

LEED® for Existing Buildings: Operations & Maintenance



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Introduction

A sustainable building maximizes operational efficiency while minimizing environmental impacts. As a cutting-edge, consensus-based system for certifying green building performance, operations and maintenance, the LEED for Existing Buildings: Operations & Maintenance (O&M) Rating System provides a road map for property managers, portfolio owners and service providers who wish to drive down operating costs while increasing occupants' productivity in an environmentally responsible manner.

The LEED for Existing Buildings: O&M Rating System is a set of voluntary performance standards for the sustainable ongoing operation of buildings not undergoing major renovations. It provides sustainability guidelines for building operations, periodic upgrades of building systems, minor space-use changes, and building processes. It is intended to provide existing buildings an entry point into the LEED certification process.

LEED for Existing Buildings: O&M certification is based on actual building operating performance, not design expectations. The certification application must provide data demonstrating that the building's operations meet the LEED for Existing Buildings: O&M prerequisites and attempted credits. The performance of the entire building must be included in measurements and calculations; tenant spaces may not be excluded.

LEED for Existing Buildings: O&M addresses building exterior and site maintenance programs, efficient and optimized use of energy and water, the purchase of environmentally preferred products and food, waste stream management and ongoing indoor environmental quality. In addition, LEED for Existing Buildings: O&M provides sustainability guidelines for whole-building cleaning and maintenance, recycling programs and systems upgrades to improve building energy performance, water consumption, indoor environmental quality and materials use.

To achieve LEED certification, buildings must meet all prerequisites in the Rating System and earn a minimum of 34 points. The flexibility of the Rating System allows building owners, managers and practitioners to determine which credits to pursue based on performance goals. LEED for Existing Buildings: O&M ratings are awarded according to the following point thresholds:

Certified	34–42 points
Silver	43–50 points
Gold	51–67 points
Platinum	68–92 points

Certification Options

The goal of LEED for Existing Buildings: O&M is to help owners improve and operate their buildings in a sustainable and efficient manner, today and in the future. To achieve this goal, LEED for Existing Buildings: O&M provides certification and recertification of building operations to recognize owners' ongoing achievements. LEED for Existing Buildings: O&M can be used to certify the following types of buildings:

- non-LEED buildings seeking initial certification and ongoing certification;
- LEED for New Construction–certified buildings seeking ongoing certification;
- LEED for Schools–certified buildings seeking ongoing certification;
- LEED for Core & Shell–certified buildings seeking ongoing certification; and
- LEED for Existing Buildings–certified buildings seeking ongoing certification.

Buildings previously certified under LEED for New Construction or LEED for Core & Shell have demonstrated

sustainable design and construction and may register for LEED for Existing Buildings: O&M at any time to demonstrate a commitment to sustainable ongoing operations.

Minimum Program Requirements

Buildings must meet the following minimum requirements to pursue certification:

- The building(s) must be fully occupied (defined as average or typical occupancy expected during normal operations) for at least the 12 continuous months preceding certification application. Vacant tenant space measuring 25% or less of the building floor area is permitted, as time-averaged over the previous 12 months. For an apartment building, hotel, dormitory, convention center, classroom, sports facility, or similar structure, ordinary partial occupancy is permitted.
- The LEED project scope must include 100% of the total floor area of each building in the certification application, with the following exception: If operations are under separate management control for a portion of a building, up to 10% of its floor area may be excluded for that reason. Other exemptions are prohibited.
- The building(s) must be in compliance with federal, state and local environmental laws and regulations, including, but not limited to, those addressing asbestos, PCBs, water discharge and waste management. The U.S. Green Building Council reserves the right to revoke LEED certification upon knowledge of noncompliance.

Performance Period

Some credits in LEED for Existing Buildings: O&M require that performance data and other documentation be submitted for the performance period. The *performance period* is the specific, defined time interval for which sustainable operations performance is being measured. The LEED project team may define the duration and timing of the performance period as it sees fit for each prerequisite and credit, subject to the following limitations:

- For the initial LEED for Existing Buildings: O&M certification, the performance period is the most recent period of operations preceding certification application and must be a minimum of three months for all prerequisites and credits except Energy & Atmosphere Prerequisite 2 and Credit 1, which have longer minimum durations. At the project team's option, the performance period for any prerequisite or credit may be extended to a maximum of 24 months preceding certification application.
- For LEED for Existing Buildings: O&M recertification, the performance period depends on whether the credit is newly pursued. For prerequisites and all credits earned in the initial LEED for Existing Buildings: O&M certification, the performance period is the entire period between the previous certification and the current application. For all credits not earned in the initial LEED for Existing Buildings: O&M certification, the performance period is the same as for initial certification.

Policy Model

Any policies required by the LEED for Existing Buildings: O&M Rating System must, at a minimum, contain the following components of the LEED for Existing Buildings: O&M policy model:

1. Scope
 - a. Describe the facility management and operations processes to which the policy applies.
 - b. Describe the building components, systems and materials to which the policy applies.

2. Performance Metric

- a. Describe how performance will be measured and/or evaluated.

3. Goals

- a. Identify the sustainability goals for the building.
- b. Note: Although applicants are required to set goals, documentation of actual achievement is not required to demonstrate compliant policies; stating the goal is enough. Applicants are encouraged to set high goals and work toward their achievement.

4. Procedures and Strategies

- a. Outline the procedures and strategies in place to meet the goals and intent of the policy.

5. Responsible Party

- a. Identify the teams and individuals involved in activities pertaining to the policy.
- b. Identify and outline key tasks for the above teams and individuals.

6. Time Period

- a. Identify the time period over which the policy is applicable.

Applicants are not required to develop separate policies for the purposes of achieving prerequisites and credits; highlighting these components in their existing operations policies is acceptable.

Facility Alterations and Additions

Although LEED for Existing Buildings: O&M focuses mainly on sustainable ongoing building operations, it also embraces sustainable alterations and new additions to existing buildings. In general parlance, alterations and additions may range from a complete gutting, major renovation or large new wing to the replacement of an old window, sheet of drywall or section of carpet.

In LEED for Existing Buildings: O&M, however, alterations and additions has a specific meaning. It refers to changes that affect usable space in the building. Mechanical, electrical or plumbing system upgrades that involve no disruption to usable space are excluded.

Only alterations and additions within the following limits are eligible for inclusion in LEED for Existing Buildings: O&M certification:

- **Maximum.** For alterations, those that affect no more than 50% of the total building floor area or cause relocation of no more than 50% of regular building occupants. For additions, those that increase the total building floor area by no more than 50%. Buildings with alterations or additions exceeding these limits should pursue certification under the LEED for New Construction program.
- **Minimum.** For alterations, projects that include construction activity by more than one trade specialty, make substantial changes to at least one entire room in the building and require isolation of the work site from regular building occupants for the duration of construction. For additions, those that increase the total building floor area by at least 5%. Alterations or additions below these limits are considered repairs, routine replacements or minor upgrades and are ineligible to earn points under LEED for Existing Buildings: O&M. The minimum applies to Materials & Resources (MR) Credits 3 and 9, and Indoor Environmental Quality (EQ) Credit 1.5.

Structure of Prerequisites and Credits

All LEED prerequisites and credits have identical structures:

- Intent: The objective of each prerequisite or credit.
- Requirements: What must be done to earn each prerequisite or credit.
- Potential Strategies and Technologies: Possible methods for achieving each prerequisite or credit. More detail on strategies, technologies and resources is provided in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

Participation and Certification Process

To apply for LEED for Existing Buildings: O&M certification of your building, register by going to the USGBC website and follow the links to the LEED section. When your project is registered, you will gain access to LEED Online and the LEED Project Team page on the USGBC website. For further information on the registration and certification process, please visit the LEED Certification Process page of the website.

Selecting the Appropriate Certification Program

The family of LEED Green Building Rating Systems™ is shown below. Only one rating system may be applicable to some projects; other projects may be applicable to two or three. Prior to registration, USGBC encourages project teams to tally the potential point totals under different rating system checklists. A project is a viable candidate for LEED certification if it can meet all prerequisites and achieve the minimum points required for a given rating system.

If you have questions or concerns pertaining to the LEED Rating Systems, please e-mail leedinfo@usgbc.org, or call 1-800-795-1747.

Contents

Sustainable Sites	13
SS Credit 1: LEED Certified Design and Construction	13
SS Credit 2: Building Exterior and Hardscape Management Plan	14
SS Credit 3: Integrated Pest Management, Erosion Control, and Landscape Management Plan	15
SS Credit 4.1 - 4.4: Alternative Commuting Transportation	17
SS Credit 5: Reduced Site Disturbance: Protect or Restore Open Space	18
SS Credit 6: Stormwater Management	19
SS Credit 7.1: Heat Island Reduction: Nonroof	20
SS Credit 7.2: Heat Island Reduction: Roof	21
SS Credit 8: Light Pollution Reduction	22
Water Efficiency	23
WE Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency	23
WE Credit 1.1 and 1.2: Water Performance Measurement	25
WE Credit 2.1 - 2.3: Additional Indoor Plumbing Fixture and Fitting Efficiency	26
WE Credit 3.1 - 3.3: Water Efficient Landscaping	27
WE Credit 4.1 - 4.2: Cooling Tower Water Management	29
Energy & Atmosphere	30
EA Prerequisite 1: Energy Efficiency Best Management Practices: Planning, Documentation and Opportunity Assessment	30
EA Prerequisite 2: Minimum Energy Efficiency Performance	31
EA Prerequisite 3: Refrigerant Management: Ozone Protection	32
EA Credit 1: Optimize Energy Efficiency Performance	33
EA Credit 2.1: Existing Building Commissioning: Investigation and Analysis	35
EA Credit 2.2: Existing Building Commissioning: Implementation	36
EA Credit 2.3: Existing Building Commissioning: Ongoing Commissioning	37
EA Credit 3.1: Performance Measurement: Building Automation System	38
EA Credit 3.2 and 3.3: Performance Measurement: System-Level Metering	39
EA Credit 4.1 - 4.4: On-Site and Off-Site Renewable Energy	40
EA Credit 5: Refrigerant Management	42
EA Credit 6: Emissions Reduction Reporting	44
Materials & Resources	45
MR Prerequisite 1: Sustainable Purchasing Policy	45
MR Prerequisite 2: Solid Waste Management Policy	46
MR Credit 1.1 - 1.3: Sustainable Purchasing: Ongoing Consumables	47

MR Credit 2.1 and 2.2: Sustainable Purchasing: Durable Goods	48
MR Credit 3: Sustainable Purchasing: Facility Alterations & Additions	50
MR Credit 4: Sustainable Purchasing: Reduced Mercury in Lamps	52
MR Credit 5: Sustainable Purchasing: Food	54
MR Credit 6: Solid Waste Management: Waste Stream Audit	55
MR Credit 7.1 and 7.2: Solid Waste Management: Ongoing Consumables	56
MR Credit 8: Solid Waste Management: Durable Goods	57
MR Credit 9: Solid Waste Management: Facility Alterations & Additions	58
Indoor Environmental Quality	59
EQ Prerequisite 1: Outdoor Air Introduction & Exhaust Systems	59
EQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control	60
EQ Prerequisite 3: Green Cleaning Policy	62
EQ Credit 1.1: IAQ Best Management Practices: IAQ Management Program	63
EQ Credit 1.2: IAQ Best Management Practices: Outdoor Air Delivery Monitoring	64
EQ Credit 1.3: IAQ Best Management Practices: Increased Ventilation	66
EQ Credit 1.4: IAQ Best Management Practices: Reduce Particulates in Air Distribution	67
EQ Credit 1.5: IAQ Best Management Practices: IAQ Management for Facility Alterations and Additions	68
EQ Credit 2.1: Occupant Comfort: Occupant Survey	70
EQ Credit 2.2: Occupant Comfort: Occupant-Controlled Lighting	71
EQ Credit 2.3: Occupant Comfort: Thermal Comfort Monitoring	72
EQ Credit 2.4 and 2.5: Occupant Comfort: Daylight and Views	73
EQ Credit 3.1: Green Cleaning: High-Performance Cleaning Program	75
EQ Credit 3.2 - 3.3: Green Cleaning: Custodial Effectiveness Assessment	76
EQ Credit 3.4 - 3.6: Green Cleaning: Purchase of Sustainable Cleaning Products and Materials	77
EQ Credit 3.7: Green Cleaning: Sustainable Cleaning Equipment	79
EQ Credit 3.8: Green Cleaning: Entryway Systems	80
EQ Credit 3.9: Green Cleaning: Indoor Integrated Pest Management	81
Innovation In Operations	82
IO Credit 1.1 - 1.4: Innovation in Operations	82
IO Credit 2: LEED® Accredited Professional	83
IO Credit 3: Documenting Sustainable Building Cost Impacts	84

Project Checklist

Sustainable Sites	9 Possible Points
Credit 1: LEED Certified Design and Construction	1
Credit 2: Building Exterior and Hardscape Management Plan	1
Credit 3: Integrated Pest Management, Erosion Control, and Landscape Management Plan	1
Credit 4.1 - 4.4: Alternative Commuting Transportation	1
Credit 5: Reduced Site Disturbance: Protect or Restore Open Space	1
Credit 6: Stormwater Management	1
Credit 7.1: Heat Island Reduction: Nonroof	1
Credit 7.2: Heat Island Reduction: Roof	1
Credit 8: Light Pollution Reduction	1
Water Efficiency	4 - 10 Possible Points
Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency	Required
Credit 1.1 and 1.2: Water Performance Measurement	1 - 2
Credit 2.1 - 2.3: Additional Indoor Plumbing Fixture and Fitting Efficiency	1 - 3
Credit 3.1 - 3.3: Water Efficient Landscaping	1 - 3
Credit 4.1 - 4.2: Cooling Tower Water Management	1 - 2
Energy & Atmosphere	13 - 30 Possible Points
Prerequisite 1: Energy Efficiency Best Management Practices: Planning, Documentation and Opportunity Assessment	Required
Prerequisite 2: Minimum Energy Efficiency Performance	Required
Prerequisite 3: Refrigerant Management: Ozone Protection	Required
Credit 1: Optimize Energy Efficiency Performance	2-15, 2 point mandatory
Credit 2.1: Existing Building Commissioning: Investigation and Analysis	2
Credit 2.2: Existing Building Commissioning: Implementation	2
Credit 2.3: Existing Building Commissioning: Ongoing Commissioning	2
Credit 3.1: Performance Measurement: Building Automation System	1
Credit 3.2 and 3.3: Performance Measurement: System-Level Metering	1 - 2
Credit 4.1 - 4.4: On-Site and Off-Site Renewable Energy	1 - 4
Credit 5: Refrigerant Management	1
Credit 6: Emissions Reduction Reporting	1
Materials & Resources	9 - 14 Possible Point
Prerequisite 1: Sustainable Purchasing Policy	Required
Prerequisite 2: Solid Waste Management Policy	Required
Credit 1.1 - 1.3: Sustainable Purchasing: Ongoing Consumables	1 - 3
Credit 2.1 and 2.2: Sustainable Purchasing: Durable Goods	1 - 2

Credit 3: Sustainable Purchasing: Facility Alterations & Additions	1
Credit 4: Sustainable Purchasing: Reduced Mercury in Lamps	1 - 2
Credit 5: Sustainable Purchasing: Food	1
Credit 6: Solid Waste Management: Waste Stream Audit	1
Credit 7.1 and 7.2: Solid Waste Management: Ongoing Consumables	1 - 2
Credit 8: Solid Waste Management: Durable Goods	1
Credit 9: Solid Waste Management: Facility Alterations & Additions	1

Indoor Environmental Quality

16 - 20 Possible Points

Prerequisite 1: Outdoor Air Introduction & Exhaust Systems	Required
Prerequisite 2: Environmental Tobacco Smoke (ETS) Control	Required
Prerequisite 3: Green Cleaning Policy	Required
Credit 1.1: IAQ Best Management Practices: IAQ Management Program	1
Credit 1.2: IAQ Best Management Practices: Outdoor Air Delivery Monitoring	1
Credit 1.3: IAQ Best Management Practices: Increased Ventilation	1
Credit 1.4: IAQ Best Management Practices: Reduce Particulates in Air Distribution	1
Credit 1.5: IAQ Best Management Practices: IAQ Management for Facility Alterations and Additions	1
Credit 2.1: Occupant Comfort: Occupant Survey	1
Credit 2.2: Occupant Comfort: Occupant-Controlled Lighting	1
Credit 2.3: Occupant Comfort: Thermal Comfort Monitoring	2
Credit 2.4 and 2.5: Occupant Comfort: Daylight and Views	1 - 2
Credit 3.1: Green Cleaning: High-Performance Cleaning Program	1
Credit 3.2 - 3.3: Green Cleaning: Custodial Effectiveness Assessment	1 - 2
Credit 3.4 - 3.6: Green Cleaning: Purchase of Sustainable Cleaning Products and Materials	1 - 3
Credit 3.7: Green Cleaning: Sustainable Cleaning Equipment	1
Credit 3.8: Green Cleaning: Entryway Systems	1
Credit 3.9: Green Cleaning: Indoor Integrated Pest Management	1

Innovation In Operations

4 - 7 Possible Points

Credit 1.1 - 1.4: Innovation in Operations	1 - 4
Credit 2: LEED® Accredited Professional	1
Credit 3: Documenting Sustainable Building Cost Impacts	2

Project Totals

85 possible base points plus 7 for IO

- Certified 34–42 points
- Silver 43–50 points
- Gold 51–67 points
- Platinum 68–92 points

Sustainable Sites (SS)

SS Credit 1: LEED Certified Design and Construction

1 point

Intent

To reward environmentally sensitive building design and construction, thereby enabling high-performance building operations to be achieved more easily.

Requirements

Choose one of the following options:

OPTION A

Show that the building has previously been certified under LEED for New Construction.

OPTION B

Show that the building has previously been certified under LEED for Core & Shell, and at least 75% of the floor area has also been certified under LEED for Commercial Interiors.

Potential Technologies & Strategies

Pursue and earn LEED certification for new buildings or major renovations.

SS Credit 2: Building Exterior and Hardscape Management Plan

1 point

Intent

To encourage environmentally sensitive building exterior and hardscape management practices that provide a clean, well-maintained and safe building exterior while supporting high-performance building operations.

Requirements

Employ an environmentally sensitive, low-impact building exterior and hardscape management plan that helps preserve surrounding ecological integrity. The plan must employ best management practices that significantly reduce harmful chemical use, energy waste, water waste, air pollution, solid waste, and/or chemical runoff (e.g., gasoline, oil, antifreeze, salts) compared with standard practices. The plan must address all of the following operational elements that occur on the building and grounds, as applicable:

- maintenance equipment;
- snow and ice removal;
- cleaning of building exterior;
- paints and sealants used on building exterior; and
- cleaning of sidewalks, pavement and other hardscape.

Potential Technologies & Strategies

Over the performance period, have in place a low-impact site and green building exterior management plan that addresses overall site management, chemicals, snow and ice removal, and building exterior cleaning and maintenance. Include green cleaning and maintenance practices and materials that minimize environmental impacts. An outline of acceptable material for a low-impact plan is available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide. Replace conventional gas-powered machinery with electric-powered equivalents (either battery or corded). Examples include, but are not limited to, maintenance equipment and vehicles, landscaping equipment and cleaning equipment.

SS Credit 3: Integrated Pest Management, Erosion Control and Landscape Management Plan

1 point

Intent

To preserve ecological integrity, enhance natural diversity, and protect wildlife while supporting high-performance building operations and integration into the surrounding landscape.

Requirements

Have in place an environmentally sensitive management plan for the site's natural components. The plan must employ best management practices that significantly reduce harmful chemical use, energy waste, water waste, air pollution, solid waste, and/or chemical runoff (e.g., gasoline, oil, antifreeze, salts) compared with standard practices. The plan must address all of the following operational elements:

- Outdoor integrated pest management (IPM), defined as managing outdoor pests (plants, fungi, insects, and/or animals) in a way that protects human health and the surrounding environment and that improves economic returns through the most effective, least-risk option. IPM calls for using least-toxic chemical pesticides, minimum use of the chemicals, use only in targeted locations, and use only for targeted species. IPM requires routine inspection and monitoring. The outdoor IPM plan must address all of the specific IPM requirements listed in EQ Credit 3.9, Green Cleaning: Indoor Integrated Pest Management, including preferred use of nonchemical methods, definition of emergency conditions, and universal notification (advance notice of not less than 72 hours under normal conditions and 24 hours in emergencies before a pesticide, other than a least-toxic pesticide, is applied in a building or on surrounding grounds that the building management maintains). The outdoor IPM plan must also be integrated with any indoor IPM plan for the building, as appropriate.
- Erosion and sedimentation control for ongoing landscape operations (where applicable) and future construction activity. The plan must address both site soil and potential construction materials. The plan must also include measures that prevent erosion and sedimentation, prevent air pollution from dust or particulate matter and restore eroded areas. Further, the plan must address the following operational elements, if applicable:
 - Diversion of landscape waste from the waste stream via mulching, composting or other low-impact means.
 - Chemical fertilizer use. The use of artificial chemicals can be minimized by the use of locally adapted plants that need no fertilizer, less polluting alternatives to artificial chemicals, or other low-impact maintenance.
 - For projects in urban sites with little or no building setback (i.e., zero lot line), SS Credit 3 may be earned using vegetated roof surfaces if the plants meet the definition of native or adapted and if the vegetated roof surface covers at least five% of the LEED project site area.

Potential Technologies & Strategies

Over the performance period, have in place a low-impact site and green building exterior management plan that addresses overall site management, chemicals, fertilizers, landscape waste, and pest management. Include such green landscape management practices as reducing the use of power equipment, improving stormwater control,

using fertilizer only as needed, composting landscape waste, applying integrated pest management, creating wildlife habitat, removing or not installing invasive plants, protecting natural areas, and using plants to reduce heating and cooling needs. Use mulching mowers to significantly reduce yard waste generation, fertilizer needs, and water consumption through retention of organic matter.

SS Credits 4.1–4.4: Alternative Commuting Transportation

1–4 points

Intent

To reduce pollution and land development impacts from conventional automobile use for commuting trips.

Requirements

Reduce the number of commuting round trips made by regular building occupants using single-occupant, conventionally powered, and conventionally fueled vehicles. For the purposes of this credit, alternative transportation includes, but is not limited to, telecommuting, compressed workweeks, mass transit, walking, bicycles or other human-powered conveyances, carpools, vanpools, and low-emitting or fuel-efficient or alternative-fuel vehicles. Performance calculations are made relative to a baseline case that assumes all regular occupants commute alone in conventional automobiles. The calculations must account for seasonal variations in the use of alternative commuting methods and, where possible, indicate the distribution of commuting trips using each type of alternative transportation.

Points are earned for reductions in conventional commuting trips during the performance period according to the following schedule:

- SS Credit 4.1** (1 point): Demonstrate a 10% reduction in conventional commuting trips.
- SS Credit 4.2** (2 points): Demonstrate a 25% reduction in conventional commuting trips.
- SS Credit 4.3** (3 points): Demonstrate a 50% reduction in conventional commuting trips.
- SS Credit 4.4** (4 points): Demonstrate a 75% reduction in conventional commuting trips.

Low-emitting vehicles and *fuel-efficient* vehicles are defined as vehicles that are classified as zero-emission vehicles (ZEVs) by the California Air Resources Board or that have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy annual vehicle-rating guide.

Potential Technologies & Strategies

When developing an alternative transportation program, consider the opportunities and limitations of different options, based on the building's location.

Provide space and infrastructure features, such as bicycle racks, changing facilities, preferred parking, access to mass transit, or alternative-fuel refueling stations. Offer employees incentives for using alternative transportation, such as additional vacation days, cash rewards, or pretax options. Distribute free or discounted public transportation passes, bicycling equipment or telecommuting equipment to individuals committed to using them. Encourage the use of alternative commuting methods by guaranteeing free rides home for employees who must unexpectedly leave work early or late. Utilize organization resources to communicate with building occupants about alternative transportation options and benefits, and facilitating communication among building occupants for coordinating ride sharing.

SS Credit 5: Reduced Site Disturbance: Protect or Restore Open Space

1 point

Intent

To conserve existing natural site areas and restore damaged site areas to provide habitat and promote biodiversity.

Requirements

Over the performance period, have in place native or adapted vegetation covering a minimum of 25% of the site area, excluding the building footprint.

Improving and/or maintaining off-site areas with native or adapted plants can contribute toward earning SS Credit 5, provided the improvement and maintenance are documented in a contract with the owner of the off-site area. Every 2 square feet off-site can be counted as 1 square foot on-site.

Native plants are plants indigenous to a locality, and *adapted plants* are cultivars of native plants that are adapted to the local climate and are not considered invasive species or noxious weeds.

Other ecologically appropriate features that contribute to this credit are natural site elements beyond vegetation that maintain or restore the ecological integrity of the site, including water bodies, exposed rock, unvegetated ground, or other features that are part of the historic natural landscape within the region and provide habitat value.

For projects in urban sites with little or no building setback (i.e., zero lot line), SS Credit 5 may be earned using vegetated roof surfaces if the plants meet the definition of native or adapted and if the vegetated roof surface covers at least 5% of the LEED project site area.

Potential Technologies & Strategies

Perform a site survey to identify site elements and adopt a master plan for management of the building site.

Activities may include removing excessive paved areas and replacing them with landscaped areas or replacing excessive turf grass area with natural landscape features. Work with local horticultural extension services or native plant societies to select and maintain indigenous plant species for site restoration and landscaping.

Coordinate with activities, technologies and strategies under SS Credit 3.

SS Credit 6: Stormwater Management

1 point

Intent

To limit the disruption of natural hydrology by the building and grounds.

Requirements

During the performance period, implement a stormwater management plan that infiltrates, collects and reuses runoff or evapotranspirates runoff from at least 15% of the precipitation falling on the whole project site both for an average weather year and for the two-year, 24-hour design storm. Implement an annual inspection program of all stormwater management facilities to confirm continued performance. Maintain documentation of inspection, including identification of areas of erosion, maintenance needs, and repairs. Perform all routine required maintenance, necessary repairs or stabilization within 60 days of inspection.

Potential Technologies & Strategies

Collect and reuse stormwater for non-potable uses such as landscape irrigation, toilet and urinal flushing and custodial uses. During facility or site alterations or additions, specify the use alternative surfaces (e.g., vegetated roofs, pervious pavement or grid pavers) and nonstructural techniques (e.g., rain gardens, vegetated swales, disconnection of imperviousness, rainwater recycling) to improve perviousness, thereby restoring or maintaining natural stormwater flows. Incorporate stormwater management facilities into routine preventive and corrective maintenance programs.

SS Credit 7.1: Heat Island Reduction: Nonroof

1 point

Intent

To reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impacts on microclimates and human and wildlife habitat.

Requirements

Choose one of the following options:

OPTION A

Use any combination of the following strategies for 50% of the site hardscape (including roads, sidewalks, courtyards, and parking lots):

- Provide shade from existing tree canopy or within five years of landscape installation; landscaping (trees) must be in place at the time of certification application.
- Provide shade from structures fully covered by solar photovoltaic panels.
- Provide shade from architectural devices or structures that have a solar reflectance index (SRI) of at least 29. Implement a maintenance program that ensures these surfaces are cleaned at least every two years to maintain good reflectance.
- Have paving materials with an SRI of at least 29 and implement a maintenance program that ensures these surfaces are cleaned at least every two years to maintain good reflectance.
- Have an open-grid pavement system (at least 50% pervious).

OPTION B

Place a minimum of 50% of parking spaces under cover (defined as underground, under deck, under roof or under a building). Any roof used to shade or cover parking must have an SRI of at least 29. Implement a maintenance program that ensures all SRI surfaces are cleaned at least every two years to maintain good reflectance. The top parking level of a multilevel parking structure is included in the total parking spaces calculation but is not considered a roof and is not required to be an SRI surface.

Potential Technologies & Strategies

Employ strategies, materials and landscaping techniques that reduce heat absorption of exterior materials. Use shade (calculated at 10 a.m., 12 noon, and 3 p.m. on the summer solstice. The arithmetic mean of these three values will be used as the effective shaded area) from native or adapted trees and large shrubs, vegetated trellises or other exterior structures supporting vegetation. Consider the use of new coatings and integral colorants for asphalt to achieve light-colored surfaces instead of blacktop. Position photovoltaic cells to shade impervious surfaces.

SS Credit 7.2: Heat Island Reduction: Roof

1 point

Intent

To reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impacts on microclimates and human and wildlife habitat.

Requirements

Choose one of the following options:

OPTION A

Use roofing materials having a solar reflectance index (SRI) equal to or greater than the values in the table below for a minimum of 75% of the roof area. If more than 75% of the roof area is covered with the SRI material, the SRI value may be lower than the required value if the resulting area-weighted equivalent SRI performance is at least as high as having the required value on 75% of the area. Implement a maintenance program that ensures all SRI surfaces are cleaned at least every two years to maintain good reflectance.

OPTION B

Install and maintain a vegetated roof covering at least 50% of the roof area.

OPTION C

Install high-albedo and vegetated roof surfaces that, in combination, meet the following criteria:

$$\begin{array}{r} \text{Area of} \\ \text{SRI Roof} \\ \hline 0.75 \end{array} + \begin{array}{r} \text{Area of Vegetated} \\ \text{Roof} \\ \hline 0.5 \end{array} \begin{array}{l} > \\ = \end{array} \begin{array}{l} \text{Total} \\ \text{Roof} \\ \text{Area} \end{array}$$

Roof type	Slope	SRI
Low-sloped roof	≤ 2:12	78
Steep-sloped roof	> 2:12	29

Potential Technologies & Strategies

Consider installing high-albedo and vegetated roofs to reduce heat absorption. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918 or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371. Default values are available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide. Product information is available from the Cool Roof Rating Council website, at www.coolroofs.org. Also, visit the ENERGY STAR website, www.energystar.gov, to research compliant products.

SS Credit 8: Light Pollution Reduction

1 point

Intent

To eliminate light trespass from the building and site, improve night sky access and reduce development impact on nocturnal environments.

Requirements

Interior Lighting. All nonemergency built-in lighting with a direct line of sight to any openings in the envelope (translucent or transparent, wall or ceiling) must be automatically controlled to turn off during all after-hours periods during the performance period. The total duration of all programmed after-hours periods annually must equal or exceed 2,190 hours per year (50% of annual nighttime hours). Manual override capability may be provided for occasional after-hours use.

Implement a program to ensure that the lighting control system is being properly used to adjust lighting levels during all after-hours periods.

Exterior and Site Lighting. Choose one of the following options:

OPTION A

If the project is certified under LEED for New Construction, show that SS Credit 8 in LEED for New Construction was earned.

OPTION B

Partially or fully shield all fixtures 50 watts and over so that they do not directly emit light to the night sky.

OPTION C

Measure the night illumination levels at regularly spaced points around the perimeter of the property, taking the measurements with the building's exterior and site lights both on and off. The building's interior lights must be in the same state during both measurements. At least eight measurements are required at a maximum spacing of 100 feet apart, so as to be representative of the illumination levels at the perimeter of the property. The illumination level measured with the lights on must not be more than 20% above the level measured with the lights off. This requirement must be met for each measurement point; averaging of all points is prohibited.

Fully shielded means exterior light fixtures are shielded or constructed so that light rays emitted by the fixture are projected below the horizontal plane passing through the lowest point on the fixture from which light is emitted.

Partially shielded means exterior light fixtures are shielded so that the lower edge of the shield is at or below the centerline of the light source or lamp such that light emission above the horizontal plane is minimized.

Potential Technologies & Strategies

Implement site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Minimize site lighting where possible and use a computer model to predict impacts when changing lighting. Technologies to reduce light pollution include full-cutoff luminaires and low-reflectance surfaces.

Water Efficiency (WE)

WE Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency

Required

Intent

To reduce indoor fixture and fitting water use within buildings to reduce the burdens on potable water supply and wastewater systems.

Requirements

Reduce potable water usage of indoor plumbing fixtures and fittings to a level equal to or below the LEED for Existing Buildings: O&M baseline, which is calculated using the assumption that 100% of the building's indoor plumbing fixtures and fittings meet the Uniform Plumbing Codes (UPC) 2006 or International Plumbing Codes (IPC) 2006 fixture and fitting performance requirements. Fixtures and fittings included in the calculations for this credit are water closets, urinals, showerheads, faucets, faucet replacement aerators, and metering faucets.

The LEED for Existing Buildings: O&M baseline water usage is set based on the year of substantial completion of the building's indoor plumbing system, as of the time the project team assesses the building for LEED for Existing Buildings: O&M compliance. Fixture and fitting retrofits performed in order to achieve compliance with LEED for Existing Buildings: O&M will not affect the baseline usage. *Substantial completion* is defined as either initial building construction or the last plumbing renovation of all or part of the building that included a 100% retrofit of all plumbing fixtures and fittings as part of the renovation. Set the baseline as follows:

- For a plumbing system substantially completed in 1993 or later throughout the building, the baseline is 120% of the water usage that would result if all fixtures met the codes cited above.
- For a plumbing system substantially completed before 1993 throughout the building, the baseline is 160% of the water usage that would result if all fixtures met the codes cited above.

If indoor plumbing systems were substantially completed at different times for different parts of the building because the plumbing renovations occurred at different times, set a whole-building average baseline by prorating between the above limits. Prorate based on the proportion of plumbing fixtures installed during the plumbing renovations in each date period, as explained in the LEED for Existing Buildings: Operations & Maintenance Reference Guide. Pre-1993 buildings that have had only minor fixture retrofits (aerators, showerheads, flushing valves) but no plumbing renovations after 1993 may use the 160% baseline for the whole building.

Demonstrate fixture and fitting performance through calculations to compare the water use of the as-installed fixtures and fittings with the use of UPC- or IPC-compliant fixtures and fittings, as explained in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

Develop and implement a policy requiring economic assessment of conversion to high-performance plumbing fixtures and fittings as part of any future indoor plumbing renovation. The assessment must account for potential water supply and disposal cost savings and maintenance cost savings.

Potable water is water suitable for drinking that meets or exceeds EPA drinking water standards; it is supplied from wells or municipal water systems.

Potential Technologies & Strategies

Reduce indoor plumbing fixture and fitting potable water usage through automatic water control systems. Install, where possible, water-conserving indoor plumbing fixtures and fittings that meet or exceed the UPC 2006 or IPC 2006 fixture and fitting requirements in combination with high-efficiency or dry fixture and control technologies.

WE Credits 1.1 and 1.2: Water Performance Measurement

1–2 points

Intent

To measure building and subsystem water performance over time to understand consumption patterns and identify opportunities for additional water savings.

Requirements

- ❑ **WE Credit 1.1** (1 point) Metering: Have in place a permanently installed water meter(s) that measures the total potable water use for the entire building and associated grounds. Meter data must be recorded on a regular basis and compiled into monthly and annual summaries. Applicants are also encouraged to meter graywater or reclaimed water supplied to the building.
- ❑ **WE Credit 1.2** (1 point) Submetering: Meet the requirements for WE Credit 1.1 and have in place permanently installed metering for one or more of the following water subsystems:
 - Irrigation. Meter water systems serving at least 80% of the irrigated landscape area on the grounds. The percentage of irrigated landscape area served must be calculated as the total metered irrigated landscape area divided by the total irrigated landscape area. All landscaping areas fully covered with xeriscaping or native vegetation that requires no routine irrigation must be excluded from the calculation entirely.
 - Indoor plumbing fixtures and fittings. Meter water systems serving at least 80% of the indoor plumbing fixtures and fittings described in WE Prerequisite 1, either directly or by deducting all other measured water use from the measured total water consumption of the building and grounds.
 - Cooling towers. Meter replacement water use of all cooling towers serving the facility.
 - Domestic hot water. Meter water use of at least 80% of the installed domestic hot water heating capacity (including both tanks and on-demand heaters).
 - Other process water. Meter at least 80% of expected daily water consumption for process-type end uses, such as humidification systems, dishwashers, clothes washers, pools, and other systems using process water.

Meters must measure potable water use, but graywater or reclaimed water use may also be measured to meet the requirements of this credit. Metering must be continuous and data-logged to allow for an analysis of time trends.

The project must compile monthly and annual summaries of results for each subsystem metered.

Meters must be calibrated within the manufacturer's recommended interval if the building owner, management organization, or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

Potable water is water suitable for drinking that meets or exceeds EPA drinking water standards; it is supplied from wells or municipal water systems.

Potential Technologies & Strategies

Install a building-level water meter to measure and track total potable water consumption in the facility. Install subsystem-level water metering to measure and track potable water consumption by specific building systems; prioritize metering for those systems that use the most potable water.

WE Credit 2.1–2.3: Additional Indoor Plumbing Fixture and Fitting Efficiency

1–3 points

Intent

To maximize indoor plumbing fixture and fitting efficiency within buildings to reduce the use of potable water and consequent burden on municipal water supply and wastewater systems.

Requirements

During the performance period, have in place strategies and systems that in aggregate produce a reduction in indoor plumbing fixture and fitting potable water use from the calculated LEED for Existing Buildings: O&M baseline established in WE Prerequisite 1.

- WE Credit 2.1** (1 point): 10% reduction in indoor plumbing fixture and fitting potable water use from the LEED for Existing Buildings: O&M baseline.
- WE Credit 2.2** (2 points): 20% reduction in indoor plumbing fixture and fitting potable water use from the LEED for Existing Buildings: O&M baseline.
- WE Credit 2.3** (3 points): 30% reduction in indoor plumbing fixture and fitting potable water use from the LEED for Existing Buildings: O&M baseline.

Potable water is water suitable for drinking that meets or exceeds EPA drinking water standards; it is supplied from wells or municipal water systems.

Potential Technologies & Strategies

Reduce indoor plumbing fixture and fitting water usage through automatic controls and other actions. Specify water-conserving indoor plumbing fixtures and fittings that exceed the Uniform Plumbing Code 2006 or International Plumbing Code 2006 fixture and fitting requirements, in combination with ultrahigh-efficiency or dry fixture and fitting and control technologies.

WE Credit 3.1–3.3: Water Efficient Landscaping

1–3 points

Intent

To limit or eliminate the use of potable water or other natural surface or subsurface resources available on or near the project site for landscape irrigation.

Requirements

Reduce potable water or other natural surface or subsurface resource consumption for irrigation compared with conventional means of irrigation. If the building does not have separate water metering for irrigation systems, the water-use reduction achievements can be demonstrated through calculations. Points are earned according to the following schedule:

- WE Credit 3.1** (1 point): 50% reduction in potable water or other natural surface or subsurface resource use for irrigation over conventional means of irrigation.
- WE Credit 3.2** (2 points): 75% reduction in potable water or other natural surface or subsurface resource use for irrigation over conventional means of irrigation.
- WE Credit 3.3** (3 points): 100% reduction in potable water or other natural surface or subsurface resource use for irrigation over conventional means of irrigation.

For building site areas with no landscaped areas, points can be earned by reducing the use of potable water for watering any roof and/or courtyard garden space or outdoor planters, provided the planters and/or garden space cover at least 5% of the building site area (including building footprint, hardscape area, parking footprint, etc.). If the planters and/or garden space cover less than 5% of the building site area, the project is ineligible for this credit.

Three options are available to demonstrate compliance with the above requirements. Project teams that do not separately meter their actual irrigation water use during the performance period must choose Option B.

CHOOSE ONE OF THE FOLLOWING OPTIONS:

OPTION A

Calculate the baseline irrigation water use by determining the water use that would result from using an irrigation system typical for the region and compare this with the building's actual potable water use for irrigation, which can be determined through submetering. Use the baseline and actual water use values to calculate the percentage reduction in potable water or other natural surface or subsurface resource use. More detail about completing this calculation is available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

OPTION B

Calculate the estimated irrigation water use by determining the landscape area for the project and sorting this area into the major vegetation types. Determine the reference Evapotranspiration Rate (ET_0) for the region and determine the Species Factor (k_s), Density Factor (k_d), and Microclimate Factor (k_{mc}) for each vegetation type. Use this information to calculate the Landscape Coefficient (K_L) and irrigation water use

for the installed case.

Calculate the baseline case irrigation water use by setting the above factors to average values representative of conventional equipment and design practices. Use the estimated and baseline case to determine the percentage reduction in potable water or other natural surface or subsurface resource use. Factor values and other resources for completing these calculations are available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

OPTION C

Use independent irrigation performance and ranking tools available from local, regional, state, or national sources to demonstrate reductions in potable water or other natural surface or subsurface resource use for irrigation purposes. Provide information about the independent tool to demonstrate that it is technically sound.

Potable water is water suitable for drinking that meets or exceeds EPA drinking water standards; it is supplied from wells or municipal water systems.

Potential Technologies & Strategies

Specify water-efficient, climate-tolerant native or adapted plantings. Implement or maintain high-efficiency irrigation technologies, such as microirrigation, moisture sensors, or weather data-based controllers. Feed irrigation systems with captured rainwater, graywater (on-site or municipal), municipally reclaimed water, or on-site treated wastewater. Consider not operating an irrigation system. Consider use of xeriscaping principles in arid climates.

WE Credits 4.1 and 4.2: Cooling Tower Water Management

1–2 points

Intent

To reduce potable water consumption for cooling tower equipment through effective water management and/or use of nonpotable makeup water.

Requirements

WE Credit 4.1 (1 point): Chemical Management

Develop and implement a water management plan for the cooling tower that addresses chemical treatment, bleed-off, biological control and staff training as it relates to cooling tower maintenance.

Improve water efficiency by installing and/or maintaining a conductivity meter and automatic controls to adjust the bleed rate and maintain proper concentration at all times.

WE Credit 4.2 (1 point): Nonpotable Water Source Use

Use makeup water that consists of at least 50% nonpotable water, such as harvested rainwater, harvested stormwater, air-conditioner condensate, swimming pool filter backwash water, cooling tower blowdown, pass-through (once-through) cooling water, recycled treated wastewater for toilet and urinal flushing, foundation drain water, municipally reclaimed water or any other appropriate on-site water source that is not naturally occurring groundwater or surface water.

Have a measurement program in place that verifies makeup water quantities used from nonpotable sources. Meters must be calibrated within the manufacturer's recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

Potable water is water suitable for drinking that meets or exceeds EPA drinking water standards; it is supplied from wells or municipal water systems.

Potential Technologies & Strategies

Work with a water treatment specialist to develop a water management strategy addressing the appropriate chemical treatment and bleed-off to ensure proper concentration levels in the cooling tower. Also, develop a biocide treatment program to avoid biological contamination and the risk of *Legionella* in the building.

Identify nonpotable water sources that may be suitable for use in the cooling tower makeup water. Ensure that the water meets the cooling tower manufacturer's guidelines in terms of water purity and adjust the chemical treatment program accordingly.

Energy & Atmosphere (EA)

EA Prerequisite 1: Energy Efficiency Best Management Practices: Planning, Documentation and Opportunity Assessment

Required

Intent

To promote continuity of information to ensure that energy-efficient operating strategies are maintained and provide a foundation for training and system analysis.

Requirements

Document the current sequence of operations for the building.

Develop a building operating plan that provides details on how the building is to be operated and maintained. The operating plan must include, at a minimum, an occupancy schedule, equipment run-time schedule, design setpoints for all HVAC equipment, and design lighting levels throughout the building. Identify any changes in schedules or for different seasons, days of the week, and times of day. Validate that the operating plan has been met during the performance period.

Develop a systems narrative that briefly describes the mechanical and electrical systems and equipment in the building. The systems narrative must include all the systems used to meet the operating conditions stated in the operating plan, including, but not limited to, heating, cooling, ventilation, lighting, and any building controls systems.

Create a narrative of the preventive maintenance plan for equipment described in the systems narrative and document the preventive maintenance schedule during the performance period.

Conduct an energy audit that meets the requirements of the ASHRAE Level I, walk-through analysis.

Potential Technologies & Strategies

Prepare a building operating plan that specifies the current operational needs of the building and identify building systems and other practices necessary to meet those needs. Outline the current sequence of operations to identify and eliminate any inefficiency.

Develop and implement a preventive maintenance program to regularly monitor and optimize the performance of mechanical equipment regulating indoor comfort and the conditions delivered in occupied spaces.

EA Prerequisite 2: Minimum Energy Efficiency Performance Required

Intent

To establish the minimum level of operating energy efficiency performance for the building and systems.

Requirements

Earn at least two points under Energy & Atmosphere Credit 1.

Potential Technologies & Strategies

Existing building commissioning will help identify areas of building operations that are not operating efficiently. Implement energy-saving operational and management practices and/or energy-efficiency retrofits to reduce energy use to the level required to meet this prerequisite.

EA Prerequisite 3: Refrigerant Management: Ozone Protection Required

Intent

To reduce stratospheric ozone depletion.

Requirements

Do not use CFC-based refrigerants in HVAC&R base building systems unless a third-party audit (as defined in the LEED for Existing Buildings: Operations & Maintenance Reference Guide) shows that system replacement or conversion is not economically feasible or it is demonstrated that a phase-out plan for CFC-based refrigerants is in place.

Required economic analysis: The replacement of a chiller is considered not economically feasible if the simple payback of the replacement is greater than 10 years. To determine the simple payback, divide the cost of implementing the replacement by the annual cost avoidance for energy that results from the replacement and any difference in maintenance costs. If CFC-based refrigerants are maintained in the building, reduce annual leakage to 5% or less using EPA Clean Air Act, Title VI, Rule 608 procedures governing refrigerant management and reporting and reduce the total leakage over the remaining life of the unit to less than 30% of its refrigerant charge.

Small HVAC&R units (defined as containing less than 0.5 pounds of refrigerant), standard refrigerators, small water coolers, and any other cooling equipment that contains less than 0.5 pounds of refrigerant are not considered part of the base building system and are exempt.

Potential Technologies & Strategies

Specify only non-CFC-based refrigerants in all new building HVAC&R systems. Identify all existing CFC-based refrigerant uses and upgrade the equipment if economically feasible and/or develop a phase-out plan that identifies a schedule for future replacement.

EA Credit 1: Optimize Energy Efficiency Performance

2–15 points; 2 points mandatory

Intent

To achieve an increased level of operating energy efficiency performance relative to typical buildings of similar type to reduce environmental impacts associated with excessive energy use.

Requirements

Choose one of the following options:

OPTION A

For buildings eligible to receive an EPA rating using ENERGY STAR's Portfolio Manager tool, achieve an energy performance rating of at least 69. If the building is eligible for a rating using Portfolio Manager, Option A must be used.

OPTION B

For buildings not eligible to receive an EPA rating using Portfolio Manager, demonstrate energy efficiency in at least the 19th percentile for typical buildings of similar type by benchmarking against national median source energy data provided in the Portfolio Manager tool or in USGBC's supplementary calculator as an alternative to EPA ratings. Follow the detailed instructions in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

OPTION C

For buildings not eligible to receive an EPA rating using Portfolio Manager and also not suited for Option B, use the alternative method described in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

In addition to Option A, B, or C, meet all the requirements below:

- Achieve energy efficiency performance better than the minima listed above; points are awarded according to the tables below.
- Have an energy meter(s) that measures all energy use throughout the performance period of each building to be certified. Each building's energy performance must be based on actual metered energy consumption for both the LEED project building(s) and all comparable buildings used for the benchmark.

A full 12 months of continuous measured energy data is required.

- Calibrate meters within the manufacturer's recommended interval if the building owner, management organization, or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

OPTION A

Epa Energy Star Rating	LEED for Existing Buildings: O&M Points
65	NA
67	1
69	2
71	3
73	4
75	5
77	6
79	7
81	8
83	9
85	10
87	11
89	12

OPTION B and C

Percentile level above national median (for buildings not eligible for an EPA rating)*	LEED for Existing Buildings: O&M Points
15	NA
17	1
19	2
21	3
23	4
25	5
27	6
29	7
31	8
33	9
35	10
37	11
39	12

Potential Technologies & Strategies

Existing building commissioning and energy audits will help identify areas of building operations that are not efficient. Implement energy-efficient retrofits and energy-saving techniques to reduce the building's energy use.

Choose energy-efficient office equipment, maintenance equipment, and appliances to help reduce energy waste. Use meters on major mechanical systems to monitor energy consumption.

In addition to efficiency improvements, consider renewable energy options as a way to minimize the building's environmental impact.

EA Credit 2.1: Existing Building Commissioning: Investigation and Analysis

2 points

Intent

Through a systematic process, to develop an understanding of the operation of the building's major energy-using systems, options for optimizing energy performance and a plan to achieve energy savings.

Requirements

Conduct one of the following:

OPTION A: Commissioning Process

Develop a retrocommissioning, recommissioning or ongoing commissioning plan for the building's major energy-using systems.

Conduct the investigation and analysis phase.

Document the breakdown of energy use in the building.

List the operating problems that affect occupants' comfort and energy use, and develop potential operational changes that will solve them.

List the identified capital improvements that will provide cost-effective energy savings and document the cost-benefit analysis associated with each.

OPTION B: ASHRAE Level II, Energy Audit

Conduct an energy audit that meets the requirements of ASHRAE Level II, energy survey and analysis.

Document the breakdown of energy use in the building.

Perform a savings and cost analysis of all practical measures that meet the owner's constraints and economic criteria, along with a discussion of any effect on operations and maintenance procedures.

List the identified capital improvements that will provide cost-effective energy savings and document the cost-benefit analysis associated with each.

Potential Technologies & Strategies

Based on the building operating plan and systems narrative, confirm that all building systems and equipment are functioning as appropriate according to the equipment schedule. Conduct testing and analysis to ensure that building systems and equipment are functioning correctly. Identify opportunities to make no- or low-cost capital improvements to enhance building performance.

EA Credit 2.2: Existing Building Commissioning: Implementation

2 points

Intent

To implement minor improvements and identify planned capital projects to ensure that the building's major energy-using systems are repaired, operated, and maintained effectively to optimize energy performance.

Requirements

Implement no- or low-cost operational improvements and create a capital plan for major retrofits or upgrades.

Provide training for management staff that builds awareness and skills in a broad range of sustainable building operations topics; this could include energy efficiency and building, equipment and systems operations, and maintenance.

Demonstrate the observed and/or anticipated financial costs and benefits of measures that have been implemented.

Update the building operating plan as necessary to reflect any changes in the occupancy schedule, equipment run-time schedule, design setpoints, and lighting levels.

Potential Technologies & Strategies

Implement no- and low-cost operational improvements that will immediately enhance building performance. Develop a capital plan for the completion of any major retrofits identified through the investigation and analysis phase.

EA Credit 2.3: Existing Building Commissioning: Ongoing Commissioning

2 points

Intent

To use commissioning to address changes in facility occupancy, usage, maintenance, and repair. Make periodic adjustments and reviews of building operating systems and procedures essential for optimal energy efficiency and service provision.

Requirements

Implement an ongoing commissioning program that includes elements of planning, system testing, performance verification, corrective action response, ongoing measurement, and documentation to proactively address operating problems.

Create a written plan that summarizes the overall commissioning cycle for the building by equipment or building system group. The ongoing commissioning cycle must not exceed 24 months. This plan must include a building equipment list, performance measurement frequency for each equipment item, and steps to respond to deviation from expected performance parameters.

Complete at least half of the scope of work in the first commissioning cycle (as indicated by the percentage of the plan's total budget) prior to the date of application for LEED for Existing Buildings: O&M certification. Only work completed within two years prior to application may be included to show progress in the ongoing commissioning cycle.

Update the building operating plan and/or systems narrative as necessary to reflect any changes in the occupancy schedule, equipment run-time schedule, design setpoints, lighting levels, or system specifications.

Potential Technologies & Strategies

Develop an ongoing commissioning program that addresses the ongoing changes and maintenance needs in an existing building.

EA Credit 3.1: Performance Measurement: Building Automation System

1 point

Intent

To provide information to support the ongoing accountability and optimization of building energy performance and identify opportunities for additional energy-saving investments.

Requirements

Have in place a computer-based building automation system (BAS) that monitors and controls key building systems, including, but not limited to, heating, cooling, ventilation, and lighting. Have a preventive maintenance program in place that ensures BAS components are tested and repaired or replaced according to the manufacturer's recommended interval. Demonstrate that the BAS is being used to inform decisions regarding changes in building operations and energy-saving investments.

Potential Technologies & Strategies

Install and/or maintain a BAS to automatically control key building systems. Ensure that relevant staff are adequately trained to use the system, analyze output, make necessary adjustments, and identify investment opportunities to improve energy performance.

EA Credits 3.2 and 3.3: Performance Measurement: System-Level Metering

1–2 points

Intent

To provide accurate energy use information to support energy management and identify opportunities for additional energy-saving improvements.

Requirements

Develop a breakdown of energy use in the building, either through EA Credits 2.1 and 2.2 or by using energy bills, spot metering or other metering to determine the energy consumption of major mechanical systems and other end-use applications. This analysis of major energy use categories must have been conducted within two years prior to the date of application for LEED for Existing Buildings: O&M certification.

Based on the energy use breakdown, employ system-level metering covering at least 40% or 80% of the total expected annual energy consumption of the building. Permanent metering and recording are required. All types of submetering are permitted.

- EA Credit 3.2** (1 point): Demonstrate that system-level metering is in place covering at least 40% of the total expected annual energy consumption of the building. Further, at least one of the two largest energy use categories from the breakdown report must be covered to the extent of 80% or more (i.e., if energy use in the two largest categories is each 100 BTUs/year, at least 80 BTUs/year in one of them must be metered).
- EA Credit 3.3** (1 point): Demonstrate that system-level metering is in place covering at least 80% of the total expected annual energy consumption of the building. Further, at least two of the three largest energy use categories from the breakdown report must be covered to the extent of 80% or more.

Meters must be calibrated within the manufacturer's recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

Potential Technologies & Strategies

Identify, through an energy audit, building commissioning or some other means, how the building systems are consuming energy. Based on the energy use profile, develop a metering plan to capture the most significant building loads. Use output from the meters to identify any changes in consumption and opportunities for energy-saving improvements. Have a plan for periodically inspecting the data.

EA Credits 4.1–4.4: On-Site and Off-Site Renewable Energy

1–4 points

Intent

To encourage and recognize increasing levels of on-site and off-site renewable energy to reduce environmental impacts associated with fossil fuel energy use.

Requirements

Over the performance period, meet some or all of the building's total energy use with on-site or off-site renewable energy systems. Points are earned according to the following table, which shows the percentages of building energy use met by renewable energy over the performance period.

Off-site renewable energy sources are defined by the Center for Resource Solutions (CRS) Green-e products certification requirements, or the equivalent. Green power may be procured from a Green-e-certified power marketer or a Green-e-accredited utility program, or through Green-e-certified tradable renewable energy certificates (RECs), or the equivalent. For on-site renewable energy that is claimed for LEED for Existing Buildings: O&M credit, the associated environmental attributes must be retained or retired and cannot be sold.

If the green power is not Green-e certified, equivalence must exist for both major Green-e program components:

- 1) current green power performance standards, and 2) independent, third-party verification that those standards are being met by the green power supplier over time.

Up to the four-point limit, any combination of individual actions are awarded the sum of the points allocated to those individual actions. For example, one point would be awarded for implementing 3% of on-site renewable energy, and two additional points would be awarded for meeting 50% of the building's energy load with renewable power or certificates over the performance period. Projects must submit proof of a contract to purchase RECs for a minimum of two years and must also make a commitment to purchase RECs on an ongoing basis beyond that.

Points	On-Site Renewable Energy		Off-Site Renewable Energy Certificates
1	3%	or	25%
2	6%	or	50%
3	9%	or	75%
4	12%	or	100%

Potential Technologies & Strategies

Design and specify the use of on-site nonpolluting renewable technologies to contribute to the total energy requirements of the building. Consider and employ solar, geothermal, wind, biomass (other than unsustainably harvested wood), and biogas technologies.

Purchase renewable energy or tradable renewable energy certificates to meet some or all of the building's energy requirements. Review the building's electrical consumption trends. Research power providers in the area and

select a provider that guarantees that a portion of its delivered electric power is derived from net nonpolluting renewable technologies. If the project is in an open-market state, investigate green power and power marketers licensed to provide power in that state. Grid power that qualifies for this credit originates from solar, wind, geothermal, biomass, or low-impact hydro sources.

EA Credit 5: Refrigerant Management

1 point

Intent

To reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to global warming.

Requirements

Choose one of the following options:

OPTION A

Do not use refrigerants in base building HVAC&R systems.

OPTION B

Complete both of the following:

- Select refrigerants and HVAC&R equipment that minimize or eliminate the emission of compounds that contribute to ozone depletion and global warming. The base building HVAC&R equipment must comply with the following formula, which sets a maximum threshold for the combined contributions to ozone depletion potential (ODP) and global warming potential (GWP):

$$LCGWP + LCODP \times 10^5 \leq 100$$

Where:

$$LCODP = [\text{ODPr} \times (\text{Lr} \times \text{Life} + \text{Mr}) \times \text{Rc}] / \text{Life}$$

$$LCGWP = [\text{GWPr} \times (\text{Lr} \times \text{Life} + \text{Mr}) \times \text{Rc}] / \text{Life}$$

LCODP: Lifecycle Ozone Depletion Potential (lbCFC11/Ton-Year)

LCGWP: Lifecycle Direct Global Warming Potential (lbCO₂/Ton-Year)

GWPr: Global Warming Potential of Refrigerant (0 to 12,000 lbCO₂/lbr)

ODPr: Ozone Depletion Potential of Refrigerant (0 to 0.2 lbCFC11/lbr)

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

Mr: End-of-life Refrigerant Loss (2% to 10%; default of 10% unless otherwise demonstrated)

Rc: Refrigerant Charge (0.5 to 5.0 lbs of refrigerant per ton of cooling capacity)

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

For multiple types of equipment, a weighted average of all base building level HVAC&R equipment must be applied using the following formula:

$$[(LCGWP + LCODP \times 10^5) \times Q_{\text{unit}}] / Q_{\text{total}} \leq 100$$

Where:

Q_{unit} = Cooling capacity of an individual HVAC or refrigeration unit (tons)

Q_{total} = Total cooling capacity of all HVAC or refrigeration

-
- Do not operate fire-suppression systems that contain ozone-depleting substances (CFCs, HCFCs or halons).

Small HVAC units (defined as containing less than 0.5 pounds of refrigerant), standard refrigerators, small water coolers and any other cooling equipment that contains less than 0.5 pounds of refrigerant are not considered part of the base building system and are exempt.

Potential Technologies & Strategies

Operate the facility without mechanical cooling and refrigeration equipment. Where mechanical cooling is needed, use for the refrigeration cycle base building HVAC and refrigeration systems that minimize direct impact on ozone depletion and global warming. Select HVAC&R replacement equipment with reduced refrigerant charge and increased equipment life. Maintain equipment to prevent leakage of refrigerant to the atmosphere. Use fire-suppression systems that do not contain HCFCs or halons.

EA Credit 6: Emissions Reduction Reporting

1 point

Intent

To document the emissions reduction benefits of building efficiency measures.

Requirements

Identify building performance parameters that reduce conventional energy use and emissions, quantify those reductions, and report them to a formal tracking program:

Track and record emissions reductions delivered by energy efficiency measures, operational improvements, renewable energy, and other building emissions reduction measures, including reductions from the purchase of renewable energy credits.

Report emissions reductions using a third-party voluntary reporting or certification program (e.g., EPA Climate Leaders, ENERGY STAR or WRI/WBCSD protocols).

Potential Technologies & Strategies

USGBC encourages projects to address all significant types of pollutants reduced by energy efficiency.

Materials & Resources (MR)

MR Prerequisite 1: Sustainable Purchasing Policy

Required

Intent

To reduce the environmental impacts of materials acquired for use in the operations, maintenance, and upgrades of buildings.

Requirements

Have in place a sustainable purchasing policy that includes, at a minimum, product purchasing policies for the building and site addressing the requirements of MR Credit 1, Sustainable Purchasing: Ongoing Consumables. This policy must adhere to the LEED for Existing Buildings: O&M policy model (see Introduction). At a minimum, the policy must cover those product purchases that are within the building and site management's control.

Additionally, extend the sustainable purchasing policy to include product purchasing for the building and site addressing the requirements of at least one of the credits listed below. This extended policy must also adhere to the LEED for Existing Buildings: O&M policy model and specifically address the goal, scope, and performance metric for the respective credit:

- MR Credit 2:** Sustainable Purchasing—Durable Goods
- MR Credit 3:** Sustainable Purchasing—Facility Alterations and Additions
- MR Credit 4:** Toxic Material Source Reduction—Reduced Mercury in Lamps

This prerequisite requires only policies, not ongoing actual sustainable performance.

Potential Technologies & Strategies

A sustainable purchasing policy introduces environmentally conscious purchasing into building practices. The policy needs to clearly define an objective and establish a sustainability claims verification procedure that can be replicated as necessary. Verification procedures may rely on product certifications such as Green Seal and ENERGY STAR. Take care to confirm the validity of any product certification criteria before including it in the sustainable purchasing policy. An acceptable way to achieve this prerequisite is by using the U.S. Environmental Protection Agency's Environmentally Preferable Purchasing (EPP) Program guidelines. The EPP Program information can be found on the associated website: <http://www.epa.gov/epp/>.

Evaluate the items that are purchased for the building, identify more environmentally friendly alternatives, and establish a policy to purchase these alternatives when economically feasible. Work with suppliers to identify sustainable products that meet the needs of the building.

MR Prerequisite 2: Solid Waste Management Policy

Required

Intent

To reduce the amount of waste and toxins that are hauled to and disposed of in landfills or incineration facilities.

Requirements

Have in place a solid waste management policy for the building and site addressing the requirements of the waste management credits listed below as well as recycling of all mercury-containing lamps. This policy must adhere to the LEED for Existing Buildings: O&M policy model (see Introduction). At a minimum, the policy must cover the waste streams that are within the building and site management's control.

- MR Credit 7:** Solid Waste Management—Ongoing Consumables
- MR Credit 8:** Solid Waste Management—Durable Goods
- MR Credit 9:** Solid Waste Management—Facility Alterations and Additions

This prerequisite requires only policies, not ongoing actual sustainable performance.

Potential Technologies & Strategies

Evaluate the building's waste stream and establish policies to divert materials from disposal in landfills or incineration facilities by encouraging the reuse and recycling of items, where possible.

MR Credit 1.1–1.3: Sustainable Purchasing: Ongoing Consumables

1–3 points

Intent

To reduce the environmental and air quality impacts of the materials acquired for use in the operations and maintenance of buildings.

Requirements

Maintain a sustainable purchasing program covering materials with a low cost per unit that are regularly used and replaced through the course of business. These materials include, but are not limited to, paper (printing or copy paper, notebooks, notepads, envelopes), toner cartridges, binders, batteries, and desk accessories but exclude food and beverages (see MR Credit 5). For materials that may be considered either ongoing consumables or durable goods (see MR Credit 2), the project team is free to decide which category to put them in as long as consistency is maintained with MR Credit 2, with no contradictions, exclusions or double-counting. Consistency must also be maintained with MR Credit 7.

A template calculator for MR Credits 1.1–1.3 is available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide. One, two, or three points are awarded to projects that achieve sustainable purchases of at least 40%, 60%, or 80%, respectively, of total purchases (by cost) over the performance period. Sustainable purchases are those that meet one or more of the following criteria:

- Purchases contain at least 10% postconsumer or 20% postindustrial material.
- Purchases contain at least 50% rapidly renewable materials.
- Purchases contain at least 50% materials harvested and processed or extracted and processed within 500 miles of the project.
- The purchases consist of at least 50% Forest Stewardship Council (FSC)–certified paper products.
- Batteries are rechargeable.

Each purchase can receive credit for each sustainable criterion met (i.e., a \$100 purchase that contains both 10% postconsumer recycled content and 50% of content harvested within 500 miles of the project counts twice in the calculation, for a total of \$200 of sustainable purchasing).

Ongoing consumables must be purchased during the performance period to earn points in this credit.

Potential Technologies & Strategies

When purchasing materials, supplies or equipment, specify those that meet one or more of the criteria.

The sustainable purchasing policy introduced environmentally conscious purchasing into building practices. The policy-defined objective and sustainability claims verification procedure are the guides to achieving this credit. Verification procedures may rely on product certifications such as Green Seal and ENERGY STAR. Take care to confirm the validity of any product certification criteria before including it in the sustainable purchasing policy. An acceptable way to achieve this credit is by using the U.S. Environmental Protection Agency's Environmentally Preferable Purchasing (EPP) Program guidelines. The EPP Program information can be found on the associated website: <http://www.epa.gov/epp/>. This credit will support the sustainable purchasing policy through implementing its requirements, and will demonstrate the project's actual, ongoing performance.

MR Credits 2.1 and 2.2: Sustainable Purchasing: Durable Goods

1–2 points

Intent

To reduce the environmental and air quality impacts of the materials acquired for use in the operations and maintenance of buildings.

Requirements

Maintain a sustainable purchasing program covering items available at a higher cost per unit and durable goods that are replaced infrequently and/or may require capital program outlays to purchase. Materials that may be considered either ongoing consumables (see MR Credit 1) or durable goods can be counted under either category provided consistency is maintained with MR Credit 1, with no contradictions, exclusions or double-counting.

Consistency must also be maintained with MR Credit 8.

- ❑ **MR Credit 2.1:** Electric-Powered Equipment. One point is awarded to projects that achieve sustainable purchases of at least 40% of total purchases of electric-powered equipment (by cost) over the performance period. Examples of electric-powered equipment include, but are not limited to, office equipment (computers, monitors, copiers, printers, scanners, fax machines), appliances (refrigerators, dishwashers, water coolers), external power adapters, and televisions and other audiovisual equipment. Sustainable purchases are those that meet one of the following criteria:
 - The equipment is ENERGY STAR labeled (for product categories with developed specifications).
 - The equipment (either battery or corded) replaces conventional gas-powered equipment. Examples include, but are not limited to, maintenance equipment and vehicles, landscaping equipment and cleaning equipment.
- ❑ **MR Credit 2.2:** Furniture. One point is awarded to projects that achieve sustainable purchases of at least 40% of total purchases of furniture (by cost) over the performance period. Sustainable purchases are those that meet one or more of the following criteria:
 - Purchases contain at least 10% post-consumer or 20% post-industrial material.
 - Purchases contain at least 70% material salvaged from off-site or outside the organization.
 - Purchases contain at least 70% material salvaged from on-site, through an internal organization materials and equipment reuse program.
 - Purchases contain at least 50% rapidly renewable material.
 - Purchases contain at least 50% Forest Stewardship Council (FSC)–certified wood.
 - Purchases contain at least 50% material harvested and processed or extracted and processed within 500 miles of the project.

Each furniture purchase can receive credit for each sustainable criterion met (i.e., a \$100 purchase that contains both 10% postconsumer recycled content and 50% of content harvested within 500 miles of the project counts twice in the calculation, for a total of \$200 of sustainable purchasing).

Durable goods must be purchased during the performance period to earn points in this credit.

Potential Technologies & Strategies

When purchasing materials, supplies or equipment, specify products that meet one or more of the criteria. This credit is eligible for exemplary performance if the project team uses Electronic Product Environmental Assessment Tools (EPEAT)–rated desktop computers, monitors, and notebooks.

The sustainable purchasing policy introduced environmentally conscious purchasing into building practices. The policy-defined objective and sustainability claims verification procedure are the guides to achieving this credit. Verification procedures may rely on product certifications such as Green Seal and ENERGY STAR. Take care to confirm the validity of any product certification criteria before including it in the sustainable purchasing policy. An acceptable way to achieve this credit is by using the U.S. Environmental Protection Agency's Environmentally Preferable Purchasing (EPP) Program guidelines. The EPP Program information can be found on the associated website: <http://www.epa.gov/epp/>. This credit will support the sustainable purchasing policy through implementing its requirements, and will demonstrate the project's actual, ongoing performance.

MR Credit 3: Sustainable Purchasing: Facility Alterations and Additions

1 point

Intent

To reduce the environmental and air quality impacts of the materials acquired for use in the upgrade of buildings.

Requirements

Maintain a sustainable purchasing program covering materials for facility renovations, demolitions, refits, and new construction additions. This applies only to base building elements permanently or semipermanently attached to the building itself. Examples include, but are not limited to, building components and structures (wall studs, insulation, doors, windows), panels, attached finishings (drywall, trim, ceiling panels), carpet and other flooring material, adhesives, sealants, paints, and coatings. Materials considered furniture, fixtures, and equipment (FF&E) are not considered base building elements and are excluded from this credit. Mechanical, electrical, and plumbing components and specialty items such as elevators are also excluded from this credit.

A template calculator for MR Credit 3 is available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide. One point is awarded to projects that achieve sustainable purchases of 50% of total purchases (by cost) over the performance period. Sustainable purchases are those that meet one or more of the following criteria:

- Purchases contain at least 10% postconsumer or 20% postindustrial material.
- Purchases contain at least 70% material salvaged from off-site or outside the organization.
- Purchases contain at least 70% material salvaged from on-site, through an internal organization materials and equipment reuse program.
- Purchases contain at least 50% rapidly renewable material.
- Purchases contain at least 50% Forest Stewardship Council (FSC)–certified wood.
- Purchases contain at least 50% material harvested and processed or extracted and processed within 500 miles of the project.
- Adhesives and sealants have a VOC content less than the current VOC content limits of South Coast Air Quality Management District (SCAQMD) Rule #1168, or sealants used as fillers meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51.
- Paints and coating have VOC emissions not exceeding the VOC and chemical component limits of Green Seal's Standard GS-11 requirements.
- Noncarpet finished flooring is FloorScore-certified and constitutes a minimum of 25% of the finished floor area.
- Carpet meets the requirements of the CRI Green Label Plus Carpet Testing Program.
- Carpet cushion meets the requirements of the CRI Green Label Testing Program.
- Composite panels and agrifiber products contain no added urea-formaldehyde resins.

Composite wood and agrifiber products are defined as particleboard, medium-density fiberboard (MDF), plywood, oriented-strand board (OSB), wheatboard, strawboard, panel substrates, and door cores.

Each purchase can receive credit for each sustainable criterion met (i.e., a \$100 purchase that contains both 10% postconsumer recycled content and 50% of content harvested within 500 miles of the project counts twice in the calculation, for a total of \$200 of sustainable purchasing).

Materials for alterations or additions must be purchased during the performance period to earn points in this credit.

Potential Technologies & Strategies

When purchasing materials, supplies, or equipment, specify products that meet one or more of the criteria.

The sustainable purchasing policy introduced environmentally conscious purchasing into building practices. The policy-defined objective and sustainability claims verification procedure are the guides to achieving this credit. Verification procedures may rely on product certifications such as Green Seal and ENERGY STAR. Take care to confirm the validity of any product certification criteria before including it in the sustainable purchasing policy. An acceptable way to achieve this credit is by using the U.S. Environmental Protection Agency's Environmentally Preferable Purchasing (EPP) Program guidelines. The EPP Program information can be found on the associated website: <http://www.epa.gov/epp/>. This credit will support the sustainable purchasing policy through implementing its requirements, and will demonstrate the project's actual, ongoing performance.

MR Credits 4: Sustainable Purchasing: Reduced Mercury in Lamps

1–2 points

Intent

To establish and maintain a toxic material source reduction program to reduce the amount of mercury brought onto the building site through purchases of lamps.

Requirements

Develop a lighting purchasing plan that specifies maximum levels of mercury permitted in mercury-containing lamps purchased for the building and associated grounds. The purchasing plan must specify a target for the overall average of mercury content in lamps of 90 picograms per lumen-hour or less. The plan must include lamps for both indoor and outdoor fixtures, as well as both hard-wired and portable fixtures. The plan must require that at least 90% of purchased lamps comply (as measured by the number of lamps). Lamps containing no mercury may be counted toward plan compliance only if they have energy efficiency at least as good as their mercury-containing counterparts.

Implement the lighting purchasing plan during the performance period. One or two points are awarded to projects for which at least 90% of all mercury-containing lamps purchased during the performance period (as measured by the number of lamps) comply with the purchasing plan and meet the following overall targets for mercury content:

- MR Credit 4.1** (1 point): 90 picograms per lumen-hour
- MR Credit 4.2** (2 points): 70 picograms per lumen-hour

A template calculator to aid in documenting performance for MR Credits 4.1 and 4.2 is available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

Exception: Screw-based, integral compact fluorescent lamps (CFLs) may be excluded from both the plan and the performance calculation if they comply with the voluntary industry guidelines for maximum mercury content published by the National Electrical Manufacturers Association (NEMA), as described in the LEED for Existing Buildings: Operations & Maintenance Reference Guide. Screw-based, integral CFLs that do not comply with the NEMA guidelines must be included in the purchasing plan and the performance calculation.

Performance metrics for lamps—including mercury content (mg/lamp), mean light output (lumens) and rated life (hours)—must be derived according to industry standards, as described in the LEED for Existing Buildings: Operations & Maintenance Reference Guide. Mercury values generated by toxicity characteristic leaching procedure (TCLP) tests do not provide the required mercury information for LEED for Existing Buildings: O&M and cannot be used in the calculation.

LEED for Existing Buildings: O&M addresses only the lamps purchased during the performance period, not the lamps previously installed in the building. Similarly, LEED for Existing Buildings: O&M does not require that each purchased lamp comply with the specified mercury limit; only the overall average of purchased lamps must comply.

Mercury-containing lamps (or their high-efficiency counterparts) must be purchased during the performance period to earn points in this credit.

Potential Technologies & Strategies

Establish and follow a lamp-purchasing program that sets a minimum level of mercury content and life for all mercury-containing lamp types. Work with suppliers to specify these requirements for all future purchases.

MR Credit 5: Sustainable Purchasing: Food

1 point

Intent

To reduce the environmental and transportation impacts associated with food production and distribution.

Requirements

Achieve sustainable purchases of at least 25% of total combined food and beverage purchases (by cost) during the performance period. Sustainable purchases are those that meet one or both of the following criteria:

- Purchases are labeled USDA Certified Organic, Food Alliance Certified, Rainforest Alliance Certified, Protected Harvest Certified, Fair Trade, or Maine Stewardship Council's Blue Eco-Label.
- Purchases are produced within a 100-mile radius of the site.

Each purchase can receive credit for each sustainable criterion met (i.e., a \$100 purchase that is both USDA Certified Organic and is produced on a farm within 100 miles of the project counts twice in the calculation, for a total of \$200 of sustainable purchasing).

Food or beverages must be purchased during the performance period to earn points in this credit.

Potential Technologies & Strategies

When purchasing food and beverages, specify that the items meet one or both criteria in this credit. Consider using catering companies that purchase locally grown and/or organic foods.

MR Credit 6: Solid Waste Management: Waste Stream Audit

1 point

Intent

To facilitate the reduction of ongoing waste and toxins generated by building occupants and building operations that are hauled to and disposed of in landfills or incineration facilities.

Requirements

Conduct a waste stream audit of the building's entire ongoing consumables waste stream (not durable goods or construction waste for facilities alterations and additions). Use the audit's results to establish a baseline that identifies the types of waste making up the waste stream and the amounts of each type by weight or volume. Identify opportunities for increased recycling and waste diversion. The audit must be conducted during the performance period.

Potential Technologies and Strategies

Understanding waste production patterns in a building is an important first step to waste reduction. Work with your waste hauler or service provider to collect and analyze information on the amounts and types of waste generated by the facility.

MR Credits 7.1 and 7.2: Solid Waste Management: Ongoing Consumables

1–2 points

Intent

To facilitate the reduction of waste and toxins generated from the use of ongoing consumable products by building occupants and building operations that are hauled to and disposed of in landfills or incineration facilities.

Requirements

Maintain a waste reduction and recycling program that addresses materials with a low cost per unit that are regularly used and replaced through the course of business. These materials include, but are not limited to, paper, toner cartridges, glass, plastics, cardboard and old corrugated cardboard, food waste, and metals. Materials that may be considered either ongoing consumables or durable goods (see MR Credit 8) can be counted under either category provided consistency is maintained with MR Credit 8, with no contradictions, exclusions or double-counting. Consistency must also be maintained with MR Credits 1 and 5.

- MR Credit 7.1** (1 point): Reuse, recycle or compost 50% of the ongoing consumables waste stream (by weight or volume).
- MR Credit 7.2** (2 points): Reuse, recycle or compost 70% of the ongoing consumables waste stream (by weight or volume).

Have a battery recycling program in place that implements the battery recycling policy adopted in MR Prerequisite 2. The program must have a target of diverting at least 80% of discarded batteries from the trash, and actual diversion performance must be verified at least annually. The program must cover all portable dry-cell types of batteries, including single-use and/or rechargeables used in radios, phones, cameras, computers, and other devices or equipment.

Potential Technologies & Strategies

Maintain a waste reduction and recycling program that addresses materials with a low cost per unit that are regularly used and replaced through the course of business. Encourage a high level of recycling by building occupants.

MR Credit 8: Solid Waste Management: Durable Goods

1 point

Intent

To facilitate the reduction of waste and toxins generated from the use of durable goods by building occupants and building operations that are hauled to and disposed of in landfills or incineration facilities.

Requirements

Maintain a waste reduction, reuse and recycling program that addresses durable goods that are replaced infrequently and/or may require capital program outlays to purchase. Examples include, but are not limited to, office equipment (computers, monitors, copiers, printers, scanners, fax machines), appliances (refrigerators, dishwashers, water coolers), external power adapters, televisions, and other audiovisual equipment. Materials that may be considered either ongoing consumables (see MR Credit 7) or durable goods can be counted under either category provided consistency is maintained with MR Credit 7, with no contradictions, exclusions, or double-counting. Consistency must also be maintained with MR Credit 2.

Reuse or recycle 75% of the durable goods waste stream (by weight, volume or replacement value) during the performance period.

Durable goods waste stream is defined as durable goods leaving the project building, site, and organization that have fully depreciated and reached the end of their useful lives for normal business operations. Durable goods that remain useful and functional and are moved to another floor or building, etc. do not qualify. Leased durable goods returned to their owner at the end of their useful lives for normal business operations do qualify.

Potential Technologies & Strategies

Maintain a waste reduction, reuse and recycling program that addresses durable items that are replaced infrequently and/or may require capital program outlays to replace. Consider taking part in a leasing or donation program to help maintain waste reduction. In addition to any statewide electronic recycling efforts, consider using StEP (<http://www.step-initiative.org/>) for guidance in disposing of electronic waste or for manufacturer and provider takeback options.

MR Credit 9: Solid Waste Management: Facility Alterations and Additions

1 point

Intent

To divert construction and demolition waste from disposal to landfills and incineration facilities. Redirect recyclable recovered resources to the manufacturing process. Redirect reusable materials to appropriate sites.

Requirements

Divert at least 70% of waste (by volume) generated by facility alterations and additions from disposal to landfills and incineration facilities. This applies only to base building elements permanently or semipermanently attached to the building itself that enter the waste stream during facility renovations, demolitions, refits, and new construction additions. Examples include, but are not limited to, building components and structures (wall studs, insulation, doors, windows), panels, attached finishings (drywall, trim, ceiling panels), carpet and other flooring material, adhesives, sealants, paints, and coatings. Furniture, fixtures, and equipment (FF&E) are not considered base building elements and are excluded from this credit. Mechanical, electrical, and plumbing components and specialty items such as elevators are also excluded.

Potential Technologies & Strategies

Maintain waste management policies applicable to any facility alterations and additions occurring on the site. Identify licensed haulers and processors of recyclable materials. Identify markets for salvaged materials. Employ deconstruction, salvage, and recycling strategies and processes. Document the cost for recycling, salvaging, and reusing materials. Make source reduction on the job site an integral part of the plan to reduce solid waste. Investigate salvaging or recycling lighting fixture pans when retrofitting.

Indoor Environmental Quality (EQ)

EQ Prerequisite 1: Outdoor Air Introduction and Exhaust Systems Required

Intent

To establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the health and well-being of the occupants.

Requirements

Choose one of the following options:

OPTION A

Modify or maintain each outside air intake, supply air fan, and/or ventilation distribution system to supply at least the outdoor air ventilation rate required by ASHRAE 62.1–2007 Ventilation Rate Procedure under all normal operating conditions.

OPTION B

If meeting ASHRAE 62.1–2007 ventilation rates is infeasible because of the physical constraints of the existing ventilation system, modify or maintain the system to supply at least 10 cubic feet per minute (cfm) of outdoor air per person under all normal operating conditions. Demonstrate through design documentation, measurements, or other evidence that the current system cannot provide the flow rates required by ASHRAE 62.1–2007 under any operating condition even when functioning properly.

Each air-handling unit in the building must comply with either Option A or Option B above. If some air-handling units can provide the outside airflow required by ASHRAE 62.1–2007 and others cannot, those that can must do so. Buildings that cannot provide at least 10 cfm per person of outside air at each air-handling unit under all normal operating conditions cannot earn this prerequisite.

Additionally, meet all the requirements below:

- Show compliance with the applicable requirement above (Option A or Option B) through measurements taken at the system level (i.e., the air-handling unit). For variable air volume systems, the dampers, fan speeds, etc. must be set during the test to the worst-case system conditions (minimum outside airflow) expected during normal ventilation operations. Each air handler must be measured; sampling of air handlers is prohibited.
- Implement and maintain an HVAC system maintenance program to ensure the proper operations and maintenance of HVAC components as they relate to outdoor air introduction and exhaust.
- Test and maintain the operation of all building exhaust systems, including bathroom, shower, kitchen, and parking exhaust systems.

Potential Technologies & Strategies

Conduct a visual inspection of outside air vents and dampers and remove any outside air vent or louver obstructions that restrict full outside air capacity from entering the distribution system. Conduct airflow monitoring to document outside air cfm. Compare measured flow with designed flow for each unit.

EQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control

Required

Intent

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

Requirements

Choose one of the following options:

OPTION A

Prohibit smoking in the building and designate exterior smoking areas at least 25 feet from building entries, outdoor air intakes and operable windows.

OPTION B

Prohibit smoking in the building except in designated smoking rooms and establish negative pressure in the rooms with smoking.

Locate any exterior designated smoking areas at least 25 feet away from building entries, outdoor air intakes and operable windows.

Design indoor designated smoking room(s) to effectively contain, capture, and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors, away from air intakes and building entry paths, with no recirculation of ETS-containing air to the nonsmoking area of the building; enclosed with impermeable deck-to-deck partitions; and operated at a negative pressure compared with the surrounding spaces of at least an average of 5 Pa (0.02 inches water gauge) and a minimum of 1 Pa (0.004 inches water gauge) when the door(s) to the smoking room are closed.

Verify performance by conducting 15 minutes of measurement, with a minimum of one measurement every 10 seconds, of the differential pressure in the smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. Conduct the testing with each space configured for worst-case conditions for transport of air from the smoking room to adjacent spaces.

OPTION C

Option C is for residential buildings only.

Reduce air leakage between smoking and nonsmoking areas.

Prohibit smoking in all common areas of the building.

Locate any exterior designated smoking areas at least 25 feet away from building entries, outdoor air intakes, and operable windows opening to common areas.

Minimize uncontrolled pathways for ETS transfer between individual residential units by sealing penetrations in each unit's walls, ceilings, and floors and by sealing adjacent vertical chases. In addition, weather-strip all doors in the residential units leading to common hallways to minimize air leakage. Demonstrate acceptable sealing of residential units in two ways: 1) by a blower door test conducted in accordance with ASTM-779-

03, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization, and 2) by use of the progressive sampling methodology defined in Chapter 7 (Home Energy Rating Systems, HERS Required Verification and Diagnostic Testing) of the California Residential Alternative Calculation Method Approval Manual. Residential units must demonstrate less than 1.25 square inches of leakage area per 100 square feet of enclosure area (i.e., the sum of all wall, ceiling, and floor areas).

Potential Technologies & Strategies

Prohibit smoking in the building or provide negative-pressure smoking rooms. For residential buildings, a third option is to provide very tight construction to minimize the transfer of ETS among dwelling units.

EQ Prerequisite 3: Green Cleaning Policy

Required

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems, and the environment.

Requirements

Have in place a green cleaning policy for the building and site addressing the following green cleaning credits and other requirements:

- Purchase of sustainable cleaning and hard floor and carpet care products meeting the sustainability criteria outlined in EQ Credits 3.4–3.6.
- Purchase of cleaning equipment meeting the sustainability criteria outlined in EQ Credit 3.7.
- Establishment of standard operating procedures (SOPs) addressing how an effective cleaning and hard floor and carpet maintenance system will be consistently utilized, managed, and audited. Specifically address cleaning to protect vulnerable building occupants.
- Development of strategies for promoting and improving hand hygiene, including both hand washing and the use of alcohol-based waterless hand sanitizers.
- Development of guidelines addressing the safe handling and storage of cleaning chemicals used in the building, including a plan for managing hazardous spills or mishandling incidents.
- Development of requirements for staffing and training of maintenance personnel appropriate to the needs of the building. Specifically address the training of maintenance personnel in the hazards of use, disposal, and recycling of cleaning chemicals, dispensing equipment, and packaging.
- Provision for collecting occupant feedback and continuous improvement to evaluate new technologies, procedures, and processes.

This policy must adhere to the LEED for Existing Buildings: O&M policy model (see Introduction). At a minimum, the policy must cover the green cleaning materials that are within the building and site management's control.

Potential Technologies & Strategies

Over the performance period, establish a written green cleaning policy addressing SOPs, sustainable products and equipment, chemical handling and storage, and staff training.

EQ Credit 1.1: IAQ Best Management Practices: IAQ Management Program

1 point

Intent

To enhance indoor air quality (IAQ) by optimizing practices to prevent the development of indoor air quality problems in buildings, correcting indoor air quality problems when they occur, and maintaining the well-being of the occupants.

Requirements

Develop and implement on an ongoing basis an IAQ management program based on EPA's "Indoor Air Quality Building Education and Assessment Model (I-BEAM)," EPA Reference Number 402-C-01-001, December 2002, available at <http://www.epa.gov/iaq/largebldgs/i-beam/index.html>.

Potential Technologies & Strategies

Operate a program to enhance IAQ by optimizing practices to prevent the development of indoor air quality problems in buildings and maintain the well-being of the occupants. Survey and evaluate building systems to identify potential IAQ problems and implement an ongoing program to prevent these problems from occurring and to maintain a high level of IAQ. Include in the program a plan for preventing moisture accumulation and mold in the building. For additional information, see the EPA website on indoor air quality, www.epa.gov/iaq/largebldgs/baqtoc.html.

EQ Credit 1.2: IAQ Best Management Practices: Outdoor Air Delivery Monitoring

1 point

Intent

To provide capacity for ventilation system monitoring to help sustain occupants' comfort and well-being.

Requirements

Install permanent, continuous monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain minimum outdoor rates under all operating conditions.

For all mechanical ventilation systems:

Provide an outdoor airflow measurement device capable of measuring (and, if necessary, controlling) the minimum outdoor airflow rate at all expected system operating conditions within 15% of the design minimum outdoor air rate. Monitoring must be performed for at least 80% of the building's total outdoor air intake flow serving occupied spaces.

The outdoor airflow measurement device(s) must take measurements at the system level (i.e., the air-handling unit). The device must be monitored by a control system that is configured to trend outdoor airflow in intervals no longer than 15 minutes for a period of no less than six months. The control system must be configured to generate an alarm visible to the system operator if the minimum outdoor air rate falls more than 15% below the design minimum rate.

All measurement devices must be calibrated within the manufacturer's recommended interval.

For mechanical ventilation systems that predominantly serve densely occupied spaces:

Have a CO₂ sensor or sampling location for each densely occupied space and compare it with outdoor ambient CO₂ concentrations. Each sampling location must be between 3 feet and 6 feet above the floor.

Test and calibrate CO₂ sensors to have an accuracy of no less than 75 parts per million (ppm) or 5% of the reading, whichever is greater. Sensors must be tested and calibrated at least once every five years or per the manufacturer's recommendation, whichever is shorter.

Monitor CO₂ sensors with a system configured to trend CO₂ concentrations in intervals no longer than 30 minutes.

The system must generate an alarm visible to the system operator and, if desired, to building occupants if the CO₂ concentration in any zone rises more than 15% above that corresponding to the minimum outdoor air rate required by ASHRAE 62 (see EQ Prerequisite 1).

CO₂ sensors may be used for demand-controlled ventilation provided the control strategy complies with ASHRAE 62 (see EQ Prerequisite 1), including maintaining the area-based component of the design ventilation rate.

Densely occupied space is defined as an area with a design occupant density greater than or equal to 25 people per 1,000 square feet (40 square feet per person). If the total square footage of all dense space is less than 5% of total occupied square footage, the project is exempt from the requirements of this section. Rooms smaller than 150 square feet are also exempt.

For natural ventilation systems:

Locate CO₂ sensors in the breathing zone of every densely populated room and every natural ventilation zone. CO₂ sensors must provide an audible or visual alarm to the occupants in the space and to the system operator if CO₂ conditions are greater than 530 parts per million above outdoor CO₂ levels or 1,000 parts per million absolute. The alarm signal must indicate that ventilation adjustments (e.g., opening windows) are required in the affected space.

All monitoring devices must be calibrated within the manufacturer's recommended interval.

Permanently open areas must meet the requirements of ASHRAE 62.1–2007, Section 5.1.

Exemptions:

If the total square footage of all space served by natural ventilation systems is less than 5% of total occupied square footage, the project is exempt from the requirements of this section. Rooms smaller than 150 square feet are also exempt.

Potential Technologies & Strategies

Install and maintain permanent ventilation monitoring systems that provide feedback on system performance to ensure minimum ventilation rates.

EQ Credit 1.3: IAQ Best Management Practices: Increased Ventilation

1 point

Intent

To provide additional outdoor air ventilation to improve indoor air quality for occupants' comfort, well-being, and productivity.

Requirements

For mechanically ventilated spaces:

Increase outdoor air ventilation rates for all air-handling units serving occupied spaces by at least 30% above the minimum required by ASHRAE 62.1–2007.

For naturally ventilated spaces:

Design natural ventilation systems for occupied spaces to meet the recommendations set forth in “Good Practice Guide 237: Natural Ventilation in Non-domestic Buildings” (1998). Determine whether natural ventilation is an effective strategy for the project by following the flow diagram process in Figure 2.8 of CIBSE Applications Manual 10: 2005, “Natural Ventilation in Non-domestic Buildings.”

In addition, either (1) use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in CIBSE Applications Manual 10: 2005, “Natural Ventilation in Non-domestic Buildings,” or (2) use a macroscopic, multizone, analytic model to predict that room-by-room airflows will effectively naturally ventilate at least 90% of occupied spaces.

Potential Technologies & Strategies

For mechanically ventilated spaces, design ventilation systems to provide ventilation rates at least 30% above the minimum rates prescribed by the referenced standard. Ensure that the additional ventilation rate does not adversely affect building humidity control during all expected operating conditions.

For naturally ventilated spaces, follow the eight design steps described in the CIBSE “Good Practice Guide 237”: (1) develop design requirements, (2) plan airflow paths, (3) identify building uses and features that might require special attention, (4) determine ventilation requirements, (5) estimate external driving pressures, (6) select types of ventilation devices, (7) size ventilation devices, and (8) analyze the design.

Use public domain software, such as NIST's CONTAM, Multizone Modeling Software, along with LoopDA, Natural Ventilation Sizing Tool, to analytically predict room-by-room airflows.

EQ Credit 1.4: IAQ Best Management Practices: Reduce Particulates in Air Distribution

1 point

Intent

To reduce exposure of building occupants and maintenance personnel to potentially hazardous particulate contaminants, which adversely affect air quality, human health, building finishes, building systems, and the environment.

Requirements

Have in place filtration media with a minimum efficiency reporting value (MERV) greater than or equal to 13 for all outside air intakes and inside air recirculation returns over the performance period. Establish and follow a regular schedule for maintenance and replacement of these filters according to the manufacturer's recommended interval.

Potential Technologies & Strategies

Install and maintain filtration media with a particle removal effectiveness of MERV 13 or greater for all outside air intakes and returns for the recirculation of inside air. Establish and follow a regular schedule for maintenance and replacement of these filters.

EQ Credit 1.5: IAQ Best Management Practices: Management for Facility Alterations and Additions

1 point

Intent

To prevent indoor air quality problems resulting from any construction or renovation projects and thus help sustain the comfort and well-being of construction workers and building occupants.

Requirements

Develop and implement an indoor air quality (IAQ) management plan for the construction and occupancy phases.

During construction, meet or exceed the recommended design approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) “IAQ Guidelines for Occupied Buildings under Construction,” 1995, Chapter 3.

If the building undergoes a tenant improvement, develop and implement an IAQ management plan for the preoccupancy phases. Perform a flush-out procedure as follows: After construction ends and all interior finishes have been installed, install new filtration media and flush out the affected space. The flush-out must be done by supplying a total outdoor air volume of 14,000 cubic feet per square foot of floor area while maintaining an internal temperature of at least 60 degrees F and maintaining a relative humidity no higher than 60% where cooling mechanisms are operated. The affected space may be occupied only after the delivery of at least 3,500 cubic feet of outdoor air per square foot of floor area and the space has been ventilated at a minimum rate of 0.30 cfm per square foot of outdoor air or the design minimum outside air rate (whichever is greater) for at least three hours prior to occupancy until the total of 14,000 cubic feet per square foot of outdoor air has been delivered to the space. The flush-out may continue during occupancy.

Protect stored on-site or installed absorptive materials from moisture damage.

If air-handlers must be used during construction, filtration media with MERV 8 must be used at each return air grille, as determined by ASHRAE 52.2–1999.

Replace all filtration media immediately prior to occupancy.

Upon the completion of construction, HVAC and lighting systems must be returned to the designed or modified sequence of operations.

Potential Technologies & Strategies

Specify containment control strategies that include protecting the HVAC system, controlling pollutant sources, interrupting pathways for contamination, enforcing proper housekeeping, and coordinating schedules to minimize disruption.

Specify the construction sequencing to install absorptive materials after the prescribed dry or cure time of wet finishes to minimize adverse impacts on IAQ materials that are susceptible to microbial contamination and are directly exposed to moisture through precipitation, plumbing leaks or condensation from the HVAC system. Sequence the application of building materials such that any significant sources of contaminants (e.g., composite

wood products, adhesives, paints and coatings, glazing) dissipate most emissions prior to the introduction of products that would absorb or trap contaminants (e.g., carpet and padding, fabric wall covering, acoustic tiles, upholstered furniture). Where protection cannot be provided by sequence of installation, protect absorbing surfaces with vapor barriers and provide air exchange through temporary or permanent ventilation systems.

Appoint an indoor air quality manager with owner's authority to inspect potential problems and require mitigation, as necessary.

EQ Credit 2.1: Occupant Comfort: Occupant Survey

1 point

Intent

To provide for the assessment of building occupants' comfort as it relates to thermal comfort, acoustics, indoor air quality, lighting levels, building cleanliness, and any other comfort issues.

Requirements

Implement an occupant comfort survey and complaint response system to collect anonymous responses about thermal comfort, acoustics, indoor air quality, lighting levels, building cleanliness, and other occupant comfort issues. The survey must be collected from a representative sample of building occupants making up at least 30% of the total occupants, and it must include an assessment of overall satisfaction with building performance and identification of any comfort-related problems.

Document survey results and corrective actions to address comfort issues identified through the surveys.

Conduct at least one occupant survey during the performance period.

Potential Technologies & Strategies

Conducting an occupant survey is a valuable tool for identifying and addressing occupants' comfort and building performance issues. Develop a plan for corrective action to address any identified problems or concerns, when 20% or more of surveyed occupants express discomfort. Alternative survey ideas are available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

EQ Credit 2.2: Occupant Comfort: Occupant-Controlled Lighting

1 point

Intent

To provide a high level of lighting control by individual occupants or specific groups in multioccupant spaces (e.g., classrooms or conference areas) to promote the productivity, comfort, and well-being of building occupants.

Requirements

Use lighting controls that enable adjustments to suit the task needs and preferences of individuals for at least 50% of individual workstations, AND for groups sharing a multioccupant space or working area for at least 50% of multioccupant space in the building.

Potential Technologies & Strategies

Implement system and occupant control of ambient and task lighting to suit individual preferences and the needs of specific tasks.

EQ Credit 2.3: Occupant Comfort: Thermal Comfort Monitoring

1 point

Intent

To support the appropriate operations and maintenance of buildings and building systems so that they continue to meet target building performance goals over the long term and provide a comfortable thermal environment that supports the productivity and well-being of building occupants.

Requirements

Have in place a system for continuous tracking and optimization of systems that regulate indoor comfort and conditions (air temperature, humidity, air speed and radiant temperature) in occupied spaces. Have a permanent monitoring system to ensure ongoing building performance to the desired comfort criteria as determined by ASHRAE 55–2004, Thermal Comfort Conditions for Human Occupancy.

The building must establish the following:

- Continuous monitoring of, at a minimum, air temperature and humidity in occupied spaces. The sampling interval cannot exceed 15 minutes.
- Periodic testing of air speed and radiant temperature in occupied spaces. Using handheld meters is permitted.
- Alarms for conditions that require system adjustment or repair. Submit a list of the sensors, zone setpoints, and limit values that would trigger an alarm.
- Procedures that deliver prompt adjustments or repairs in response to problems identified.

All monitoring devices must be calibrated within the manufacturer's recommended interval.

Potential Technologies & Strategies

Implement systematic monitoring of the actual performance of the building to the comfort criteria defined by ASHRAE 55–2004.

As appropriate, monitoring may include measurement and trending of temperatures, relative humidity, air speed, and radiant temperatures at locations selected according to their variability and effect on occupants' comfort.

EQ Credits 2.4 and 2.5: Occupant Comfort: Daylight and Views

1-2 points

Intent

To provide a connection between indoor spaces and the outdoor environment through use of daylight and views in the occupied areas of the building.

Requirements

EQ Credit 2.4 (1 point): Achieve a 2% daylight factor in 50% of all spaces occupied for critical visual tasks.

OR

Achieve direct line of sight to vision glazing for building occupants in 45% of regularly occupied spaces.

EQ Credit 2.5 (1 point): Achieve a 2% daylight factor in 75% of all spaces occupied for critical visual tasks

OR

Achieve direct line of sight to vision glazing for building occupants in 90% of regularly occupied spaces.

For daylight:

Achieve a minimum daylight factor of 2% (excluding all direct sunlight penetration) in space occupied for critical visual tasks, not including copy rooms, storage areas, mechanical, laundry, and other low-occupancy support areas. Exceptions include those spaces where tasks would be hindered by daylight or enhanced by direct sunlight. Provide glare control for all windows where direct sunlight would interfere with normal activities. Choose one of the following options:

OPTION A. MEASUREMENT

Demonstrate, through records of indoor light measurements, that a minimum daylight illumination level of 25 foot-candles has been achieved in at least 50% (Credit 2.4) or 75% (Credit 2.5) of all regularly occupied areas. Measurements must be taken on a 10-foot grid for all occupied spaces and must be recorded on building floor plans.

Only the square footage associated with the portions of rooms or spaces meeting the minimum illumination requirements can be counted in the calculations.

In all cases, provide daylight redirection and/or glare control devices to avoid high-contrast situations that could impede visual tasks. Exceptions for areas where tasks would be hindered by daylight will be considered on their merits.

OPTION B. CALCULATION

Achieve a minimum glazing factor of 2% in a minimum of 50% (Credit 2.4) or 75% (Credit 2.5) of all regularly occupied areas. Calculate the glazing factor as follows:

$$\text{Daylight Factor} = \frac{\text{Window Area [SF]}}{\text{Floor Area [SF]}} \times \text{Window Geometry Factor} \times \frac{\text{Actual } T_{\text{VIS}}}{\text{Minimum } T_{\text{VIS}}} \times \text{Window Height Factor}$$

OPTION C. SIMULATION

Demonstrate, through computer simulation, that a minimum daylight illumination level of 25 foot-candles has been achieved in a minimum of 50% (Credit 2.4) or 75% (Credit 2.5) of all regularly occupied areas. Modeling must demonstrate 25 horizontal foot-candles under clear sky conditions, at noon on the equinox, at 30 inches above the floor.

For views:

Achieve direct line of sight to the outdoor environment via vision glazing between 2'6" and 7'6" above the finished floor for building occupants in 45% (Credit 2.4) or 90% (Credit 2.5) of all regularly occupied areas.

Determine the area with direct line of sight by totaling the regularly occupied square footage that meets the following criteria:

- In plan view, the area is within sight lines drawn from perimeter vision glazing.
- In section view, a direct sight line can be drawn from the area to perimeter vision glazing.

Line of sight may be drawn through interior glazing. For private offices, the entire square footage of the office can be counted if 75% or more of the area has direct line of sight to perimeter vision glazing. For multioccupant spaces, the actual square footage with direct line of sight to perimeter vision glazing is counted.

Potential Technologies & Strategies

Achieve a minimum daylight factor of 2% (excluding all direct sunlight penetration) in space occupied for visual tasks. Design alterations or additions to maximize interior daylighting. Strategies to consider include building orientation, shallow floor plates, increased building perimeter, exterior and interior permanent shading devices, high-performance glazing and automatic photocell-based controls. Predict daylight factors via manual calculations or model daylighting strategies with a physical or computer model to assess foot-candle levels and daylight factors achieved.

Design alterations or additions to maximize daylighting and outdoor view opportunities. Strategies to consider include lower partition heights, interior shading devices, interior glazing, and automatic photocell-based controls.

EQ Credit 3.1: Green Cleaning: High-Performance Cleaning Program

1 point

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems, and the environment.

Requirements

Have in place over the performance period a high-performance cleaning program, supported by a green cleaning policy (EQ Prerequisite 3), that addresses the following:

- Appropriate staffing plan.
- Implementation of training of maintenance personnel in the hazards, use, maintenance, disposal, and recycling of cleaning chemicals, dispensing equipment, and packaging.
- Use of chemical concentrates with appropriate dilution systems to minimize chemical use wherever possible.
- Use of sustainable cleaning materials, products, equipment, janitorial paper products, and trash bags (including microfiber tools and wipes).
- Use of sustainable cleaning and hard floor and carpet care products meeting the sustainability criteria outlined in EQ Credits 3.4–3.6.
- Use of cleaning equipment meeting the sustainability criteria outlined in EQ Credit 3.7.

Potential Technologies & Strategies

Have in place over the performance period a high-performance cleaning program, supported by policy, staffing plans, standard operating procedures, and storage procedures, that address sustainable and effective cleaning and hard floor maintenance.

EQ Credits 3.2 and 3.3: Green Cleaning: Custodial Effectiveness Assessment

1–2 points

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems, and the environment, by implementing, managing, and auditing cleaning procedures and processes.

Requirements

Conduct an audit in accordance with APPA Leadership in Educational Facilities' (APPA) "Custodial Staffing Guidelines" to determine the appearance level of the facility.

- EQ Credit 3.2** (1 point): The facility must score 3 or less.
- EQ Credit 3.3** (2 points): The facility must score 2 or less.

More information about the audit procedures is provided in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

Potential Technologies & Strategies

Designate an individual or team to conduct a walk-through inspection of a sample of rooms in the building to evaluate the effectiveness of the cleaning program. Identify areas that fall below the owner's expected standard and make improvements to the cleaning program accordingly.

EQ Credits 3.4–3.6: Green Cleaning: Purchase of Sustainable Cleaning Products and Materials

1–3 points

Intent

To reduce the environmental impacts of cleaning products, disposable janitorial paper products, and trash bags.

Requirements

Implement sustainable purchasing for cleaning materials and products, disposable janitorial paper products, and trash bags. Cleaning product and material purchases include items used by in-house staff or outsourced service providers. One point is awarded for each 30% of the total annual purchases of these products (by cost) that meet at least one of the following sustainability criteria:

- The cleaning products meet one or more of the following standards for the appropriate category:
 - Green Seal GS-37, for general-purpose, bathroom, glass and carpet cleaners used for industrial and institutional purposes.
 - Environmental Choice CCD-110, for cleaning and degreasing compounds.
 - Environmental Choice CCD-146, for hard surface cleaners.
 - Environmental Choice CCD-148, for carpet and upholstery care.
- Disinfectants, metal polish, floor finishes, strippers or other products not addressed by the above standards meet one or more of the following standards for the appropriate category:
 - Green Seal GS-40, for industrial and institutional floor care products.
 - Environmental Choice CCD-112, for digestion additives for cleaning and odor control.
 - Environmental Choice CCD-113, for drain or grease traps additives.
 - Environmental Choice CCD-115, for odor control additives.
 - Environmental Choice CCD-147, for hard floor care.
 - California Code of Regulations maximum allowable VOC levels for the specific product category.
- Disposable janitorial paper products and trash bags meet the minimum requirements of one or more of the following programs for the applicable product category:
 - U.S. EPA Comprehensive Procurement Guidelines for Janitorial Paper and Plastic Trash Can Liners.
 - Green Seal GS-09, for paper towels and napkins.
 - Green Seal GS-01, for tissue paper.
 - Environmental Choice CCD-082, for toilet tissue.
 - Environmental Choice CCD-086, for hand towels.
 - Janitorial paper products derived from rapidly renewable resources or made from tree-free fibers.

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- Hand soaps meet one or more of the following standards:
 - No antimicrobial agents (other than as a preservative) except where required by health codes and other regulations (i.e., food service and health care requirements).
 - Green Seal GS-41, for industrial and institutional hand cleaners.
 - Environmental Choice CCD-104, for hand cleaners and hand soaps.

The materials and products described above must be purchased during the performance period to earn points in this credit.

Potential Technologies & Strategies

When purchasing materials or supplies, specify that they meet one or more of the sustainability criteria.

EQ Credit 3.7: Green Cleaning: Sustainable Cleaning Equipment

1 point

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment, from powered cleaning equipment.

Requirement

Implement a program for the use of janitorial equipment that reduces building contaminants and minimizes environmental impact. The cleaning equipment program must require the following:

- Vacuum cleaners are certified by the Carpet and Rug Institute “Green Label” Testing Program for vacuum cleaners and operate with a sound level of less than 70dBA.
- Carpet extraction equipment used for restorative deep cleaning is certified by the Carpet and Rug Institute’s “Seal of Approval” Testing Program for deep-cleaning extractors.
- Powered floor maintenance equipment, including electric and battery-powered floor buffers and burnishers, is equipped with vacuums, guards and/or other devices for capturing fine particulates and operates with a sound level of less than 70dBA.
- Propane-powered floor equipment has high-efficiency, low-emissions engines with catalytic converters and mufflers that meet the California Air Resources Board (CARB) or Environmental Protection Agency (EPA) standards for the specific engine size and operate with a sound level of less than 90dBA.
- Automated scrubbing machines are equipped with variable-speed feed pumps and on-board chemical metering to optimize the use of cleaning fluids.
- Battery-powered equipment is equipped with environmentally preferable gel batteries.
- Powered equipment is ergonomically designed to minimize vibration, noise, and user fatigue.
- Equipment is designed with safeguards, such as rollers or rubber bumpers, to reduce potential damage to building surfaces.

Keep a log for all powered cleaning equipment to document the date of equipment purchase and all repair and maintenance activities and include vendor specification sheets for each type of equipment in use.

Potential Technologies & Strategies

Develop, implement, and maintain a policy for the use of low-impact powered cleaning equipment. Evaluate the powered cleaning equipment currently being used and make a plan for upgrading to powered cleaning equipment that reduces building contaminants and minimizes environmental impact.

EQ Credit 3.8: Green Cleaning: Entryway Systems

1 point

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems, and the environment.

Requirements

Utilize entryway systems (grilles, grates, mats) to reduce the amount of dirt, dust, pollen and other particles entering the building at all public entryways, and develop the associated cleaning strategies to maintain those entryway systems as well as exterior walkways. At least 10 feet of mats must be in place immediately inside all public entryways. Public entryways that are not in use or serve only as emergency exits are excluded from the requirements, as are private offices.

Potential Technologies & Strategies

Use grilles, grates, or mats to catch and hold dirt particles and prevent contamination of the building interior.

Design exterior stone, brick, or concrete surfaces to drain away from public building entrances.

At public building entrances, install low-maintenance vegetation within the landscape design and avoid plants, including trees and shrubs, that produce fruit, flowers, or leaves that are likely to be tracked into the building. Base plant selection on an integrated pest management (IPM) approach to eliminate pesticide applications that could be tracked into the building.

Provide a water spigot and electrical outlet at each building entrance for maintenance and cleaning.

EQ Credit 3.9: Green Cleaning: Indoor Integrated Pest Management

1 point

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants that adversely affect air quality, human health, building finishes, building systems, and the environment.

Requirement

Develop, implement, and maintain an indoor integrated pest management (IPM) plan, defined as managing indoor pests in a way that protects human health and the surrounding environment and that improves economic returns through the most effective, least-risk option. IPM calls for using least-toxic chemical pesticides, minimum use of chemicals, use only in targeted locations, and use only for targeted species. IPM requires routine inspection and monitoring. The plan must include the following elements, integrated with any outdoor IPM plan used for the site as appropriate:

- Integrated methods, site or pest inspections, pest population monitoring, evaluation of the need for pest control and one or more pest control methods, including sanitation, structural repairs, mechanical, and living biological controls, other nonchemical methods, and if nontoxic options are unreasonable and have been exhausted, a least-toxic pesticide.
- Specification of the circumstances under which an emergency application of pesticides in a building or on surrounding grounds being maintained by building management can be conducted without complying with the earlier provisions.
- A communications strategy directed to building occupants that addresses universal notification, which requires notice of not less than 72 hours before a pesticide under normal conditions and 24 hours after application of a pesticide in emergency conditions, other than a least-toxic pesticide, is applied in a building or on surrounding grounds that the building management maintains.

Any cleaning products included in the integrated pest management policy must meet the requirements for EQ Credits 3.4–3.6.

Potential Technologies & Strategies

Use IPM, a safer and usually less costly option for effective pest management. An IPM program employs commonsense strategies to reduce sources of food, water, and shelter for pests in buildings and on the grounds and minimizes the use of pesticides.

Innovation in Operations

Innovation Credit 1.1–1.4: Innovation in Operations

1–4 points

Intent

To provide building operations, maintenance, and upgrade teams with the opportunity to earn points for environmental benefits achieved beyond those already addressed by the LEED for Existing Buildings: Operations & Maintenance Rating System.

Requirements

Choose one of the following options:

OPTION A

Achieve exemplary performance in a LEED for Existing Buildings: O&M prerequisite or credit that allows exemplary performance (as specified in the LEED for Existing Buildings: Operations & Maintenance Reference Guide).

OPTION B

Achieve significant, measurable environmental performance using an operations, maintenance, or system upgrade strategy not addressed in the LEED for Existing Buildings: Operations & Maintenance Rating System.

- Credit 1.1** (1 point) Specify the exemplary performance achieved (Option A). Alternatively, identify the intent of the proposed innovation credit, the additional environmental benefits delivered, the proposed requirements for compliance, the proposed performance metrics to demonstrate compliance, and the approaches (strategies) that might be used to meet the requirements; meet the proposed requirements during the performance period (Option B).
- Credit 1.2** (1 point) Same as Credit 1.1.
- Credit 1.3** (1 point) Same as Credit 1.1.
- Credit 1.4** (1 point) Same as Credit 1.1.

Potential Technologies & Strategies

Implement and maintain over the performance period actions that provide added environmental benefits. These can be either actions that substantially exceed a current LEED for Existing Buildings: O&M credit requirement or actions not addressed in LEED for Existing Buildings: O&M that provide substantial added environmental benefits.

Innovation Credit 2: LEED® Accredited Professional

1 point

Intent

To support and encourage the operations, maintenance, upgrade, and project team integration required for LEED

for Existing Buildings: O&M implementation and to streamline the application and certification process.

Requirements

At least one principal participant of the project team must be a LEED Accredited Professional.

Potential Technologies and Strategies

Engage a LEED Accredited Professional within the organization.

Have someone in your organization study for and successfully complete the LEED professional accreditation exam.

Hire a LEED Accredited Professional to support the project. Consider selecting a LEED Accredited Professional experienced with sustainable best practices in the operations and maintenance of existing buildings.

Innovation Credit 3: Documenting Sustainable Building Cost Impacts

2 points

Intent

To document sustainable building cost impacts.

Requirements

Document overall building operating costs for the previous five years (or length of building occupancy, whichever is shorter) and track changes in overall building operating costs over the performance period. Document building operating costs and financial impacts of all aspects of LEED for Existing Buildings: O&M implementation on an ongoing basis. Follow the detailed instructions in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

Potential Technologies & Strategies

Track building operating costs to identify any positive impacts related to the sustainable performance improvements to the building and its operations.