use of passive solar heating and cooling.

- Elongate building on an east-west axis. The east-west axis of the building should be within 15 degrees of due east-west.
- The glazing area on the north- and south-facing walls of the building should be at least 50 percent greater than the sum of the glazing area on the east- and west- facing walls.
- The roof should have a minimum of 450 square

feet of south-facing area that is oriented appropriately for solar applications.

- At least 90 percent of the glazing on the south-facing wall should be completely shaded (using shading, overhangs, etc.) at noon on June 21 and unshaded at noon on Dec. 21.

Two points may be awarded if the applicant is able to orient the buildings as required above to the maximum extent feasible based on site constraints.

Intent

Solar energy is a radiant heat source that yields

natural processes on which all life depends. Some of the natural processes can be managed through building design to help heat and cool the building. The basic natural processes used in passive solar energy are the thermal energy flows associated with radiation, conduction and natural convection. When sunlight strikes a building, the building materials can reflect, transmit or absorb the solar radiation. Additionally, the heat produced by the sun causes air movement that can be predictable in designed spaces. These basic responses to solar heat lead to design elements, material choices and placements that can provide heating and cooling effects in a home. Passive solar energy means that mechanical means are not employed to utilize solar energy.

Things to Consider

- Projects that achieve this measure meet the requirements for LEED for Homes credit ID 1.5, “Building Orientation for Solar Design,” worth 1 point toward LEED certification.
- Interior spaces requiring the most light, heating and cooling should be along the south face of the building.

- A narrow floor plate (less than 40 feet), single-loaded corridors and an open floor plan optimize daylight penetration and passive ventilation.
- Shading through overhangs and canopies on the south and trees on the west prevent the summer sun from entering the interior.
- U.S. Department of Energy, Building Technologies Program: www.eere.energy.gov/buildings/info/design/integratedbuilding/passive.html. A part of the department’s “Building Toolbox,” this site includes tips and techniques for passive solar heating, passive solar cooling, thermal storage and daylighting.
- Passive Solar Design for the Home, U.S. Department of Energy Office of Energy Efficiency and Renewable Energy. Report # DOE/GO-102001-1105. February, 2001. Available from the U.S. Office of Scientific and Technical Information (www.osti.gov) or online at www.nrel.gov/docs/fy01osti/27954.pdf.

2-4b LH	Smart Site Location: Grayfield, Brownfield or Adaptive Reuse Site OPTIONAL 10 points
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How

Locate the project on a grayfield, brownfield or adaptive reuse site.

Intent

Use of previously developed sites, including those where development is complicated by real or perceived environmental contamination or physical constraints, reduces pressure on undeveloped land and the spread of pavement to new watersheds. Many such sites are otherwise prime locations for redevelopment and provide potential economic and location benefits to citizens, neighborhoods and regions. Reuse of existing structures reduces the need for new materials and utilizes embodied energy.

Definitions

- Grayfields are previously developed abandoned sites such as parking lots, obsolete shopping centers and dilapidated residential structures scheduled to be deconstructed or demolished.

- Brownfields require a Phase II Environmental Site Assessment and remediation plan.
- An adaptive reuse site is one that was previously developed for non-residential purposes in which at least 25 percent of the proposed development will reuse existing non-residential structures.

Things to Consider

- Projects that achieve this measure also meet the requirement under LEED for Homes credit LL 3.3, “Previously Developed,” worth 1 point toward LEED certification.
- U.S. Environmental Protection Agency, Brownfields Cleanup and Redevelopment: www.epa.gov/brownfields/index.html. On this site, you can find information about EPA’s Brownfields Program, including the Brownfields Law, EPA Brownfields Grants, technical tools and resources and information on brownfield projects across the county.

- Municipal Research and Services Center of Washington, Infill Development Strategies for Shaping Livable Neighborhoods: www.mrsc.org/Publications/textfill.aspx.
This site, sponsored by the state of Washington, contains an overview of strategies for encouraging and implementing infill development patterns. The principal audience is policymakers and developers in Washington, but the insights are broadly applicable.
- Congress of New Urbanism, Grayfields into

Goldfields: Dead Malls Become Living Neighborhoods: www.cnu.org/malls.
This website contains a 2002 study on the opportunity for converting dead shopping malls into new neighborhoods.

- National Vacant Properties Campaign: www.vacantproperties.org.
This website provides information, resources, tools and assistance to support vacant property revitalization efforts.

2-5 LH	Compact Development OPTIONAL <i>5 points for an increase of at least five units per acre for multifamily buildings, at least two per acre for town homes and at least one unit per acre for single-family houses.</i>
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How

Calculate density as defined under 2-2 – Compact Development – and increase average minimum density for new construction to meet or exceed the following guidelines:

- 7 units per acre for detached or semi-detached
- 12 units per acre for town homes
- 20 units per acre for apartments

Intent

Compact development encourages more resource-efficient development of land, reduces development costs and conserves energy. It also can contribute to creating more walkable communities while helping restore, invigorate and sustain livable development patterns.

Things to Consider

- Projects that achieve this measure also meet the requirement under LEED for Homes SS 6 “Compact Development.” Points toward LEED

certification are awarded depending on the density of the development, with 2 points available for seven or more units per acre, 3 points available for 10 or more units per acre or 4 points for 20 or more units per acre.

- Congress for New Urbanism: www.cnu.org.
This nonprofit organization provides tools and resources for promoting walkable, neighborhood-based development as an alternative to sprawl.
- Smart Growth Network: www.smartgrowth.org.
This website outlines smart growth principles, provides a guide through smart growth terms and technical concepts, and hosts a searchable catalogue of reports, websites, tools, and case studies dating from 1997 to today.
- Urban Land Institute: www.washington.uli.org.
The Urban Land Institute is a nonprofit organization based in Washington, D.C., that promotes the responsible use of land to enhance the total environment. ULI’s online bookstore includes numerous publications regarding compact and higher-density development.

2-6	Walkable Neighborhoods: Connections to Surrounding Neighborhood OPTIONAL <i>5 points</i>
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How

Provide a site map demonstrating at least three separate connections (excluding entrances / exits from a single building) to sidewalks or all-weather pathways in surrounding neighborhoods.

Intent

Providing easy access to sidewalks or other all-weather pathways promotes walking, biking and other healthy lifestyles. Walkable neighborhoods reduce dependence on automobile travel and possibly automobile ownership while reducing auto-related emissions.

Things to Consider

- Integrate pedestrian and bicycle connections from the new development to the surrounding neighborhoods through sidewalks, bike lanes or paths.
- Consider using porous pavement for sidewalks and other paved surfaces to reduce storm-water runoff and the distribution of pollutants to streams, rivers and other water bodies. Design sidewalks to distribute storm water to open space for recharge and to eliminate flooding.
- Where possible, wait until development is occupied before laying out paved pathways/sidewalks from the development to the surrounding neighborhood. Build the pathways/sidewalks where there is visible evidence of pedestrian and bicycle use.

2-7 LH	Transportation Choices OPTIONAL <i>6 or 12 points</i>
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How

Provide a context map demonstrating that the site is within one-quarter mile radius of adequate bus service (see definition below), or one-half mile radius from adequate fixed rail or ferry station (see definitions below). Site qualifies for 6 points

If it can be shown that the site is within one-half mile of combined transit services (bus, rail and ferry) constituting 60 or more transit rides per weekday, it qualifies for 12 points.

Intent

Encouraging the use of public transportation minimizes dependence on car ownership.

Transit-oriented neighborhoods reduce residents' needs to own a car, eliminating or lowering the costs of auto ownership and controlling the area needed for car use and storage. Transit use reduces related emissions of air pollutants and climate-change gasses.

Definitions

Adequate bus service during peak periods is defined as 30 or more transit rides per weekday per qualifying bus line. Adequate fixed rail or ferry service is defined as at least hourly service during the periods of 6-9:30 a.m. and 3:30-7 p.m.

Things to Consider

- Projects that achieve these measures meet the requirement for LEED for Homes credit LL 5.1 "Basic Community Resources" worth up to 2 points toward LEED certification. Additional points toward LEED certification are available for projects that have greater frequency of transit rides available (more than 60 per weekday); see the LEED for Homes Rating System for additional information.
- Reconnecting America: www.reconnectingamerica.org.
Reconnecting America provides both the public and private sectors with an impartial, fact-based perspective on development-oriented transit and transit-oriented development, and seeks to reinvent the planning and delivery system for building regions and communities around transit and walking rather than solely around the automobile.
- Victoria Transportation Policy Institute: www.vtpi.org. This independent research organization provides consulting and publicly available research about solutions to emerging transportation issues, such as transportation demand management.



Section 3: Site Improvements

3-1 Environmental Remediation

MANDATORY

How

Conduct a Phase I Environmental Site Assessment and additional assessments required to determine whether any hazardous materials are onsite. Indicate which of the following has been or will be used: ASTM Transaction Screen, Phase I Environmental Site Assessment or Phase II Abatement Plan.

Intent

A Phase I Site Assessment is an investigation of the site's conditions, often performed before purchase of the property to satisfy the due-diligence requirements of a property transaction. The site assessment helps to assess potential environmental liabilities associated with real property acquisition and ownership.

3-2 Erosion and Sedimentation Control

LH MANDATORY

How

Implement EPA's Best Management Practices for erosion and sedimentation control during construction, referring to the EPA document, Storm Water Management for Construction Activities (EPA 832-R-92-005).

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

Intent

Erosion and sedimentation control during site development keeps valuable top soil onsite and reduces pollution, storm-water runoff and sediment runoff associated with construction activities into local waterways. Compacted soils resulting from construction are less able to absorb water, resist plant root penetration and lack the porosity needed for adequate aeration. Erosion and sedimentation control helps to avoid storm-water-related problems that can delay construction, cause environmental degradation (to creeks, streams and coastal waters) and damage public and private properties downstream.

Things to Consider

- Projects that achieve this measure also meet the requirement for LEED for Homes prerequisite SS 1.1, "Erosion Controls During Construction," which is a mandatory requirement for LEED certification.
- Consider opting for one of the following methods – phasing, seeding, grading, protecting on-site vegetation, directing runoff to on-site depressions or swales – instead of using silt

fencing. Additionally, the measures that are employed should result in no visible off-site discharge.

- The EPA's document, Storm Water Management for Construction Activities, may be purchased as item PB 922 359 51 from the National Technical Information Service at yosemite.epa.gov/water/owrccatalog.nsf.
- CPESC Inc.: www.cpesc.net. Search the directory on this website to find certified erosion and sedimentation control professionals in your state.
- EPA Erosion and Sediment Control Model Ordinances: www.epa.gov/owow/nps/ordinance/erosion.htm.
This resource, developed by the Environmental

Protection Agency, is geared toward helping municipalities draft ordinances for erosion and sedimentation control and might serve as a helpful tool in developing company policies for meeting the SS 1.1 prerequisite.

- Vermont Department of Environmental Conservation, Water Quality Division: www.vtwaterquality.org/stormwater/docs/construction/sw_low_risk_site_handbook.pdf.

This website links to the Low Risk Site Handbook for Erosion Prevention and Sediment Control, an easy-to-follow guide that describes specific strategies, including diagrams and photos.

3-3 LH	Landscaping MANDATORY <i>If providing landscaping.</i>
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How

Commit to providing a tree or plant list, to be certified by the Architect or Landscape Architect at Construction Documents stage, that the selection of new trees and plants are at least 50 percent native species, 100 percent appropriate to the site's soil and microclimate, and do not include invasive species.

Intent

Native vegetation is well adapted to the climate and provides excellent erosion, sediment, dust and pollution control. Native plants are also more resistant to naturally occurring disease, insects and low levels of nutrients, thereby reducing the need for fertilizers, pesticides or herbicides. (In areas where water shortages are common, xeriscape (a landscaping method that uses drought-resistant plants to conserve resources, especially water) should be considered.

Things to Consider

- The requirement of this measure that projects "...not include invasive species" also meets the requirement of LEED for Homes prerequisite SS 2.1, "No Invasive Plants," which is a mandatory requirement for LEED certification. Additionally, projects may be eligible for points under SS 2.2 – 2.4, which award projects for employing principles of basic sustainable landscape design, limiting conventional turf and using drought-tolerant plants.

- Consult a local arborist and involve a landscape architect in the architectural design process to identify appropriate areas for landscaping and energy savings.
- Combine landscape plan with storm-water management to provide surface water filtration and aesthetic benefits.
- Non-native turf needs about 35 inches of water per year to thrive, whereas native turf needs much less water per year.
- While turf is appropriate for some landscaping, such as for play areas, they should be minimized wherever possible, except in climates where they need no irrigation.
- In areas where water shortages are common, xeriscape (a landscaping method that uses drought-resistant plants to conserve resources, especially water) should be employed.
- Lists of local drought-tolerant plants and grasses are available from local USDA Agricultural Cooperative Extension Service offices, as well as through numerous internet resources. To find local Extension Service offices, go to www.csrees.usda.gov/Extension/index.html.
- Lady Bird Johnson Wildlife Center: www.wildflower.org.
The center, located in Austin, Texas, has the mission of educating people about the environmental necessity,

economic value and natural beauty of native plants. The website offers a number of resources, including a nationwide native plant information network and a national supplier's directory.

- National Invasive Species Information Center: www.invasivespeciesinfo.gov/plants/main.shtml. As part of the USDA's National Agricultural Library, NISIC serves as a reference gateway to information, organizations, and services about invasive species.

- U.S. Forest Service "Celebrating Wildflowers:" www.fs.fed.us/wildflowers/nativegardening/instructions.shtml.

A site hosted by the U.S. Forest Service has extensive information on native gardening, selecting appropriate native plants, invasive plant species, and basic instructions for restoration and native landscaping projects.

3-4 Surface Water Management

LH OPTIONAL 5 Points

How

Capture, retain, infiltrate and/or harvest the first one-half inch of rainfall in a 24-hour period.

Intent

Reducing storm-water runoff through design and management techniques increases onsite filtration, prevents pollutants from entering waterways and reduces soil erosion. Water storage and nutrient collection processes reduce the need for irrigation and contribute to forming a healthier ecological community within the landscape.

Things to Consider

- Projects achieving this measure also may satisfy

the requirements of LEED for Homes SS 4.3, "Management of Runoff from Roof" and/or WE 1.1, "Rainwater Harvesting System." See the LEED for Homes Rating System for the specific requirements.

- Check with state and local governments to verify that capture of rainwater is permitted.
- Make use of innovative, low-impact techniques such as rain gardens, green roofs, rain barrels and cisterns to capture and re-use storm water.
- Minimize impervious areas (surfaces that do not allow storm-water infiltration), including roofs, driveways, sidewalks and streets, or use porous materials for such areas.

3-5 Storm Drain Labels

OPTIONAL 2 points

How

Assure the project plans and specifications call for labeling of all storm drains or storm inlets to clearly indicate where the drain or inlet leads.

Intent

Provide a visual reminder that storm sewer inlets connect to area waterways and groundwater storages and should not be used to dump garbage of any kind.

Things to Consider

- Use a simple painted stencil that reads: "Caution – leads to [name of body of water]!"
- New Jersey Department of Environmental Protection, Storm Drain Labeling Guidelines for New Jersey: www.state.nj.us/dep/watershedmgt/DOCS/StormDrainLabeling.pdf.



Section 4: Water Conservation

4-1a Water-Conserving Appliances and Fixtures: New Construction

LH MANDATORY

How

Install water-conserving fixtures with the following specifications:

- Toilets – 1.3 GPF (gallons per flush) or better including dual-flush toilets and pressure-assisted toilets
- Showerheads – 2.0 GPM (gallons per minute) or better
- Kitchen faucets – 2.0 GPM or better
- Bathroom faucets – 2.0 GPM or better

Intent

Showers and faucets account for approximately 25 percent of indoor water use. Toilets account for approximately 20 percent of indoor water use. Saving water translates into utility savings, both by conserving water and reducing the energy required for water heating. Compared with pre-1992 fixtures, water-conserving fixtures can reduce the amount of water used in showers and sinks by 75 percent and 50 percent, respectively.

Things to Consider

- Projects achieving this measure will also be eligible for 3 points toward LEED certification under LEED for Homes credit WE 3.1 “High Efficiency Fixtures and Fittings” for efficient showerheads and faucets. Additionally, points for very high efficiency fixtures and fittings are available under WE 3.2.
- Not all high-efficiency toilets operate equally well, and poor design can lead to ineffective flushing. The U.S. Environmental Protection Agency’s WaterSense program certifies toilets that achieve both water

efficiency and operational effectiveness. The WaterSense label identifies high-efficiency products that have been verified for performance. WaterSense currently has a specification for high-efficiency toilets and bathroom faucets and specification for showerheads is under development. Information is available at www.epa.gov/owm/water-efficiency.

- Maximum Performance (MaP™) TESTING California Urban Water Conservation Council: www.cuwcc.org/maptesting.lasso.

The Maximum Performance testing project was initiated in 2003 to test toilet models’ performance. This testing protocol simulates real-world use to help consumers identify high-efficiency toilets that not only save water but also work well. The current MaP testing report provides performance information on 470 toilet models. This site provides access to the complete listings of the tested toilets.

- Composting Toilet Reviews: www.buildinggreen.com/features/mr/waste.html.

An Environmental Building News article discusses commercial composting toilets.

- Water Use It Wisely: www.wateruseitwisely.com/toolsLinks/index.shtml. This site provides extensive lists of links and related resources concerning water conservation in addition to a series of links to plumbing fixture and faucet resources and sites. Scroll down to the “Fixtures and Appliances” section of links and resources.

4-1b LH	Water-Conserving Appliances and Fixtures: For moderate Rehabilitation MANDATORY
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How

Install water-conserving fixtures with the following specifications for toilets and shower heads and follow requirements for other fixtures wherever and whenever they are replaced:

- Toilets – 1.3 GPF (gallons per flush) or better including dual-flush toilets and pressure-assisted toilets
- Showerheads – 2.0 GPM (gallons per minute) or better
- Kitchen faucets – 2.0 GPM or better
- Bathroom faucets – 2.0 GPM or better

Intent

Showers and faucets account for approximately 25 percent of indoor water use. Toilets account for approximately 20 percent of indoor water use. Saving water translates into utility savings, both by conserving water and reducing the energy required for water heating. Compared with pre-1992 fixtures, water-conserving fixtures can reduce the amount of water used in showers and sinks by 75 percent and 50 percent, respectively.

Things to consider

- Projects achieving this measure will also be eligible for 2 points toward LEED certification under LEED for Homes credit WE 3.1 “High Efficiency Fixtures and Fittings” for efficient showerheads and faucets. Additionally, points for very high efficiency fixtures and fittings are available under WE 3.2.
- Not all high-efficiency toilets operate equally well, and poor design can lead to ineffective flushing. The

U.S. Environmental Protection Agency’s WaterSense program certifies toilets that achieve both water efficiency and operational effectiveness. The WaterSense label identifies high-efficiency products that have been verified for performance. WaterSense currently has a specification for high-efficiency toilets and bathroom faucets and specification for showerheads is under development. Information is available at www.epa.gov/owm/water-efficiency.

- **Maximum Performance (MaP™) TESTING**
California Urban Water Conservation Council: www.cuwcc.org/maptesting.lasso. MaP™ testing project was initiated in 2003 to test toilet models’ performance. This testing protocol simulates real-world use to help consumers identify high-efficiency toilets that not only save water but also work well. The current MaP testing report provides performance information on 470 toilet models. This site provides access to the complete listings of the tested toilets.
- **Composting Toilet Reviews:** www.buildinggreen.com/features/mr/waste.html.
An Environmental Building News article discusses commercial composting toilets.
- **Water Use It Wisely:** www.wateruseitwisely.com/toolsLinks/index.shtml.
This site provides extensive lists of links and related resources concerning water conservation in addition to a series of links to plumbing fixture and faucet resources and sites. Scroll down to the “Fixtures and Appliances” section of links and resources.

4-1c LH	Water-Conserving Appliances and Fixtures OPTIONAL 5 points
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How

Install water-conserving fixtures with the following specifications:

- Toilets – 1.1 GPF (gallons per flush) or better
- Showerheads – 1.75 GPM (gallons per minute) or better

- Kitchen faucets – 2.0 GPM or better
- Bathroom faucets – 1.5 GPM or better

Intent

Showers and faucets account for approximately 25 percent of indoor water use. Toilets account for

approximately 20 percent of indoor water use. Saving water translates into utility savings, both by conserving water and reducing the energy required for water heating. Compared with pre-1992 fixtures, water-conserving fixtures can reduce the amount of water used in showers and sinks by 75 percent and 50 percent, respectively.

Things to consider

- Projects achieving the requirements of this measure may be eligible for points toward LEED certification under LEED for Homes credit WE 3.2 “Very High Efficiency Fixtures and Fittings.”
- Not all high-efficiency toilets operate equally well, and poor design can lead to ineffective flushing and the need for multiple flushes. The U.S. Environmental Protection Agency’s WaterSense program certifies toilets that achieve both water efficiency and operational effectiveness. The WaterSense label identifies high-efficiency products that have been verified for performance. WaterSense currently has a specification for high-efficiency toilets and bathroom faucets and specification for showerheads is under development. Information is available at www.epa.gov/owm/water-efficiency.

- Maximum Performance (MaP™) Testing California Urban Water Conservation Council: www.cuwcc.org/maptesting.lasso.

MaP™ testing project was initiated in 2003 to test toilet models’ performance. This testing protocol simulates real-world use to help consumers identify high-efficiency toilets that not only save water but also work well. The current MaP testing report provides performance information on 470 toilet models. This site provides access to the complete listings of the tested toilets.

- Composting Toilet Reviews: www.buildinggreen.com/features/mr/waste.html. An Environmental Building News article discusses commercial composting toilets.

- Water Use It Wisely: www.wateruseitwisely.com/toolsLinks/index.shtml.

This site provides extensive lists of links and related resources concerning water conservation in addition to a series of links to plumbing fixture and faucet resources and sites. Scroll down to the “Fixtures and Appliances” section of links and resources.

4-2 Efficient Irrigation

LH MANDATORY *If irrigation is necessary.*

How

If irrigation is necessary, use recycled gray water, roof water, collected site runoff, water from a municipal recycled water system or a highly efficient irrigation system including at least the following requirements:

- Install irrigation system designed by an EPA Water Sense certified professional or qualified landscape professional.
- At least 50 percent of landscape planting beds have a drip irrigation system to minimize evaporation.
- Turf and each type of bedding area (based on watering needs) should be separately zoned.
- A timer/controller that activates the valves for each watering zone at the best time of day to minimize evaporative losses while maintaining healthy plants and obeying local regulations and water-use guidance.

- Install a moisture sensor controller or rain delay controller.
- Watering tubes for trees are allowed for a grace period of two years.

Intent

On average, outdoor water use accounts for about 40 percent of residential water use. Native landscapes or carefully selected plantings can tolerate no irrigation once they have been established, even in dry periods. Accurate delivery of water reduces evaporation and eliminates overspray. Proper scheduling eliminates wet/dry fluctuations that stress plants.

Things to Consider

- Projects achieving the requirements of this measure for a high efficiency irrigation system may be eligible for up to 3 points toward LEED

certification under LEED for Homes credit WE 2.1 “High Efficiency Irrigation System.”

- Design and install irrigation system with head-to-head coverage.
- Install a central shut-off meter.
- Install a sub-meter for the irrigation system.
- Pressure regulating devices to maintain optimal pressure.
- Utilize high-efficiency nozzles with an average Distribution Uniformity (DU) of at least 0.70. This may include conventional rotors, multi-stream rotors, or high efficiency spray heads, but the DU must be verified by manufacturer documentation or third-party tests.
- Check valves in heads.
- American Society of Landscape Architects: www.asla.org.

ASLA is the national professional association representing landscape architects. The website provides information about members, products, services, publications and events.

- International Center for Water Technology: www.icwt.net.

The International Center for Water Technology is a consortium of public and private entities, led by the efforts of California State University – Fresno.

This website includes research papers and educational materials about cutting-edge progress in water-saving technologies.

- U.S. EPA WaterSenseSM: Efficiency Made Easy: www.epa.gov/owm/water-efficiency/pp/irrprof.htm.

This site provides information on the Environmental Protection Agency’s WaterSense labeling program for water-efficient landscape irrigation products plus tips and recommendations for water-efficient irrigation. Follow the link to “Weather- or Sensor-Based Irrigation Control Technologies” for related information on high-efficiency irrigation controllers.

- Water-Efficient Landscaping: Preventing Pollution and Using Resources Wisely: www.epa.gov/owm/water-efficiency/docs/water-efficient_landscaping_508.pdf.

This manual from the Environmental Protection Agency provides information about reducing water consumption through creative landscaping techniques.

- Water Wiser: The Water Efficiency Clearinghouse: www.awwa.org/waterwiser/.

This clearinghouse provides articles, reference materials and papers on all forms of water efficiency.



Section 5: Energy Efficiency

5-1a Efficient Energy Use: New Construction

LH MANDATORY *New construction*

How

Provide verification demonstrating energy efficiency by meeting one of the following:

- Energy Star standards (HERS Index of 85 in climate zones 1–5, or HERS Index of 80 in climate zones 6–8, as established by the Residential Energy Services Network (RESNET) policy effective July 1, 2006) for all residential structures under four stories. U.S. climate zones are identified in the 2007 International Energy Conservation Code (IECC 2007). See the Energy Star for Homes website to identify the climate zone in which the project is located: www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_performance.
- Residential structures four stories or above must exceed ASHRAE 90.1-2004 by 15 percent.
- Projects in California, regardless of size, must exceed by 15 percent the version of Title 24 under which the project is permitted.
- Low rise projects in Oregon, Washington state, Idaho and Montana must meet the performance requirements of Northwest Energy Star.

Intent

In 1992, the EPA introduced Energy Star as a voluntary labeling program designed to identify and promote energy-efficient products to reduce greenhouse gas emissions. Energy Star is an accepted standard for single-family residential new construction projects.

Energy Star-qualified homes are independently verified to be energy efficient. These savings are based on heating, cooling, hot water, normalized lights and appliance energy use and are typically achieved

through a combination of building-envelope upgrades, high-performance windows, controlled air infiltration, upgraded heating and air conditioning systems, tight duct systems and upgraded water-heating equipment, appliances and lighting. These features contribute to improved home quality and homeowner comfort, and to lower energy demand and reduced air pollution.

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2004 establishes minimum requirements for the energy-efficient design of buildings, except low-rise residential buildings. The standard is also the basis of Chapter 7 of the International Code Council's International Energy Conservation Codes. State energy codes that may be more stringent than ASHRAE 90.1 are identified on the U.S. Department of Energy's Building Energy Codes website, www.energycodes.gov. The Energy Star pilot program for mid- and high-rise buildings requires 20 percent better than ASHRAE 90.1-2004.

A Home Energy Rating System (HERS) evaluates the energy efficiency of a home or apartment, compared with a computer-simulated reference unit of identical size and shape. The HERS rating results in a score between 0 and 100, with the reference unit assigned a score of 100. From this point, each 1 percent reduction in energy usage (compared to the reference unit) results in a one-point decrease in the HERS score. Energy Star requires a unit to be significantly more energy efficient than the reference unit by setting a standard of achieving a HERS score of at least 85 in climate zones 1-5, or 80 in climate zones 6-8. HERS ratings are conducted by third-party HERS raters.

The Builder Option Package (BOP) is used to determine components of an Energy Star-qualified new home.

Things to Consider

- Projects that are three stories or less and meet this measure also fulfill the requirement of LEED for Homes prerequisite EA 1.1 “Energy Performance,” a mandatory requirement for LEED certification. Projects that are four stories and above should connect with their local LEED for Homes Provider to determine the energy performance requirements for their project type.

- For more information regarding Energy Star standards, go to the new homes section of the Energy Star homepage, www.energystar.gov.
- For information on Builder Option Packages, go to www.energystar.gov/index.cfm?c=bop.pt_bop_index.
- To identify a Home Energy Rater in your area, call the Energy Star toll-free hotline: 888.STAR.YES.
- For more information on ASHRAE, go to www.ashrae.org or call 888.527.4723.

5-1b Efficient Energy Use: Moderate and Substantial Rehabilitation

MANDATORY *For moderate and substantial rehabilitation*

How

Identify an architect with green building experience, an engineer or energy auditor to conduct an energy analysis of the existing building condition and identify cost-effective energy improvements by preparing an energy improvement report. The report must use software recognized by the energy modeling industry to model the current and projected energy performance of the building. Implement energy improvements adequate to improve the building's energy performance by 15 percent from pre-renovation figures. The report does not have to be generated for each single-family home because the analysis presumably will recommend standard measures that can be applied to all homes that are of a similar building type.

Intent

In substantial and moderate rehabs, the financial benefits of making specific building improvements (added insulation, replacement windows, etc.) vary tremendously

from one building to the next, in relation to existing building conditions and the local climate. Because of that, the most effective practice is to conduct a building assessment, determine the unique conditions of the building (amount of existing insulation, R-value of windows, etc.), and use software or manual calculations to determine the cost and return on investment of various alternative improvements. Building upgrades should represent a significant improvement in energy performance from pre-renovation performance; 15 percent has been selected for this criterion as a minimum level of improvement in energy performance, based on data from and alignment with other national and regional green building programs.

Things to Consider

- As an alternative way of achieving energy performance requirements, moderate and substantial rehab projects may opt to fulfill the requirements of 5-1a.

5-2 Energy Star Appliances

LH **MANDATORY** *If providing appliances*

How

If providing appliances, install Energy Star clothes washers, dishwashers and refrigerators.

When the energy performance of the home is modeled to produce a HERS Index for 5-1a, the model should include the appliances and the HERS Index should reflect this.

Intent

In 1992, EPA introduced Energy Star, a voluntary labeling program designed to identify and promote energy-efficient products to reduce greenhouse gas emissions. Energy Star products must meet strict energy efficiency criteria set by EPA. These products reduce utility costs and greenhouse gas emissions.

Things to Consider

- Projects that achieve this measure may be eligible for points toward LEED certification under LEED for Homes credit EA 9.1 “High Efficiency Appliances,” for up to 2 points. Note that this credit is part of the prescriptive pathway in the energy category in LEED for Homes; thus, projects receiving points in the performance pathway (for energy performance under credit EA 1) are not eligible for this credit, and vice versa.

5-3a Efficient Lighting: Interior

MANDATORY

How

Install the Energy Star Advanced Lighting Package in all interior units, and use Energy Star or high-efficiency commercial grade fixtures in all common areas and outdoors.

If reusing existing fixtures in a rehab, installing compact fluorescent light bulbs (CFLs) is permitted. If installing new fixture, these must be Energy Star labeled.

The following lighting types are exempt from this requirement: emergency lighting; lighting required by code for health and safety purposes; and lighting used for eye adaptation near covered vehicle entrances and exits.

Intent

Energy Star-qualified lighting uses two-thirds less energy and lasts six to 10 times longer than traditional lighting. Reduced energy use lowers utility costs and greenhouse gas emissions.

Things to Consider

- Projects that achieve this measure should meet the requirements of LEED for Homes prerequisite EA 8.1 “Energy Star Lights,” a mandatory requirement for LEED certification. Additionally, projects that achieve this measure also may be eligible for points toward LEED certification under LEED for

- For more information on Energy Star labeled appliances go to the appliances section of the Energy Star homepage, www.energystar.gov/index.cfm?c=appliances.pr_appliances.
- This ENERGY STAR site includes links to lists of qualified dishwashers, clothes washers, refrigerators, and freezers, along with product and store locators, purchasing guides, and information about rebates and other incentive programs.

Homes credit EA 8 for installing the Energy Star Advanced Lighting Package. Note that this credit is part of the prescriptive pathway in the energy category in LEED for Homes; thus, projects receiving points in the performance pathway (for energy performance under credit EA 1) are not eligible for this credit, and vice versa.

- The Energy Star Advanced Lighting Package (ALP) designation identifies homes equipped with a comprehensive set of Energy Star qualified light fixtures. The ALP designation applies to lighting packages for new home construction that consist of a minimum of 60 percent Energy Star qualified hard-wired fixtures and 100 percent Energy Star qualified ceiling fans where installed. Information on the ALP can be found at www.energystar.gov/index.cfm?c=bldrs_lenders_raters.ALP_Builder.

This site includes complete information on EPA’s Advanced Lighting Program specifications and requirements, along with extensive technical resources, qualified product and manufacturer lists and locators, case studies, and marketing support resources.

- For more information on lighting, go to the Products section of the Energy Star homepage, www.energystar.gov.

5-3b	Efficient Lighting: Exterior
LH	MANDATORY

How

Install daylight sensors or timers on all outdoor lighting, including front and rear porch lights in single family homes.

The following lighting types are exempt from this requirement: emergency lighting; lighting required by code for health and safety purposes; and lighting used for eye adaptation near covered vehicle entrances and exits.

Intent

Daylight sensors automatically turn off the exterior lighting when sufficient day light is available or lighting is otherwise not required. Proper aiming of exterior fixtures and the use of shade trees and plants help prevent unwanted glare (light trespass) into neighboring buildings and natural areas, and limit disturbance of the night sky (light pollution).

Things to Consider

- Projects that achieve this measure are eligible for points toward LEED certification under LEED for Homes credit EA 8.2 for improved lighting. Note that this credit is part of the prescriptive pathway in the energy category in LEED for Homes; thus, projects receiving points in the performance pathway (for energy performance under credit EA 1) are not eligible for this credit, and vice versa.
- Design outdoor lighting to eliminate light trespass from the building and site and to minimize impact on nocturnal environments.
- Use downlighting instead of uplighting.
- Consult the Illuminating Engineering Society of North America's Recommended Practice Manual: Lighting for Exterior Environments.

5-4	Electricity Meter
	MANDATORY <i>Except for zero-bedroom and designated supportive housing dwelling units</i>

How

Install individual or sub-metered electric meters.

Intent

To raise residents' awareness of the cost associated with electricity consumption, which may reduce energy use.

5-5	Additional Reductions in Energy Use
LH	OPTIONAL <i>1 point for each additional point awarded by the Home Energy Rating System (HERS) or for each 1 percent change in energy efficiency)</i>

How

Exceed the relevant Energy Star HERS score (80 or 85 by climate zone) for low-rise residential buildings, or provide calculations for the following:

- Forecast the annual energy efficiency of the entire project to exceed ASHRAE 90.1-2004 by 15 percent as in 5-1a.
- Analyze and adopt additional energy improvements.
- Reforecast annual energy costs with the additional improvements. Use that figure to determine the percentage of energy savings from the baseline established in the first bullet.

- For moderate and substantial rehabilitation projects, perform energy modeling as required in 5-1b and determine percentage that exceeds the required 15 percent reduction in energy usage from pre-renovation figures.
- For projects in California, regardless of size, exceed by 15 percent the version of Title 24 under which the project is permitted.

Intent

The relative energy efficiency of a given dwelling unit is established by comparing it to the HERS Reference Home, an accepted national standard based on the

2006 International Energy Conservation Code that uses a scale of 0-100. The lower the score is, the more efficient the home. The HERS Reference Home scores a HERS Index of 100 points. Essentially, one point is awarded or deducted for each 1 percent change in energy efficiency for the home's thermal envelope, heating, cooling and domestic hot water systems relative to the 2006 IECC. A home that uses approximately 20 percent less energy than the HERS Reference Home scores 20 points and is equivalent to an Energy Star-qualified home in climate zones 6-8. A home with zero-purchased energy scores 0.

For new construction, adding incremental improvements will advance energy efficiency while reducing utility and operating costs for residents and building owners. Renewable energy use and energy conservation lessen smog, acid rain and greenhouse gas emissions.

Things to Consider

- Projects that achieve this measure may be eligible for points toward LEED certification under LEED for Homes credit EA 1.2, "Exceptional Energy Performance," for up to 34 points. See EA 1 in the LEED for Homes Rating System for the logarithmic equations that relate the HERS Index to the appropriate number of LEED points.
- For more information regarding Energy Star standards go to the new homes section of the Energy Star homepage, www.energystar.gov.
- For information on Builder Option Packages, go to www.energystar.gov/index.cfm?c=bop.pt_bop_index.
- To identify a Home Energy Rater in your area, call the Energy Star toll-free hotline: 888.STAR.YES.
- For more information on ASHRAE, go to www.ashrae.org or call 888.527.4723.

5-6a LH

Renewable Energy

OPTIONAL 5 points for first 10 percent, plus 5 points for each additional 10 percent increment, up to a maximum of 15 points

How

Install PV panels, wind turbines or other renewable source to provide at least 10 percent of the project's estimated electricity demand.

Intent

Use of renewable energy reduces environmental impacts associated with utility energy production and use. These impacts include natural resource destruction, air pollution, greenhouse gas emissions and water pollution. Use of onsite renewable energy technologies, such as PV panels and wind turbines, can also result in energy cost savings.

Things to Consider

- Projects that achieve this measure may be eligible for up to 10 points toward LEED for Homes certification under credit EA 10 "Renewable Energy System." Projects can receive 1 point for every 3 percent of the annual reference electrical load met by the renewable energy system. Note that the annual reference electric load is defined as the amount of electricity that a typical home (e.g., the HERS Reference Home) would consume in a typical year.

- American Solar Energy Society: www.ases.org. ASES is a nonprofit organization committed to a sustainable energy economy. ASES accelerates the development and use of solar and other renewable energy resources through advocacy, education, research and collaboration among professionals, policymakers and the public.
- American Wind Energy Association: www.awea.org. AWEA is a national trade association representing wind power plant developers, wind turbine manufacturers, utilities, consultants, insurers, financiers, researchers, and others involved in the wind industry.
- Database of State Incentives for Renewable Energy: www.dsireusa.org. The North Carolina Solar Center developed this database to collect information on state financial and regulatory incentives (e.g., tax credits, grants and special utility rates) designed to promote the application of renewable energy technologies. DSIRE also offers additional features such as preparing and printing reports that detail the incentives on a state-by-state basis.
- Florida Solar Energy Center: www.fsec.ucf.edu/en/

consumer/solar_electricity/index.htm.

This is a resource for basic information on types of photovoltaic solar electric systems, sizing, installation and system ratings. FSEC also has an industry resources page that includes its Photovoltaic System Design Course Manual, available at www.fsec.ucf.edu/en/industry/resources/pv/index.htm.

- National Center for Photovoltaics: www.nrel.gov/ncpv. NCPV provides a clearinghouse on all aspects of photovoltaic solar cell systems.
- National Renewable Energy Laboratory: www.nrel.gov.

The National Renewable Energy Laboratory is a leader in the U.S. Department of Energy's effort to secure an energy future for the nation that is environmentally and economically sustainable.

- U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy: www.eere.energy.gov.

The EERE website includes information on all types of renewable energy technologies and energy efficiency.

5-6b Photovoltaic (PV) Ready

OPTIONAL 2 points

How

Site, design, engineer and wire the development to accommodate installation of photovoltaic (PV) in the future. General contractor and PV contractor must document the information on the roof load, location of conduit and the potential location of the dash box. GC and PV contractor should provide documentation to building owner and manager.

Submit photos that demonstrate the following:

- Orient buildings to permit access to sunlight.
- Design and include south facing architectural elements on the roof for PV.
- Reserve unobstructed roof areas where panels can be placed.
- Run wiring from the prospective PV location to a central panel, as part of the general electrical work

Intent

Photovoltaics are composite materials that convert sunlight directly into electrical power and are the easiest renewable energy source to use in affordable housing.

Generating and using renewable energy in a development is a hedge against rising costs for purchased energy. Further, it avoids the environmental impacts associated with conventional power generation: natural resource destruction, air and water pollution, and greenhouse gas production.

Things to Consider

- The first cost of PV can be high, but grants and subsidies are available in many states.

Building "PV Readiness" into a project reserves the opportunity to install a system later when resources become available.

- Database of State Incentives for Renewable Energy: www.dsireusa.org.

The North Carolina Solar Center developed this database to collect information on state financial and regulatory incentives (e.g., tax credits, grants and special utility rates) designed to promote the application of renewable energy technologies. DSIRE also offers additional features such as preparing and printing reports that detail the incentives on a state-by-state basis.



Section 6: Materials Beneficial to the Environment

(all items are optional)

6-1 Construction Waste Management

LH OPTIONAL 5 points

How

Reduce the amount of construction waste sent to the landfill.

- Investigate and document local options for diversion (recycling, reuse, etc.) of all anticipated major constituents of the project waste stream, including cardboard packaging and “household” recyclables (e.g., beverage containers).
- Commit to following a waste management plan that is appropriate for the site and local conditions, and that recycles or salvages at least 25 percent of non-hazardous construction and demolition debris (see LEED for Homes chart MR 3-A for calculations).

Intent

The amount of job-site waste resulting from construction of the average (2000 sq. ft.) U.S. home is four pounds per square foot of conditioned space, totaling about 8,000 pounds and taking up 50 cubic yards of landfill space. To the extent possible, waste should be avoided because landfill space is rapidly diminishing; incineration produces pollutants; and waste of materials is, in itself, a negative environmental impact. (Source: National Association of Home Builders Research Center, 2001, www.nahbrc.org)

Things to Consider

- This measure helps a project meet LEED for Homes prerequisite MR 3.1 “Construction Waste Management Planning,” a mandatory requirement for LEED certification. The other mandatory requirement that is part of this LEED prerequisite

is to document the diversion rate for construction waste. Projects may also be eligible for additional points toward LEED certification for construction waste reduction under MR 3.2.

- Consider creating detailed framing plans or scopes of work and accompanying architectural details for use on the job site. Refer to LEED for Homes MR 1.2: Detailed Framing Documents for additional information.
- Consider creating a detailed cut list and lumber order prior to construction. Refer to LEED for Homes MR 1.3: Detailed Cut List and Lumber Order for additional information.
- NAHB Research Center, Toolbase.org, Best Practices for Construction Waste Management: www.toolbase.org/Best-Practices/Construction-Waste/waste-mgmt-field-guide.

This page includes frequently asked questions, case studies, reports, and various links. It also includes A Builder’s Field Guide, which includes guidance for creating a step-by-step construction waste management and recovery plan.

- U.S. EPA WasteWise Program: www.epa.gov/wastewise/targeted/challenge/cbres.htm.
This site has information about the WasteWise Building Challenge program, including articles, publications and various links and resources for more information.
- U.S. Environmental Protection Agency, Construction and Demolition Debris: www.epa.gov/epaoswer/non-hw/debris-new/index.htm.

This site includes basic information on

construction and demolition debris disposal practices, regional and state programs, publications and links.

- Construction Materials Recycling Association: www.cdrecycling.org.
Includes links to websites on recycling concrete, asphalt roof shingles and drywall, as well as a state-by-state listing of construction waste reusers and recyclers.
- Residential Construction Waste Management: A Builder's Field Guide. NAHB Research Center, 1997: www.nahbrc.org/bookstore/cw0503w.aspx.

This guide may be used to create a step-by-step construction waste management and recovery plan. See.

- Efficient Wood Use in Residential Construction. Natural Resources Defense Council, 1998: <http://www.nrdc.org/cities/building/rwoodus.asp>.
This NRDC handbook describes the advantages of several wood-efficient approaches to design, material selection, and construction for residential applications and includes extensive practical and resource information for builders, architects, engineers, and developers.

6-2 LH	Recycled Content Material OPTIONAL <i>2 points for the first 5 percent, plus 3 points for each additional 5 percent increment, not to exceed 14 points</i>
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How

The percentage of recycled content material is based on cost or value and does not include mechanical and electrical equipment. Provide calculations for recycled content percentage as follows:

- For a given material or furnishing, multiply the recycled content percentage by weight (post-consumer or post-industrial) by the value of the product to find the value of the recycled content for that item.
- Add up the values of the recycled content of all the materials and furnishings.
- Divide this sum by the total value of the materials for the project.

Intent

Recycled materials have been recovered or otherwise diverted from the solid waste stream either during the manufacturing process or after consumer use. Use of recycled content materials reduces the negative impact resulting from extraction and processing of virgin materials. Many recycled content materials have additional benefits, which yield better results and a stronger final product.

Things to Consider

- Projects that achieve this measure may be eligible for points under LEED for Homes credit MR 2.2 "Environmentally Preferable Products," worth one-half point per component toward LEED certification. Note that a particular material must make up 90 percent of the component, by weight or volume. See MR 2.2 in the LEED for Homes Rating System for more information.
- Consider the incorporation of recycled content building materials from the early stages of project design.
- Many commonly used products, such as metals, concrete, masonry, acoustic tile, drywall, carpet, ceramic tile and insulation, are now available with recycled content. For guidance, see the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7(e).
- Oikos Green Building Source: www.oikos.com/green_products/index.php.
A website dedicated to sustainable and energy-efficient construction: green building news, products database, product gallery, Energy Source Builder newsletter and more.

6-3 Certified, Salvaged and Engineered Wood

LH OPTIONAL 5 points

How

Commit to using at least 25 percent (by cost) wood products and materials that are certified in accordance with the Forest Stewardship Council, salvaged wood, or engineered framing materials. The percentage of certified, salvaged and engineered wood products is based on cost or value. The project architect must complete and submit the following calculation: Divide the sum of the value of all certified, salvaged or engineered wood products by the value of all wood products.

Intent

Less than 10 percent of the old growth forest remains in the United States. The use of Forest Stewardship Council-certified wood encourages forestry practices that are environmentally responsible, socially beneficial and economically viable. The use of salvaged wood and engineered wood products precludes the need to use old-growth lumber.

Things to Consider

- Projects that achieve this measure through FSC-

certified or salvaged wood may be eligible for points under LEED for Homes credit MR 2.2 “Environmentally Preferable Products,” worth one-half point per component toward LEED certification for environmental preferability (FSC-certification) or local production. To achieve points for local production, products must be extracted, processed and manufactured within 500 miles of the project. See MR 2.2 in the LEED for Homes Rating System for more information.

- For help in locating FSC-certified products, fill out the form on this website and submit it to FSC-US. FSC will circulate it to certified companies, who then will contact you if they have your desired product(s) available. The form is located at: www.fscus.org/faqs/fsc_products.php and www.findfsc.org.
- Rainforest Alliance, “SmartGuide to Green Building Wood Sources:” www.rainforestalliance.org/smartguides.

This site lists U.S. suppliers, manufacturers and distributors of FSC-certified building products.

6-4a Water-Permeable Walkways

LH OPTIONAL 5 points

How

Use water-permeable materials in 50 percent or more of walkways.

Intent

Water-permeable materials reduce storm-water runoff by allowing water to soak into the ground. Storm-water runoff pollutes receiving waterways by carrying sediment and other pollutants and by raising water temperature. Storm-water runoff also causes downstream flooding and erosion, and hampers aquifer recharge and transmission of moisture for vegetation.

Things to Consider

- Projects that achieve this measure may be eligible for points under LEED for Homes SS 4.1 “Permeable Lot,” worth up to 4 points toward LEED certification. To achieve points under this

credit, at least 70 percent of the built environment, not including area under roof, must be permeable or designed to capture water runoff for infiltration on-site. See SS 4.1 in the LEED for Homes Rating System for more information.

- Use water-permeable materials such as pervious interlocking concrete paving blocks, concrete grid pavers, perforated brick pavers and compacted gravel.
- NAHB Research Center ToolBase Services: Permeable Pavement: toolbase.org/Technology-Inventory/Sitework/permeable-pavement.

In a resource provided through a partnership with the Department of Housing and Urban Development, the Partnership for Advancing Technology in Housing (PATH), and the National Association of Home Builders Research Center, this site provides details, lists of manufacturers, and related information on permeable paving options.

6-4b	Water-Permeable Parking Areas
LH	OPTIONAL 5 points

How

Use water-permeable materials in 50 percent or more of paved parking areas.

Intent

Water-permeable materials reduce storm-water runoff by allowing water to soak into the ground. Storm-water runoff pollutes receiving waterways by carrying sediment and other pollutants and by raising water temperature. Storm-water runoff also causes downstream flooding and erosion and hampers aquifer recharge and transmission of moisture for vegetation.

Things to Consider

- Projects that achieve this measure may be eligible for points under LEED for Homes SS 4.1, “Permeable Lot,” worth up to 4 points toward LEED certification. To achieve points under this credit, at least 70 percent of the built environment,

not including area under roof, must be permeable or designed to capture water runoff for infiltration onsite. See SS 4.1 in the LEED for Homes Rating System for more information.

- Water-permeable materials include pervious interlocking concrete paving blocks, concrete grid pavers, perforated brick pavers and compacted gravel.
- NAHB Research Center ToolBase Services: Permeable Pavement: toolbase.org/Technology-Inventory/Sitework/permeable-pavement.

In a resource provided through a partnership with the Department of Housing and Urban Development, the Partnership for Advancing Technology in Housing (PATH), and the National Association of Home Builders Research Center, this site provides details, lists of manufacturers, and related information on permeable paving options.

6-5a	Reducing Heat-Island Effect: Roofing
LH	OPTIONAL 5 points

How

Use Energy Star-compliant (reflectivity of greater than .65) and high-emissive roofing (with an emissivity of at least 0.8 when tested in accordance with ASTM 408). Or, install a “green” (vegetated) roof for at least 50 percent of the roof area. Combinations of high-albedo and vegetated roof can be used, providing they collectively cover 75 percent of the roof area.

Intent

Urban heat islands disturb the atmosphere and cause energy waste by increasing loads on cooling systems. Heat islands create thermal gradient differences between developed and undeveloped areas. Using roof surfaces that do not retain heat reduces the heat island. Resources and information on green roofs can be found at www.earthpledge.org/GreenRoof.html.

Things to Consider

- Projects that achieve this measure through installation of a green roof may be eligible for up to 1 point

toward LEED certification under LEED for Homes credit SS 4.3, “Management of Runoff from Roof.” To achieve this point, LEED for Homes requires that the green roof covers at least 50 percent of the roof area for one-half point, or 100 percent of the roof area for 1 point.

- U.S. Environmental Protection Agency, Heat Island Effect: www.epa.gov/heatisland.

Basic information about heat island effect, its social and environmental costs, and strategies to minimize its prevalence, including shading and coloration of hardscapes.

- Lawrence Berkeley National Laboratory, Heat Island Group: eetd.lbl.gov/HeatIsland.

The Lawrence Berkeley National Laboratory conducts research to find, analyze, and implement solutions to minimizing heat island effects; its current efforts focus on the study and development of more reflective surfaces for roadways and buildings.

6-5b Reducing Heat-Island Effect: Paving**LH** OPTIONAL 5 points**How**

Use light-colored, high-albedo materials and/or an open-grid pavement, with a minimum Solar Reflective Index of greater than or equal to 60 for over at least 30 percent of the site's hardscaped area.

Intent

Urban heat islands have increased local air temperatures due to the absorption of solar energy by the built environment. They increase energy consumption by increasing loads on cooling systems. Heat islands create thermal gradient differences between developed and undeveloped areas. Use paving surfaces that do not retain heat and reduce the heat island effect.

Things to Consider

- Projects achieving this measure may be eligible for 1 point toward LEED certification under LEED for Homes credit SS 3.1, "Reduce Local Heat Island Effects." To achieve this point, LEED for Homes requires that light-colored, high-albedo materials or vegetation are installed for at least 50 percent of sidewalks, patios, and driveways within 50 feet of the home.

- The Solar Reflectance Index (SRI) is a measure of the constructed surface's ability to reflect 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. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980-01.

- U.S. Environmental Protection Agency, Heat Island Effect: www.epa.gov/heatisland.

This site contains information about heat island effect, its social and environmental costs and strategies to minimize its prevalence, including shading and coloration of hardscapes.

- Lawrence Berkeley National Laboratory, Heat Island Group: eetd.lbl.gov/HeatIsland.

The Lawrence Berkeley National Laboratory conducts research to find, analyze and implement solutions to minimizing heat island effects. Its current efforts focus on the study and development of more reflective surfaces for roadways and buildings.

6-5c Reducing Heat-Island Effect: Plantings**LH** OPTIONAL 5 points**How**

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

Intent

Urban heat islands have increased local air temperatures due to the absorption of solar energy by the built environment. They increase energy consumption by increasing loads on cooling systems. Heat islands create thermal gradient differences between developed and undeveloped areas. Use paving surfaces that do not retain heat and reduce the heat island effect.

Things to Consider

- Projects that achieve this measure also meet a requirement of LEED for Homes credit SS 3.1 "Reduce Local Heat Island Effects," worth 1 point toward LEED certification.

- The Home Depot Foundation encourages programs that create or expand partnerships between community tree organizations and those focused on other areas of community development, such as affordable housing and programs that provide volunteer opportunities.

More information: http://www.homedepotfoundation.org/support_trees.html.



Section 7: Healthy Living Environment

7-1 Low / No VOC Paints and Primers

LH MANDATORY

How

Specify that all interior paints and primers must comply with current Green Seal standards for low VOC limits.

Intent

VOCs are chemicals containing carbon molecules that are volatile enough to evaporate from material surfaces into indoor air at normal temperatures. Interior paints and primers that release VOCs may pose health hazards to residents and workers. Outdoors, VOCs react with sunlight and nitrogen in the atmosphere to form ground level ozone, a chemical that has a detrimental effect on human health and ecosystems. Ozone damages lung tissue, reduces lung function and sensitizes the lungs to other irritants. Use of low-VOC paints and primers will reduce the concentration of such airborne chemicals.

Things to Consider

- This measure helps a project meet the requirement of LEED for Homes credit MR 2.2,

“Environmentally Preferable Products,” worth one-half point per component toward LEED certification for products that meet low emissions specifications. See MR 2.2 in the LEED for Homes Rating System for more information.

- The website, www.greenseal.org/findaproduct/index.cfm#paints, lists paints that are Green Seal certified. Also, the Green Seal Standard GS-11 (available for download at www.greenseal.org/certification/environmental.cfm) shows the following VOC limits for paints:

Architectural paints, coatings and primers applied to interior walls and ceilings	Flats: 50 g/L	Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993
	Nonflats: 150 g/L	

- The website, www.toolbase.org/secondary/TrackID=&CategoryID=1312, has information on low- and no-VOC paints, including a list of paint manufacturers that carry these products.

7-2 Low / No VOC Adhesives and Sealants

LH MANDATORY

How

Specify that all adhesives must comply with Rule 1168 of the South Coast Air Quality Management District. All caulks and sealants must comply with regulation 8, rule 51, of the Bay Area Air Quality Management District.

Intent

Interior caulks, sealants and adhesives that release VOCs may pose health hazards to residents and workers (see 7-1.) Use of low-VOC adhesives and sealants will reduce the concentration of such airborne chemicals.

Things to Consider

- This measure helps a project meet the requirements of LEED for Homes credit MR 2.2 “Environmentally Preferable Products,” worth one-half point per component toward LEED certification for products that meet low emissions specifications. See MR 2.2 in the LEED for Homes Rating System for more information.

- South Coast Air Quality Management District, Rule 1168, establishing VOC Limits: <http://www.aqmd.gov/rules/reg/reg11/r1168.pdf>.

Architectural Applications Current VOC Limit (Less Water and Less Exempt Compounds in Grams per Liter):

Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesive	100
Rubber floor adhesives	60

Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Dry wall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single ply roof membrane adhesives	250

- Pontolilo, Brian. Making Sense of Caulks and Sealants. *Fine Homebuilding Magazine* 62 (April/May 2004): 97-101.
- Taunton. Building Information online: www.taunton.com/fh/ (from spec 4.2).
- NREL. Weatherize Your Home – Caulk and Weatherstrip. U.S. Department of Energy, National Renewable Energy Laboratory, p. 4.
- U.S. Dept. of Energy: Building America. www.eere.energy.gov/buildings/building_america/ (from spec 4.2).

7-3 Urea Formaldehyde-free Composite Wood

MANDATORY

How

Use particleboard and MDF that is certified compliant with the ANSI A208.1 and A208.2 – see Things to Consider below. If using composite wood that does not comply with ANSI, all exposed edges and sides must be sealed with low-VOC sealants.

Intent

Particleboard and MDF may emit urea formaldehyde. Formaldehyde is a volatile organic compound. Symptoms of exposure vary widely and can include watery eyes, nausea, coughing, chest tightness, wheezing, skin rashes, allergic reactions and burning sensations in the eyes, nose and throat. In a new report, the World Health Organization (WHO) International Agency for Research on Cancer upgraded its evaluation of formaldehyde from a probable carcinogen to a known human carcinogen based on new evidence that formaldehyde causes nasopharyngeal cancer in humans. Avoiding products with added urea formaldehyde will reduce the quantity of harmful indoor air contaminants.

Things to Consider

- Make this requirement part of the specifications for sub-contractor submittals. Obtain the manufacturer’s specifications to determine whether materials meet this requirement. See third-party testing labels documenting compliance with the relevant ANSI standards. Materials certified as compliant with ANSI A208.1 and A208.2 must meet formaldehyde emission limits. The American National Standard for Particleboard, ANSI A208.1, classifies particleboard by density and class, and is the voluntary particleboard standard for the North American industry. This standard covers physical, mechanical and dimensional characteristics as well as formaldehyde levels. ANSI A208.1 for particleboard limits formaldehyde in industrial particleboard to 0.30 parts per million (ppm), and 0.20 ppm in particleboard flooring.
- ANSI Standard A208.2, Medium Density Fiberboard, is the North American industry standard for MDF. This standard classifies MDF by density and use (interior or exterior) and identifies product grades. Specifications identified in the standard include

physical and mechanical properties, dimensional tolerances and formaldehyde emission limits. ANSI A208.2 sets the formaldehyde emission limit for MDF at 0.30 parts per million (ppm) at a loading

of 0.26m/m (0.08 ft²/ft³). The addition of finishes or overlays may significantly alter product emissions.

- If feasible, specify urea-formaldehyde-free plywood or medium-density fiberboard.

7-4 LH	Green Label Certified Floor Coverings MANDATORY <i>If providing carpeted floor coverings</i>
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How

Do not install carpets in below grade living spaces, entryways, laundry rooms, bathrooms, kitchens or utility rooms. If using carpet, use products that meet the Carpet and Rug Institute's Green Label certified carpet, pad and carpet adhesives.

Intent

New carpets, padding and adhesives release VOCs that may pose health hazards to residents and workers. Carpets also attract allergens such as dirt, pollen, mold spores, dust mites and other microbes that may pose health hazards to individuals allergic to these substances. The Carpet and Rug Institute's program certifies that labeled carpets are low VOC.

Things to Consider

- More information on the Carpet and Rug Institute

can be found on their website at www.carpet-rug.org. Details are provided under "Commercial Customers," and within "Green Building and the Environment."

- The EPA Energy Star with Indoor Air Package Specifications require Green Label Plus carpet. The "Plus" label is more stringent. The California Rug Institute maintains a list of manufacturers and products meeting the Green Label Plus standard. To view the list, go to www.carpet-rug.org/drill_down_2.cfm?page=8&sub=17&requesttimeout=350.
- Make this requirement part of the specifications for sub-contractor submittals. Do not specify the use of wall-to-wall carpets in bathrooms, kitchens, entryways, utility rooms and other wet areas. Instead, use smooth and resilient flooring that can tolerate moisture (e.g., ceramic tile, linoleum).

7-5a LH	Exhaust Fans – Bathroom: New Construction and Substantial Rehabilitation MANDATORY
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How

Install Energy Star-labeled bathroom fans that exhaust to the outdoors and are connected to a light switch and are equipped with a humidistat sensor or timer, *or* operate continuously.

Intent

Properly sized and controlled exhaust fans in bathrooms and kitchens reduce moisture condensation, lowering the potential for indoor mold growth that may yield odors and pose health hazards to residents. Besides helping to reduce moisture, kitchen fans also help remove carbon dioxide and carbon monoxide over fuel-burning appliances and other air contaminants that may be by-products of cooking. Energy Star-qualified fans use 65 percent less energy on average than standard models and move more air per unit energy used with less noise. Timers and humidistat

sensors help ensure that fans regularly remove moisture and provide increased ventilation.

Things to Consider

- This criterion helps a project meet one of two requirements under LEED for Homes prerequisite EQ 5.1 "Basic Local Exhaust," which is a mandatory requirement for LEED certification. The other requirement is that of designing and installing a local exhaust system in the kitchen(s). Projects achieving this criterion also may be eligible for 1 point toward LEED certification under LEED for Homes credit EQ 5.2 "Enhanced Local Exhaust." See EQ 5 in the LEED for Homes Rating System for more information.
- For more information on bathroom fans, go to the products section of the Energy Star homepage: www.energystar.gov/index.cfm?c=vent_fans.pr_vent_fans.

This website describes the advantages of Energy Star-labeled bathroom, utility room and kitchen exhaust fans and provides product and manufacturer lists.

- The cubic feet per minute (cfm) for intermittent bath fans should be at least 50 cfm or 20 cfm if operating continuously, per ASHRAE Standard 62.2-2007 section 5.
- Home Ventilating Institute, Ventilation Systems and Controls: www.hvi.org/; <http://www.hvi.org/assets/pdfs/HVIGuide2006Low.pdf> and www.hvi.org/assets/pdfs/Ventilation_Controls_for_Life-Styles.pdf.

HVI provides consumers an assurance of product performance. It also works to increase public awareness of the need for good ventilation and provides resources for selecting the proper ventilation products.

- Review of Residential Ventilation Technologies: www.buildingscience.com/documents/reports.

This page provides a link to “Review of Residential Ventilation Technologies,” a report that reviews current and potential ventilation technologies for residential buildings with particular emphasis on North American climates and construction.

7-5b Exhaust Fans – Kitchen: New Construction and Substantial Rehabilitation

LH MANDATORY *For new construction and substantial rehabilitation*

How

Install power vented fans or range hoods that exhaust to the exterior.

Intent

Properly sized and controlled exhaust fans in bathrooms and kitchens reduce moisture condensation, lowering the potential for indoor mold growth that may yield odors and pose health hazards to residents. Besides helping to reduce moisture, kitchen fans also help remove carbon dioxide and carbon monoxide over fuel-burning appliances and other air contaminants that may be by-products of cooking. Energy Star-qualified fans use 65 percent less energy on average than standard models and move more air per unit energy used with less noise. Timers and humidistats help ensure that fans regularly remove moisture and provide increased ventilation.

Things to Consider

- This measure helps a project meet one of two requirements under LEED for Homes prerequisite

EQ 5, “Basic Local Exhaust,” which is a mandatory requirement for LEED certification. The other requirement is that of designing and installing a local exhaust system in the bathroom(s). See EQ 5 in the LEED for Homes Rating System for more information on how to meet this prerequisite.

- There is currently no Energy Star labeling program for kitchen range fans. Avoid oversized range fans, which can depressurize homes and cause back-drafting of combustion appliances. For most kitchen applications, a range hood fan with a capacity of ~200 cfm is more than adequate. For more information on kitchen fans or range hoods, go to the products section of the Energy Star homepage, www.energystar.gov.
- If continuous, the cfm for intermittent kitchen fans should be at least 100 cfm or five air changes per hour (ach) based on kitchen volume. ASHRAE Standard 62.2-2007 section 5.

7-5c Exhaust Fans – Kitchen: Moderate Rehabilitation

LH OPTIONAL *For moderate rehabilitation 5 points*

How

Install power vented fans or range hoods that exhaust to the exterior.

Intent

Properly sized and controlled exhaust fans in bathrooms and kitchens reduce moisture condensation, lowering the potential for indoor mold growth that may yield odors and pose health hazards to residents.

Besides helping to reduce moisture, kitchen fans also help remove carbon dioxide and carbon monoxide over fuel-burning appliances and other air contaminants that may be byproducts of cooking. Energy Star-qualified fans use 65 percent less energy on average than standard models and move more air per unit energy used with less noise. Timers and humidistats help ensure that fans regularly remove moisture and provide increased ventilation.

Things to Consider

- This measure helps a project meet one of two requirements under LEED for Homes prerequisite EQ 5 “Basic Local Exhaust,” which is a mandatory requirement for LEED certification. The other requirement is that of designing and installing a local exhaust system in the bathroom(s). See EQ 5 in the

LEED for Homes Rating System for more information on how to meet this prerequisite.

- There is currently no Energy Star labeling program for kitchen range fans. Avoid oversized range fans, which can depressurize homes and cause back-drafting of combustion appliances. For most kitchen applications, a range hood fan with a capacity of ~200 cfm is more than adequate.
- For more information on kitchen fans or range hoods, go to the products section of the Energy Star homepage, www.energystar.gov.
- If continuous, the cfm for intermittent kitchen fans should be at least 100 cfm or five air changes per hour (ach), based on kitchen volume, per ASHRAE Standard 62.2-2007 section 5.

7-6a LH	Ventilation: New Construction and Substantial Rehabilitation MANDATORY <i>For new construction and substantial rehabilitation.</i>
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How

Install a ventilation system for the dwelling unit providing adequate fresh air per ASHRAE 62.1-2007 for residential buildings above three stories or ASHRAE 62.2 for single family and low-rise multifamily dwellings.

Intent

Optimal ventilation improves indoor air quality by providing fresh air to the living space on a regular basis.

Things to Consider

- Projects that achieve this measure also meet the requirements of LEED for Homes prerequisite EQ 4.1 “Basic Outdoor Air Ventilation,” which is a mandatory requirement for LEED certification. Projects that meet this measure may also be eligible for 1 point toward LEED certification under EQ 4.2 “Enhanced Outdoor Air Ventilation.”
- Specify a mechanical whole-house ventilation system per ASHRAE 62.2-2007 and the EPA Energy Star with Indoor Air Package Specifications.

- ASHRAE Standard 62.2-2007 and ASHRAE Standard 62.1-2007: www.ashrae.org/technology/page/548.

This site provides a viewable version of ASHRAE Standard 62.2-2007. The online version cannot be printed or saved but can be previewed.

- University of Minnesota, Common Questions about Heat and Energy Recovery Ventilators: www.extension.umn.edu/distribution/housingandclothing/DK7284.html.

This site provides a brief, easy-to-understand overview of heat- and energy-recovery ventilators.

- Building Science.com, Review of Residential Ventilation Technologies: www.buildingscience.com/documents/reports.

This page provides a link to “Review of Residential Ventilation Technologies,” a report that reviews current and potential ventilation technologies for residential buildings with particular emphasis on North American climates and construction.

7-6b	Ventilation: Moderate Rehabilitation
LH	OPTIONAL <i>10 points</i>

How

Install a ventilation system for the dwelling unit providing adequate fresh air per ASHRAE 62.1-2007 for residential buildings above three stories or ASHRAE 62.2 for single family and low-rise multifamily dwellings.

Intent

Optimal ventilation improves indoor air quality by providing fresh air to the living space on a regular basis.

Things to Consider

- Projects that achieve this measure also meet the requirements of LEED for Homes prerequisite EQ 4.1 “Basic Outdoor Air Ventilation,” which is a mandatory requirement for LEED certification. Projects that meet this measure may also be eligible for a point toward LEED certification under EQ 4.2 “Enhanced Outdoor Air Ventilation.
- Specify a mechanical whole-house ventilation system per ASHRAE 62.2-2007 and the EPA Energy Star with Indoor Air Package Specifications.

7-7	HVAC Sizing
LH	MANDATORY

How

Size heating and cooling equipment in accordance with the Air Conditioning Contractors of America (ACCA) Manual, Parts J and S, ASHRAE handbooks, or equivalent software, to prevent short-cycling of heating or air conditioning and ensure adequate dehumidification.

Intent

Appropriately sized equipment can ensure adequate dehumidification, preventing short-cycling that can lead to excess moisture in the air, which can cause mold growth and resident discomfort.

Things to Consider

- Projects that achieve this measure also meet the requirements under LEED for Homes prerequisite EA 6.1 “Good HVAC Design and Installation,” which is a mandatory requirement for LEED certification.
- The HVAC contractor generates a Manual J load calculation to ensure proper sizing of the cooling system. This calculation accounts for factors such as the home’s orientation with respect to the sun, window design and insulation rating. The contractor can utilize one of the HVAC-industry adopted software programs, based upon Manual J, which assists with these designs. Consult www.acca.org for a list of software programs to perform Manual J calculations.
- Air Conditioning Contractors of America, Manual D: Residential Duct Design: www.acca.org/tech/codes/Manual_D_verification.pdf.
- Air Conditioning Contractors of America, Manual J: Residential Load Calculation: www.acca.org/tech/manualj/.
- Air Conditioning Contractors of America, HVAC Quality Installation Specification: acca.org/tech. This website provides a free link to the ACCA Standard: “HVAC Quality Installation Specification: Residential and Commercial Heating, Ventilating, and Air Conditioning Applications.” The site also includes a link to various articles and other ANSI and ACCA standards.
- California Energy Commission, Procedures for HVAC System Design and Installation
See <http://www.energy.ca.gov/efficiency/qualityhomes/procedures.html>
This site provides an overview of good practices for designing and installing the HVAC system, as well as detailed strategies and measures for the “house as a system” approach to construction.

7-8 Water Heaters: Mold Prevention

MANDATORY

How

Use tankless hot water heaters or install conventional hot water heaters in rooms with drains or catch pans with drains piped to the exterior of the dwelling and with non-water sensitive floor coverings. Drain pans shall be sloped, corrosion resistant (e.g., stainless or plastic) with drains at the low point. Condensate lines shall be drained to drainage system; not just deposited under slab.

Intent

The use of heaters or heaters with drains and catch pans prevents moisture problems caused by leakage or overflow. Capturing water overflow from hot water heaters or allowing for proper drainage will prevent water from sitting idle, creating excess moisture and

allowing mold to germinate. Cooling coils, as part of the HVAC equipment for air conditioning, can generate significant amounts of water through condensation on the surface of the coils. If this water is not constantly drained from the “drip pan” under the coil, mold and other organisms can grow in the standing water. HVAC-system air blowing across this area can distribute this mold and other material throughout the home.

Things to Consider

- ASHRAE. User’s Manual of Standard 62.1-2004. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2004. (Fig 4.9a and 4.9b): www.ashrae.org.
- International Residential Code: www.iccsafe.org.

7-9a Materials in Wet Areas: Surfaces

MANDATORY

How

In wet areas, use materials that have smooth, durable, cleanable surfaces. Do not use mold-propagating materials such as vinyl wallpaper and unsealed grout.

Intent

The use of moisture-resistant materials in wet areas such as bathrooms reduces moisture buildup, diminishing the potential for indoor mold growth that may yield odors and pose health hazards to residents.

Things to Consider

- This measure will help a project to meet part of a prerequisite in LEED for Homes. Prerequisite ID 2.1, part c, requires, among other things, that kitchens, bathrooms, laundry rooms, spa areas, and entryways within three feet of the exterior door make use of water-resistant flooring. Carpet is disallowed.

7-9b Materials in Wet Areas: Tub and Shower Enclosures

MANDATORY

How

Use fiberglass or similar enclosure or, if using any form of grouted material, use backing materials such as cement board, fiber cement board or equivalent (i.e., not paper-faced).

Intent

The use of moisture-resistant materials in wet areas such as bathrooms reduces moisture buildup, diminishing the potential for indoor mold growth that may yield odors and pose health hazards to residents.

Things to Consider

- This measure will help a project to meet part of a prerequisite in LEED for Homes. Prerequisite ID 2.1, part c, requires, among other things, that nonpaper-faced backer board is used on the walls of tubs, showers and spa areas.

7-10a Basements and Concrete Slabs: Vapor Barrier**MANDATORY****How**

- Provide vapor barriers under all slabs.
- For concrete floors either in basements or the on-grade slab, install a capillary break of 4 inches of clean or washed gravel (one-half inch diameter or greater) placed over soil.
- Cover all gravel with a 6-millimeter polyethylene sheeting moisture barrier, with joints lapped 1 foot or more to prevent moisture from migrating from the soil through the slab to a living or storage area.
- On interior below grade walls, avoid using separate vapor barrier or a below grade vertical insulation (such as polyethylene sheeting, vinyl wallpaper or foil faced), which can trap moisture inside wall systems. Semi-vapor permeable rigid insulation is not considered a vapor barrier.

Intent

Water can migrate through concrete and most other masonry materials. Proper foundation drainage prevents water from saturated soils from being pushed by hydrostatic pressure through small cracks. Vapor barriers and waterproofing materials can greatly reduce the migration of moisture that can occur even in non-saturated soils. Installation of radon-resistant features will reduce concentrations of radon, a cancer-causing soil gas that can leak into homes through cracks in the slab and foundation.

Things to Consider

- Ensure that other trades' work does not puncture the vapor barrier.

7-10b Basements and Concrete Slabs: Radon**LH** **MANDATORY** For new construction and substantial rehabilitation.**How**

In EPA Zone 1 and 2 areas, install passive radon-resistant features below the slab along with a vertical vent pipe with junction box available, if an active system should prove necessary.

For substantial rehab, test the homes or building for presence of radon. If elevated levels of radon exist, introduce radon-reduction measurements. Check technical guidance at www.epa.gov/iaq/radon/pubs/index.html.

Intent

Installation of radon-resistant features will reduce concentrations of radon, a cancer-causing soil gas that can leak into homes through cracks in the slab and foundation. Also, water can migrate through concrete and most other masonry materials. Proper foundation drainage prevents water from saturated soils from being pushed by hydrostatic pressure through small cracks. Vapor barriers and waterproofing materials can greatly reduce the migration of moisture that can occur even in non-saturated soils.

Things to Consider

- Projects that achieve this measure also meet part of the requirements under LEED for Homes prerequisite EQ 9.1 "Radon-Resistant Construction in High-Risk Areas," a mandatory requirement for LEED certification. Projects located outside EPA Zone 1 may achieve a point toward LEED certification under EQ 9.2 "Radon-Resistant Construction in Moderate-Risk Areas" if the home is designed and built using radon-resistant construction techniques.
- Consult www.epa.gov/radon/zonemap, or contact your state radon coordinator through the state health office, to determine if your development is located in a Zone 1 or 2 radon area.
- EPA. "Building Radon Out." U.S. Environmental Protection Agency, 2006. (#EPA/402-K-01-002): www.epa.gov/iaq/radon/pubs.
- EPA. "Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings." U.S. Environmental Protection Agency: www.epa.gov/radon/pubs/mitstds.html.

- American Lung Association, Radon Fact Sheet: www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=35420.

This is a general overview of the health risks associated with radon exposure.

- Washington State Ventilation and Indoor Air Quality Code, “Builder’s Field Guide:” www.energy.wsu.edu/pubs.

Chapter 2 of this field guide provides tips, procedures and schematics for understanding how to mitigate radon risks during new construction.

7-11 Water Drainage

MANDATORY

How

Provide drainage of water to the lowest level of concrete away from windows, walls and foundations by implementing the following techniques:

- Water management – walls
 - Provides a housewrap/weather resistive barrier with sheets lapped, shingle style, especially over windows, doors and other penetrations to prevent rain water that penetrates the finished exterior cladding system, from entering the wall assembly or being introduced into window or door openings.
 - Provides a pathway for liquid water that has penetrated the cladding system or accumulates due to daily or seasonal changes in thermal and humidity levels behind the cladding system to safely exit the exterior wall assembly.
 - Flashing and/or weather-resistive barriers installed in rough window and door openings must integrate with window and door unit flashings, particularly at the sill and head. OR
 - Install pan flashing, side flashing that extends over pan flashing, and head flashing (top flashing) that extends over side flashing on windows and exterior door openings. Apply window pan flashing over building paper at sill and corner patches.
 - Flashings at roof/wall intersections and at penetrations through the wall (i.e. plumbing, electrical, vents, HVAC refrigerant lines, etc.) that are provided by other trades must be integrated with the drainage plane to keep water from entering the wall assembly.
- Water management – roof systems
 - Installation of drip edge at entire perimeter of roof

- Flashing where sloped roofs meet gable wall end/all vertical wall integrated into building drainage plane
- Use of kick-out flashings at all wall eave intersections integrated into drainage plane
- At wall/roof intersections maintain ≥ 2 ” clearance between wall cladding and roofing materials
- Integrity and continuity of the thermal barrier
- The drainage plane, when properly sealed, can also reduce airflow through the wall assembly, which improves the thermal performance of the cavity insulation.

Intent

Diverting water from the building prevents bulk water entry into foundations and basements, which can contribute to moisture-related problems such as mold and the deterioration of wood and other building materials. Flashing helps direct water away from wall cavities to the drainage plane. Careful architectural detailing of the drainage system and construction supervision ensures proper water drainage.

Things to Consider

- Best practices include a grade of one-half inch per foot, or approximately a 4 percent pitch. EPA recommends a 2 percent pitch (one-quarter inch per foot) for hard surfaces such as patio slabs, walks and driveways.
- Building America Best Practice Guides, free downloads: www.eere.energy.gov/buildings/building_america/.
- EEBA Water Management Guide (for purchase only): www.eeba.org/bookstore

7-12	Garage Isolation
LH	MANDATORY

How

- Provide a continuous air barrier between the conditioned (living) space and any unconditioned garage space to prevent the migration of any contaminants into the living space.
- Do not install air handling equipment in a garage.
- All connecting doors between living space and garage shall include an automatic closer, and shall be fixed with gaskets or otherwise made substantially air-tight with weather stripping.
- In single-family houses install a CO alarm inside the house on the wall that is attached to the garage and outside the sleeping area.

Intent

The CO alarm will help ensure that residents are alerted in the case of accidental accumulation of CO. The air barrier will help prevent CO migration from the garage to the living space.

Things to Consider

- Projects that achieve this measure also meet part of the requirements of LEED for Homes prerequisite EQ 10.1 “No HVAC in Garage,”

which is a mandatory requirement for LEED certification. Projects that meet this measure also may be eligible for points toward LEED certification under credits EQ 10.2 and 10.3 for minimizing pollutants from the garage and/or installing an exhaust fan in the garage.

- Refer to ASHRAE 62.2 to specify garage contaminant isolation measures.
- National Institute of Standards and Technology, Air and Pollutant Transport from Attached Garages to Residential Living Spaces: www.fire.nist.gov/bfrlpubs/build03/art068.html.

This report provides an overview of the major issues, as well as a review of relevant scientific studies and a series of field studies.

- Builder’s Guide series for specific North American climate zones: Cold Climates, Mixed Humid Climates, Hot-Humid Climates, and Hot-Dry & Mixed Dry Climates, by Joseph Lstiburek, Ph.D., P.Eng.

Building Science Press. Refer to the discussion and construction details regarding air sealing and connected garages. Available at www.eeba.org/bookstore/default.asp.

7-13	Clothes Dryer Exhaust
LH	MANDATORY

How

Clothes dryers must be exhausted directly to the outdoors.

Intent

Outdoor venting of clothes dryers substantially reduces air moisture that can lead to mold growth.

Things to Consider

- This measure will help a project meet part of a prerequisite in LEED for Homes. Prerequisite ID 2.1, part c, requires, among other things, that clothes dryers must be exhausted directly to the outdoors.
- It is important to minimize the duct run to avoid build up of moisture and particles that can inhibit the flow of air through the duct. Rigid duct materials are preferred to help ensure clean ducts and reduce build up on particles and moisture.

7-14	Integrated Pest Management
LH	MANDATORY

How

Seal all wall, floor and joint penetrations with low-VOC caulking to prevent pest entry. Provide rodent and corrosion proof screens (e.g., copper or stainless steel mesh) for large openings.

Intent

Sealing of cracks and penetrations will minimize entry points for pests such as rodents and cockroaches.

Things to Consider

- Projects that meet this measure may be eligible for points toward LEED certification under LEED for Homes credit SS 5 “Pest Control Alternatives,” with one-half point offered for each acceptable pest management practice, with 2 points maximum. See SS 5 in the LEED for Homes Rating System for a list of acceptable pest management practices.
- Consider a no spray policy to be included in maintenance and resident manuals for cockroaches and rodents.

7-15	Lead-Safe Work Practices: Rehabilitation
	MANDATORY

How

For properties built before 1978, use lead-safe work practices during renovation, remodeling, painting and demolition.

Intent

Any activity that disturbs painted surfaces or building components in pre-1978 dwellings that contain lead-based paint may generate and spread lead dust and debris, increasing the risk of lead poisoning for exposed children and families. Controlling lead dust and debris helps minimize lead in the environment.

Things to Consider

- Get a lead-based paint inspection or risk assessment if it is likely that the surfaces to be disturbed contain lead-based paint.
- Information about lead-safe work practices: www.epa.gov/lead/pubs/traincert.htm and www.hud.gov/offices/lead/training/index.cfm.

7-16	Healthy Flooring Materials: Alternative Sources
LH	OPTIONAL <i>5 points</i>

How

Use non-vinyl, non-carpet floor coverings in all rooms.

Intent

While certain health hazards are linked with the production of vinyl products, some alternative flooring materials that are natural and renewable have demonstrated low-VOC emissions and an environmentally friendly production. Avoid the use of carpet, which can serve as a sink for dust, allergens and other substances that may pose health hazards to susceptible residents.

Things to Consider

- Projects that achieve this measure also meet the requirement under LEED for Homes credit MR 2.2 “Environmentally Preferable Products,” worth one-half point per component toward LEED certification for products that are environmentally preferable. See MR 2.2 in the LEED for Homes Rating System for more information.
- Use alternative flooring materials such as linoleum, laminate, ceramic tile, bamboo, cork, wood (especially salvaged wood) or rubber.

- For basements, leave the slab exposed and stained with low-VOC material rather than providing any floor treatments.
- Scientific Certification Systems, FloorScore Program: www.scs-certified.com/iaq/floorscore.html. This website includes information about the SCS

FloorScore program, as well as a list of certified products that is updated regularly.

- Green Building Products: The GreenSpec Guide to Residential Building Materials. BuildingGreen, Inc., and New Society Publishers: www.buildinggreen.com/e-commerce/gbp.cfm.

7-17 Smoke-free Building

OPTIONAL 2 points

How

Implement and enforce a “no smoking” policy in all common and individual living areas of all buildings. Common areas include rental or sales offices, entrances, hallways, resident services areas and laundry rooms.

Intent

Secondhand smoke is the third leading cause of preventable death in the country. Air filtration and ventilation systems do not eliminate the health hazards caused by secondhand smoke. Tobacco smoke from one unit may seep through the cracks, be circulated by a shared ventilation system, or otherwise enter the living space of another. In addition to the negative health effects, smoking significantly increases fire hazard and boosts cleaning and maintenance costs. Also, many property insurance companies offer a discount for buildings with no-smoking policies.

Things to Consider

- Building owners and property managers should

ensure residents are aware they are prohibited from smoking in the building. A designated outdoor smoking area should be provided as an alternative arrangement for residents who smoke.

- Provide suitable receptacles in the designated outdoor smoking area for the disposal of cigarette butt litter. Ensure the receptacles are inside the building line and do not encroach into public space.
- American Lung Association, Air Quality in the Home: www.lungusa.org. This site includes an entire section devoted to indoor air quality in the home. Choose “Air Quality” at the bottom of the screen and then click “Indoor Air Quality” and “Air Quality in the Home” to find numerous articles and educational pieces about maintaining a healthy indoor environment.
- U.S. Environmental Protection Agency, Indoor Air Quality Division: www.epa.gov/iaq. This site has numerous resources related to indoor air quality in homes, including reports and web links.

7-18 Combustion Equipment: Includes Space and Water-Heating Equipment

MANDATORY

How

Specify power vented or combustion sealed equipment. One hard-wired carbon monoxide (CO) detector shall be installed for each sleeping area, minimum one per floor.

Intent

Direct vent systems draw all the air needed directly from the outside so there is no risk of spilling combustion contaminants into the residence. Power vented equipment uses a fan or blower to create the pressure difference that causes air to flow from inside

the house, through the combustion device out an approved chimney or vent system to the outdoors.

Things to Consider

- This measure will help a project meet two of the four requirements of LEED for Homes prerequisite EQ.2.1 “Basic Combustion Venting Measures,” a mandatory requirement for LEED certification. Projects must also fulfill the following two requirements to meet this prerequisite:
- No unvented combustion appliances (e.g., decorative logs) are allowed.

- All fireplaces and woodstoves must have doors.
- U.S. Environmental Protection Agency, Combustion Gases and Carbon Monoxide: www.epa.gov/iaq/combust.html and www.epa.gov/iaq/co.html.

These two extensive EPA sites describe the sources of carbon monoxide and other combustion gases, their health effects, steps to reduce exposure, related standards and guidelines, and additional resources and links.

- Canada Mortgage and Housing Corporation: www.cmhc-schl.gc.ca/en/co/maho/yohoyohe/inaiqu/inaiqu_004.cfm.

This site is part of CMHC's "About Your House" series of educational articles. It includes information about combustion gases, the effects of exposure, and strategies for limiting exposure.

- Underwriters Laboratories, Product Safety Tips: CO Alarms

See <http://www.ul.com/consumers/co.html>

This site provides a basic overview of the problems associated with carbon monoxide, as well as tips about purchasing and installing carbon monoxide alarms.



Section 8: Operations and Maintenance

8-1	Building Maintenance Manual
LH	MANDATORY

How

Provide a manual that includes the following: a routine maintenance plan; operations and maintenance guidance for all appliances, HVAC operation, water-system turnoffs, lighting equipment, paving materials and landscaping, pest control, and other systems that are part of each occupancy unit; and an occupancy turnover plan that describes in detail the process of educating the tenant about proper use and maintenance of all building systems.

Intent

A regularly maintained building and site will provide optimum health benefits and ensure environmental and economic performance.

Things to Consider

- Refer to Building Maintenance Manual Template under Information Resources at www.greencommunitiesonline.org.
- Projects that achieve this measure also meet one of the two requirements for LEED for Homes credit AE 2 “Education of Building Manager,” worth one point toward LEED certification. Note that the required LEED documentation must be included in the manual. The other requirement for this LEED credit is a one-hour walkthrough of the building before occupancy to identify installed equipment, provide instructions for operation and describe necessary maintenance protocol.
- Incorporate a “no-spray” policy in the ongoing maintenance of a green property, as sprays are ineffective at managing pests and very harmful for residents.
- NCHH. “Healthy Homes Maintenance Checklist.” National Center for Healthy Housing, 2005. See www.centerforhealthyhousing.org.

8-2	Occupant’s Manual
LH	MANDATORY

How

Provide a guide for homeowners and renters that explains the intent, benefits, use and maintenance of green building features, along with the location of transit stops and other neighborhood conveniences and features, and encourages additional green activities such as recycling, gardening, use of healthy cleaning materials, alternative measures to pest control, and purchase of green power. For homeowners, include appropriate instructions from Section 8-1.

Intent

Homeowners and renters may be unfamiliar with green systems or features installed in their houses or buildings, or with nearby amenities that can provide transportation choices and conveniences within walking distance. Assistance with understanding, operating and maintaining them will allow both homeowners and renters to fully realize the environmental, health and economic benefits that Green Communities offers.

Things to Consider

- Refer to Occupant Manual Template under Information Resources at www.greencommunitiesonline.org.
- Projects that achieve this measure also meet one requirement for LEED for Homes prerequisite AE 1.1 “Basic Operations Training,” a mandatory requirement for LEED certification. Note that the required LEED documentation must be included in the manual. The other mandatory requirement of this LEED prerequisite is a one-hour walkthrough of the home (as required by Green Communities 8-3). Projects may also be eligible for additional points toward LEED certification for enhanced training or public awareness under AE 1.2 and 1.3.
- Provide homeowners/tenants with two radon test kits designed for 48-hour exposure with instructions

for use and follow-up action, per EPA’s Indoor Air Package.

- Connecticut Department of Environmental Protection, Health Home brochure: www.ct.gov/dep/lib/dep/p2/individual/healthyhome.pdf.

This site links to the A Green Home Is a Healthy Home brochure, a good example of a simple brochure with a readable layout and presentation.

- Minnesota Building Industry Foundation, Home-Smart: www.home-smart.org.

This site provides information for homeowners on maintaining their home. It includes seasonal checklists and step-by-step instructions for general maintenance, as well as special instructions for new home buyers on maintaining their home during its first year.

8-3	Homeowner and New Resident Orientation
LH	MANDATORY

How

Provide a comprehensive walk-through and orientation to the homeowner or new resident using the Occupant Manual from 8-2 above that reviews the building’s green features, operations and maintenance, along with neighborhood conveniences that may facilitate a healthy lifestyle.

Intent

A walk-through and orientation will help ensure that the Green Development Plan achieves its intended environmental and economic benefits.

Things to Consider

- Projects that achieve this measure also meet one requirement for LEED for Homes prerequisite AE 1.1 “Basic Operations Training,” a mandatory requirement for LEED certification. The other mandatory requirement of this LEED prerequisite is the provision of an operations and maintenance manual (as required by Green Communities 8-2). Projects may also be eligible for additional points toward LEED certification for enhanced training or public awareness under AE 1.2 and 1.3.



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