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# LEED v4.1 OPERATIONS AND MAINTENANCE

Getting started guide for beta participants

April 2021

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# Welcome to LEED v4.1 Beta

Welcome to the next evolution of LEED for existing buildings! Whether you are a seasoned LEED practitioner, or new to LEED, we encourage you to test out this bigger, stronger, bolder rating system for your buildings and interior spaces and to be a leader in shaping the future of building performance.

LEED is the world's rating system for the design, construction and operation of high-performance green buildings. For the last 18 years, various versions of LEED have pushed the global green building market forward progressively, with more than 93,000 registered and certified projects and a total of 19.3 billion square feet of space used worldwide.

After the widespread success of LEED 2009, we wanted to raise the bar on the market. As green builders, it's not just our job to be efficient with our construction and design, but to be aspirational, to give the environment more than we receive. Today, LEED v4 is the most rigorous green building rating system in the world. From improving energy performance to emphasizing human health and integrative building design, LEED is encouraging project teams to operate beyond the status quo.

For the past nine months, we have been out there listening and learning, looking at what works and what doesn't. Regions and markets move at different paces, and we want to be sure we can meet the needs of everyone in the green building community. LEED v4.1 represents a series of upgrades that will improve our standards, encourage leadership, and make our platform more user friendly, more accessible—and most importantly—more collaborative than ever before.

This is not a full version change, but rather an incremental update to the LEED rating systems. LEED v4.1 will be our most inclusive and transparent platform to date. That's because our most important requirement for adoption will come from our most valuable resource of all—YOU!

For LEED in existing buildings we have learned that the certification and documentation process needs to be simple, data driven, and iterative. Therefore, we are testing a new process for certification with LEED v4.1 O+M and new methodologies for rating performance. These methodologies will be refined during and after the beta as more projects participate and share their experiences and building data.

This document is a comprehensive guide to the LEED v4.1 O+M beta program. We will update this document as needed and as more program features become available.

## Guidance Revisions

*Original Publication* March 2018

*Updated* November 2018

*Updated* April 2019

*Updated* July 2019

# LEED v4.1 O+M: Existing Buildings Scorecard

<b>LOCATION AND TRANSPORTATION</b>		<b>14</b>
Prerequisite	Transportation Performance	14
<b>SUSTAINABLE SITES</b>		<b>4</b>
Credit	Rainwater Management	1
Credit	Heat Island Reduction	1
Credit	Light Pollution Reduction	1
Credit	Site Management	1
<b>WATER EFFICIENCY</b>		<b>15</b>
Prerequisite	Water Performance	15
<b>ENERGY AND ATMOSPHERE</b>		<b>35</b>
Prerequisite	Energy Efficiency Best Management Practices	Required
Prerequisite	Fundamental Refrigerant Management	Required
Prerequisite	Energy Performance	33
Credit	Enhanced Refrigerant Management	1
Credit	Grid Harmonization	1
<b>MATERIALS AND RESOURCES</b>		<b>9</b>
Prerequisite	Purchasing Policy	Required
Prerequisite	Facility Maintenance and Renovations Policy	Required
Prerequisite	Waste Performance	8

Credit	Purchasing	1
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<b>INDOOR ENVIRONMENTAL QUALITY</b>	<b>22</b>
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Prerequisite	Minimum Indoor Air Quality	Required
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Prerequisite	Environmental Tobacco Smoke Control	Required
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Prerequisite	Green Cleaning Policy	Required
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Prerequisite	Indoor Environmental Quality Performance	20
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Credit	Green Cleaning	1
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Credit	Integrated Pest Management	1
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<b>INNOVATION</b>	<b>1</b>
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Credit	Innovation	1
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<b>TOTAL</b>	<b>100 Possible Points</b>
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# LEED v4.1 O+M: Interiors Scorecard

<b>LOCATION AND TRANSPORTATION</b>		<b>14</b>
Prerequisite	Transportation Performance	14
<b>WATER EFFICIENCY</b>		<b>15</b>
Prerequisite	Water Performance	15
<b>ENERGY AND ATMOSPHERE</b>		<b>34</b>
Prerequisite	Energy Efficiency Best Management Practices	Required
Prerequisite	Fundamental Refrigerant Management	Required
Prerequisite	Energy Performance	33
Credit	Enhanced Refrigerant Management	1
<b>MATERIALS AND RESOURCES</b>		<b>12</b>
Prerequisite	Purchasing Policy	Required
Prerequisite	Facility Maintenance and Renovations Policy	Required
Prerequisite	Waste Performance	8
Credit	Purchasing	4
<b>INDOOR ENVIRONMENTAL QUALITY</b>		<b>24</b>
Prerequisite	Minimum Indoor Air Quality	Required
Prerequisite	Environmental Tobacco Smoke Control	Required
Prerequisite	Green Cleaning Policy	Required
Prerequisite	Indoor Environmental Quality Performance	20

Credit	Green Cleaning	3
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Credit	Integrated Pest Management	1
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<b>INNOVATION</b>		<b>1</b>
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Credit	Innovation	1
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<b>TOTAL</b>		<b>100 Possible Points</b>
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# WHAT YOU NEED TO KNOW

If you're already familiar with LEED, the idea is the same. We have prerequisites (which are required for everyone) and credits (which are optional and allow you to achieve points).

One new thing you'll see in LEED v4.1 is that we've introduced performance-based prerequisites for Location and Transportation, Materials and Resources, and Indoor Environmental Quality. We still have the performance prerequisites in Water Efficiency and Energy and Atmosphere.

100 total points are available. A minimum of 40 points are required for certification and more points get you higher levels of certification:

- ▶ Certified: 40-49 points
- ▶ Silver: 50-59
- ▶ Gold: 60-79
- ▶ Platinum: 80+

Because buildings and interior spaces are different, they have different sets of requirements and points available.

## Summary of changes - Changes from LEED v4

For the LEED v4.1 O+M Beta rating system, some credits have been removed because their credit intents contribute to the achievement of outcomes that are measured in new credits included in the rating system.

### LOCATION AND TRANSPORTATION

Prerequisite	Transportation Performance	<ul style="list-style-type: none"><li>▶ Changed title from Alternative Transportation</li><li>▶ Changed to prerequisite</li><li>▶ Transportation survey must be conducted using the USGBC system</li><li>▶ Removed Option 2. The alternative transportation rate performance metric was replaced by the transportation performance score. The alternative transportation rate in LEED v4 O+M is based on the percentage reduction in conventional commuting trips (commute alone in automobile) whereas the transportation performance score is based on CO2e per one-way trip per occupant.</li><li>▶ Removed Option 3. An alternative transportation program may be used to improve the transportation score</li></ul>
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### SUSTAINABLE SITES

Prerequisite	Site Management Policy	<ul style="list-style-type: none"><li>▶ Credit removed</li></ul>
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Credit	Site Development- Protect or Restore Habitat	▶	Credit removed
Credit	Rainwater Management	▶	Minor edits for clarification
Credit	Heat Island Reduction	▶	<p>Compliance is based on total site paving area and total roof area. Individual compliance options for nonroof, roof, and parking under cover have been removed, requiring projects to consider the site as a whole. This ensures the credit achievement is based on the overall impact of heat island mitigation practices on the site.</p> <p>▶ Revised credit language to clarify all strategies must be in place and more specifically address the existing building context that much of the strategies will be existing, not newly installed.</p>
Credit	Light Pollution Reduction	▶	None
Credit	Site Management	▶	<p>Added requirement to conduct site assessment to identify natural areas providing habitat.</p> <p>▶ Credit is now based on management practices being used, not comparing performance goals from a Site Management policy.</p> <p>▶ Revised requirement for management of snow and ice to better align with SITES rating system.</p> <p>▶ Revised requirements for fertilizers to better align with LEED v4 prerequisite Site management policy and to provide more flexibility for meeting the intent.</p> <p>▶ Added requirement for organic matter mulch in planting areas.</p> <p>▶ Added requirement for vegetation irrigating, using controlled systems.</p> <p>▶ Removed performance requirements for limited turf area / all manual or electric powered equipment/ Reduction in emissions from site management equipment / protect or restore habitat</p>
Credit	Site Improvement Plan	▶	Credit removed
Credit	Joint Use of Facilities	▶	Credit removed

**WATER EFFICIENCY**

Prerequisite	Water Performance	▶	New prerequisite
Prerequisite	Indoor Water Use Reduction	▶	Prerequisite removed
Prerequisite	Building-Level Water Metering	▶	Prerequisite removed

Credit	Outdoor Water Use Reduction	▶	Credit removed
Credit	Indoor Water Use Reduction	▶	Credit removed
Credit	Cooling Tower Water Use	▶	Credit removed
Credit	Water Metering	▶	Credit removed

## ENERGY & ATMOSPHERE

Prerequisite	Energy Efficiency Best Management Practices	▶	Incorporated international alternative compliance path (ACP) allowing projects in Europe to use the energy audit procedure defined in EN 16247-2:2014 ▶ Minor edits to improve applicability for Interiors
Prerequisite	Minimum Energy Performance	▶	Prerequisite removed
Prerequisite	Building-Level Energy Metering	▶	Credit removed
Prerequisite	Fundamental Refrigerant Management	▶	None
Prerequisite	Energy Performance	▶	New Prerequisite
Credit	Existing Building Commissioning- Analysis	▶	Credit removed
Credit	Existing Building Commissioning- Implementation	▶	Credit removed
Credit	Ongoing Commissioning	▶	Credit removed
Credit	Optimize Energy Performance	▶	Credit removed
Credit	Advanced Energy Metering	▶	Credit removed
Credit	Renewable Energy and Carbon Offsets	▶	Credit removed
Credit	Grid Harmonization	▶	Changed title from Demand Response to better reflect options available for teams and credit intent to make energy generation and distribution systems more efficient, increase grid reliability, and reduce greenhouse gas emissions ▶ Added details in Case 1 for on-peak demand period ▶ Minor edits to Case 2 for clarification

		<ul style="list-style-type: none"> <li>▶ Added examples to Case 3 of grid harmonization technologies that support permanent load shifting and provide energy storage capabilities on-site to illustrate how teams can prepare for electrical load shifting</li> </ul>
Credit	Enhanced Refrigerant Management	<ul style="list-style-type: none"> <li>▶ None</li> </ul>

## MATERIALS & RESOURCES

Prerequisite	Purchasing Policy	<ul style="list-style-type: none"> <li>▶ Changed title from Ongoing Purchasing and Waste Policy</li> <li>▶ Removed requirements for solid waste management policy. A waste policy is a strategy for the waste performance score.</li> <li>▶ Moved requirements for storage locations for recyclable materials and batteries and lamps to MR prerequisite Waste Performance.</li> <li>▶ Tracking food and beverage purchases is now required in the policy for all projects</li> <li>▶ Renamed durable goods purchase to electronic equipment</li> <li>▶ Moved lamps under electronic equipment</li> <li>▶ Removed retail requirements for environmentally responsible sourcing of retail merchandise.</li> <li>▶ New requirements added for Interiors adaptation</li> </ul>
Prerequisite	Facility Maintenance and Renovation Policy	<ul style="list-style-type: none"> <li>▶ Added requirement to separate facility maintenance and renovation waste from ongoing waste.</li> </ul>
Prerequisite	Waste Performance	<ul style="list-style-type: none"> <li>▶ Credit renamed from Solid Waste Management- Ongoing</li> <li>▶ Credit is now a prerequisite, minimum waste performance score of 40 is now required.</li> <li>▶ Waste must now be tracked in weight, volume option is no longer available</li> <li>▶ 50% ongoing waste and 75% durable goods waste thresholds have been replaced with waste performance score.</li> </ul>
Credit	Purchasing	<ul style="list-style-type: none"> <li>▶ New credit</li> <li>▶ Credit is a combination of Purchasing-Ongoing, Purchasing – Lamps, and Purchasing-Facility Maintenance and Renovation</li> <li>▶ Added points note for Interiors projects</li> <li>▶ Reorganized structure of credit, 4 options available</li> <li>▶ Added/modified purchasing criteria under each option</li> <li>▶ Added new section for building materials</li> </ul>

		<ul style="list-style-type: none"> <li>▶ Compliance may now be demonstrated with a minimum one month of purchases.</li> <li>▶ Reduced threshold for ongoing consumables from 60% to 50%, increased threshold for electronic equipment from 40% to 50%, reduced threshold for food from 25% to 15%</li> </ul>
Credit	Purchasing - Ongoing	<ul style="list-style-type: none"> <li>▶ Credit requirements moved to Purchasing credit</li> </ul>
Credit	Purchasing- Lamps	<ul style="list-style-type: none"> <li>▶ Credit requirements moved to Purchasing credit</li> </ul>
Credit	Purchasing- Facility Maintenance and Renovation	<ul style="list-style-type: none"> <li>▶ Credit requirements moved to Purchasing credit</li> </ul>
Credit	Solid Waste Management- Ongoing	<ul style="list-style-type: none"> <li>▶ Credit requirements moved to Waste Performance prerequisite</li> </ul>
Credit	Solid Waste Management- Facility Maintenance and Renovation	<ul style="list-style-type: none"> <li>▶ Credit removed</li> </ul>

## INDOOR ENVIRONMENTAL QUALITY

Prerequisite	Minimum Indoor Air Quality	<ul style="list-style-type: none"> <li>▶ Prerequisite renamed from Minimum Indoor Air Quality Performance</li> <li>▶ Updated referenced standard from 62.1-2010 to 62.1-2016</li> <li>▶ Revised outdoor air requirements for mechanically ventilated spaces, including removal of Case 2</li> <li>▶ Revised minimum opening and size requirements for naturally ventilated spaces</li> <li>▶ Clarified credit requirements for residential units</li> </ul>
Prerequisite	Environmental Tobacco Smoke Control	<ul style="list-style-type: none"> <li>▶ The requirement exterior signage has been removed and replaced with a requirement to communicate the no-smoking policy to occupants and have in place provisions for enforcement. This change was made to give projects more flexibility in the way they manage their no smoking policies and tailor their approach to the project site and local context.</li> <li>▶ New requirements added for Interiors adaptation</li> <li>▶ Added definition for smoking</li> </ul>
Prerequisite	Green Cleaning Policy	<ul style="list-style-type: none"> <li>▶ Minor edits for clarification</li> </ul>

		<ul style="list-style-type: none"> <li>▶ Under Option 2, deleted auditing requirement but added that the cleaning service must be in good standing.</li> </ul>
Prerequisite	Indoor Environmental Quality Performance	▶ New Prerequisite
Credit	Indoor Air Quality Management Program	▶ Credit removed
Credit	Enhanced Indoor Air Quality Strategies	▶ Credit removed; Entryway systems credit requirements moved to Green Cleaning credit
Credit	Thermal Comfort	▶ Credit removed
Credit	Interior Lighting	▶ Credit removed
Credit	Daylight and Quality Views	▶ Credit removed
Credit	Green Cleaning	<ul style="list-style-type: none"> <li>▶ New credit</li> <li>▶ Credit is a combination of Green Cleaning- Custodial Effectiveness Assessment, Green Cleaning- Products and Materials, Green Cleaning-Equipment</li> <li>▶ For custodial effectiveness assessment (Option 1), minor edits for clarification</li> <li>▶ Renamed Green cleaning- equipment to Powered janitorial equipment,</li> <li>▶ For powered janitorial equipment (Option 3), compliance is now based on percentage of equipment used to clean the project at time of inventory, tracking over the entire year is no longer required.</li> <li>▶ For powered janitorial equipment (Option 3), the requirement for a phase out plan has been removed.</li> <li>▶ For cleaning products and materials (Option 4), tracking total annual purchases is no longer required.</li> <li>▶ Compliance may now be demonstrated with a product inventory or from total annual purchases.</li> </ul>
Credit	Green Cleaning- Custodial Effectiveness Assessment	▶ Credit requirements moved to Green Cleaning credit
Credit	Green Cleaning- Products and Materials	▶ Credit requirements moved to Green Cleaning credit
Credit	Green Cleaning-Equipment	▶ Credit requirements moved to Green Cleaning credit
Credit	Integrated Pest Management	▶ Minor edits for clarification

Credit	Occupant Comfort Survey	▶ Credit removed; occupant comfort is covered in the Indoor Environmental Quality Performance prerequisite
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## INNOVATION

Credit	Innovation	<ul style="list-style-type: none"> <li>▶ LEED accredited professional is now required.</li> <li>▶ The options within the credit have been updated. In addition to working with a LEED AP, project teams can choose to pursue one eligible innovation strategy or pilot credit to achieve the point.</li> <li>▶ The Exemplary Performance option has been removed to encourage projects to pursue sustainability strategies not already included in the rating system.</li> </ul>
Credit	LEED Accredited Professional	▶ Credit requirements moved to Innovation

## REGIONAL PRIORITY

Credit	Regional Priority	▶ Credit removed
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LEED v4.1 gives more weight to credit requirements that are directly measurable by the project. 90 of the total points are allocated to the prerequisites that have a calculated performance score, based on actual building data. The remaining 10 points were distributed across the remaining credits with equal weight (1 point each).

Summary of point changes for each category from LEED v4 to LEED v4.1 Existing Buildings: O+M:

Location and Transportation:	reduced	15 pts to 14 pts
Sustainable Sites:	reduced	10 pts to 4 pts
Water Efficiency:	increased	12 pts to 15 pts
Energy and Atmosphere:	reduced	38 pts to 35 pts
Materials and Resources:	increased	8 pts to 9 pts
Indoor Environmental Quality:	increased	17 pts to 22 pts
Innovation:	reduced	6 pts to 1 pt
Regional Priority:	reduced	4 pts to 0 pts

## **Rating System Development Process**

To stay agile and adaptive, we plan to regularly adjust the scores that power the rating system to incorporate expert opinions from our volunteers, such as the LEED Technical Advisory Groups, and as we learn more about rating building performance. USGBC is working on a process for updating the score on a continual, predictable basis. The score is intended to use the best available information about building performance.

These scores are used in five prerequisites in the v4.1 O+M rating system. These scores may change during beta, potentially impacting the score for your project. You will be notified when a change has been made and given the opportunity to upgrade to the newer version.

USGBC will present LEED v4.1 for public comment, followed by a member ballot. Feedback from the beta will inform the public comment draft(s). In addition to the beta, proposals for v4.1 were accepted in the spring of 2018; project teams can refer to [www.usgbc.org](http://www.usgbc.org) for responses from USGBC on the proposals.



# How it Works

## 1. Confirm eligibility

Projects pursuing LEED v4.1 O+M beta certification must meet three [LEED Minimum Program Requirements](#).

To submit for certification review, LEED v4.1 O+M beta projects must be fully operational and occupied for at least one year. Registration can happen at any time and is encouraged to happen as early as possible to allow for performance tracking, surveying, and implementation of sustainability practices. If you are not quite at the one year point but want to get a head start on Certification, we offer Precertification to all registered projects to help set you up for success.

## 2. Select appropriate rating system

LEED v4.1 O+M beta includes two rating system adaptations.

- ▶ LEED O+M: Existing Buildings. Existing whole buildings.
- ▶ LEED O+M: Interiors. Existing interior spaces that are contained within a portion of an existing building. Interior spaces may serve commercial, retail, or hospitality purposes.

[Contact us](#) if you are not clear which rating system adaptation you should use.

## 3. Sign up

Register your project under the selected LEED v4.1 O+M beta rating system in LEED Online at [lo.usgbc.org](http://lo.usgbc.org)

For registration fees, view our detailed fees table at [usgbc.org](http://usgbc.org).

## 4. Get started

Each beta project will receive extra support from USGBC. Once registered, you will be contacted by a representative from our team to help you along the way. All registered projects have the option to pursue Precertification. See the Timeline and Precertification tabs in LEED Online for more information.

To complete your application for certification you will need to:

- ▶ Upload required documentation and/or provide requested information (*for each prerequisite / credit being pursued*)
- ▶ Administer USGBC's survey(s) to project occupants for two prerequisites: LT prerequisite Transportation Performance and EQ prerequisite Indoor Environmental Quality Performance
- ▶ Calculate a performance score via LEED Online for a specific 365 day period (*for five prerequisites: (LT prerequisite Transportation Performance, WE prerequisite Water Performance, EA prerequisite Energy Performance, MR prerequisite Waste Performance, EQ prerequisite Indoor Environmental Quality Performance)*)

Your v4.1 O+M beta certification is based on the performance of the building/project spaces for a specific 1 year time period (365 consecutive days). Note that this is different from the “performance period” approach used in LEED v4.

Your project’s performance data is collected on a rolling basis, with the “current score” displayed based on the most recent 365 days. For LEED certification, you will need to define the specific 1 year time period that you would like your performance scores to be calculated for when you submit for certification review. All performance scores must use the same 1 year time period.

**Project information**

You will need to provide basic information about the project, including the LEED project boundary, zip code or postal code, gross floor area, operating hours, and occupancy. See below for details on how this information should be determined.

Use the USGBC calculator to calculate the weighted occupancy and weighted operating hours for your project, complete the calculator with the following information:

- ▶ Gross Floor area
- ▶ Operating hours per week (can be broken out by space if needed)
- ▶ Number of regular building occupants
- ▶ Number of part time employees: # of part time employees, hours worked per employee per day
- ▶ Number of visitors per day
- ▶ Duration of visit (in hours/day)

It is critical that this information is as accurate as possible. The information will be used for the following prerequisites to calculate performance scores:

Table 1. Credits with calculations based on project information

	LEED prerequisite				
	Transportation performance	Water performance	Energy performance	Waste performance	Indoor environmental quality performance
Gross floor area		x	x		
Weighted operating hours		x	x		
Weighted occupancy	x (see notes)	x	x	x	x (see notes)
Weighted occupancy excluding hotel or lodging guests (for Hospitality projects)	x (see notes)				x (see notes)

*Notes: Weighted occupancy is used to determine how many occupants need to be surveyed and what percentage of occupants have responded to the survey. For hospitality projects, hotel or lodging guests may be excluded from the surveying.*

## LEED project boundary

The LEED project boundary defines the scope of your building O+M project. As stated in the Minimum program requirement Use reasonable LEED boundaries, the LEED project boundary must include all contiguous land that is associated with the project and supports its typical operations. This includes features used primarily by the project's occupants, such as hardscape (parking and sidewalks), septic or stormwater treatment equipment, and landscaping. The LEED boundary may not unreasonably exclude portions of the building, space, or site to give the project an advantage in complying with credit requirements.

Projects may exclude up to 10% of the total gross building floor area from the LEED project boundary, which will apply consistently throughout the submission except in EQ prerequisite Environmental Tobacco Smoke, where the entire building must be considered.

## 10% Tenant Spaces Exclusion

10% of the LEED project (by gross floor area) may be excluded from an individual prerequisite or credit if it is not possible to gather the necessary tenant data for, or if the applicant does not have control over the required element. The specific spaces excluded as part of the 10% can vary by credit. In your prerequisite or credit documentation, clearly note which spaces have been excluded.

This exclusion is different than the 10% exclusion allowed for the LEED project boundary (see LEED project boundary above). Note that projects are encouraged to obtain commitment and cooperation from tenants and to include the entire building or project spaces to ensure a full picture of performance.

## Gross floor area

The gross floor area is the sum of the floor areas of the spaces within the LEED project boundary. Gross floor area is calculated via the USGBC calculator, summarizing each space in the project.

Include basements, mezzanine and intermediate-floored tiers, and penthouses with headroom height of 7.5 ft (2.2 meters) or greater. Exclude non-enclosed (or non-enclosable) roofed-over areas, such as exterior covered walkways, porches, terraces or steps, roof overhangs, and similar features. Excludes air shafts, pipe trenches, chimneys and floor area dedicated to the parking and circulation of motor vehicles.

Floor area calculations are taken from the exterior faces of exterior walls OR from the centerline of walls separating buildings, OR (for Interiors projects) from the centerline of walls separating spaces.

## Operating hours

The operating hours for the project, referred to as weighted operating hours, are the number of hours the building is in operation during a typical full week. Operating hours are space-weighted, calculated via the USGBC Calculator using Equation 1

Equation 1. Weighted operating hours =  $\sum(\text{operating hours per week for space} * \text{space gross floor area}) / \text{total gross floor area}$

Example:

A 150,000 sf office building opens 60 hours/week and contains a call center (7,000 sf) that operates 24/7 (168 hours). To calculate the building's operating hours, take a weighted average of the hours:  $[60*(150,000-7,000) + (168 * 7,000)] / 150,000 = 65 \text{ hours/week}$ .

## Weighted occupancy

The project's weighted occupancy, is the typical number of people in the project at any given time. Occupants are grouped into two categories, regular building occupants and visitors. Occupancy is space-weighted, calculated via the USGBC Calculator using Equation 4.

- ▶ Regular building occupants are habitual users of a building. Examples are: employees or staff, volunteers who regularly use the building, residents including residents of a dormitory, primary and secondary school students, hotel guests, and inpatients.
- ▶ Visitors (also "transients") intermittently use the project. Examples are: retail customers, outpatients, volunteers, and higher-education students.

Occupancy is time weighted. The part time employees are included in the regular building occupant count based on number of hours worked compared to a typical 8 hour work period (see Equation 2).

Equation 2. Weighted part-time employees = (# part time employees \* hours worked per employee per day) / 8

Visitors are counted as a daily average, weighted by duration (the average amount of time the visitor spends in the space and the average hours of operation of the space) (see Equation 3).

Equation 3. Daily average visitors = (# visitors per day) / (operating hours per day) \* duration of visit

The total weighted occupants is calculated using Equation 4.

Equation 4. Weighted total building occupants =  $\sum$ (# of regular building occupants + # of average daily visitors)

Example:

A retail store, open for 80 hours/week (or 11.43 hours/day), is staffed with 40 full time employees and has 1,250 visitors per day, each that stays for 1 hour. The store has about 109 visitors per hour (1,250 visitors per day divided by 11.43 daily store hours). The total building occupants is [40+ (1,250/11.43)] =149.

## 5. Certify

GBCI, the certification body for the LEED rating system, will perform the beta certification reviews, in accordance with the Guide to Certification for Commercial projects.

Your initial LEED v4.1 O+M certification is valid for three years from date of certification acceptance.

In order to keep certification active, projects need to provide data annually and must recertify every three years

# LT Prerequisite: Transportation performance

This prerequisite applies to

- ▶ O+M: Existing Buildings (6-14 points)
- ▶ O+M: Interiors (6-14 points)

## Intent

To reduce pollution and land development effects from transportation.

## Requirements

Conduct a transportation survey of building occupants on their commute patterns.

Regular building occupants must be surveyed. Building occupants shall provide information on their two-way commutes over one work week and consider seasonal variations and variations in work schedules. Visitors are encouraged to be surveyed, especially if the daily average is greater than the number of regular building occupants. Visitors shall provide information on their one-way travel to the building for that day in particular.

The required number of responses that must be received is outlined in Figure 1.

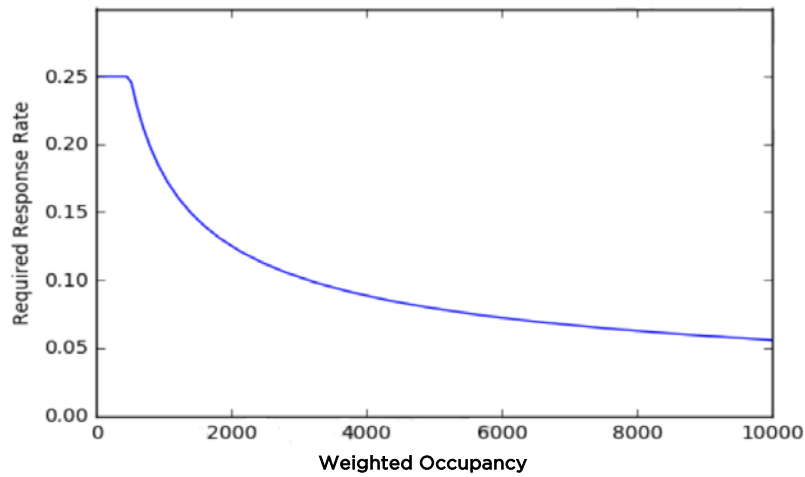
Conduct the survey at least once per year and calculate a transportation performance score for the project.

Obtain a minimum transportation performance score of 40. Additional points for this prerequisite are awarded for transportation performance scores above 40, according to Table 1.

Table 1. LEED Points for Transportation Performance Score

Transportation Performance Score	LEED Points
40 (Required)	6 (Required)
47	7
54	8
61	9
68	10
75	11
83	12
90	13
97	14

Figure 1. Required Responses Rate for Survey



Equation: Response rate= 100 \* (0.25 / square root (occupancy / 500))

### The Transportation Performance Score

The transportation performance score rates the project's greenhouse gas emissions measured in carbon dioxide equivalent emissions (CO<sub>2</sub>e) resulting from transportation to and from the building against other high performing buildings worldwide.

The score is a value from 1-100 based on the project's average CO<sub>2</sub>e per one-way trip per occupant (lbs.)

### Transportation Performance Score Calculation

To calculate a transportation performance score, the following data is required. All data is collected via the transportation survey. At least one survey every 365 days must be conducted:

- ▶ Number of regular building occupants and visitors.
- ▶ For Hospitality projects, number of hotel or lodging guests (these occupants may be excluded from the survey even though they are considered regular building occupants).
- ▶ Regular building occupant survey responses
  - # of routes for 2-way commutes over one week
  - Per route,
    - Commuting transportation mode(s),
    - Distance traveled (in miles or kilometers)
- ▶ Visitor occupant responses
  - Commuting transportation mode(s),
  - Distance traveled (in miles or kilometers)

An emissions value is calculated for each building occupant that completes the survey as follows:

1. A CO<sub>2</sub>e value is calculated for each route provided for the occupant, using the commuting transportation mode(s), distance traveled, the CO<sub>2</sub>e per mile values in Table 2 and Equation 1:

Equation 1: CO<sub>2</sub>e for route (lbs.) = (CO<sub>2</sub>e lbs./mile) \* distance traveled in miles

Table 2. CO2e values for a one-way trip, for each mode of transit

Mode	CO2e pounds/mile	Source
Walk, bike, telecommute	0	NA
Motorcycle	0.26	DEFRA/DECC 2014: emissionfactors.com
Heavy rail	0.33	American Bus Association Foundation. Updated Comparison of Energy use & CO2 Emissions From Different Transportation Modes, 2008.
2-3 Carpool	0.39	EPA: <a href="http://www.epa.gov/cleanenergy/energy-resources/refs.html">http://www.epa.gov/cleanenergy/energy-resources/refs.html</a>
Light rail	0.44	American Bus Association Foundation. Updated Comparison of Energy Use & CO2 Emissions from Different Transportation Modes, 2008.
Alternative Fuel Vehicles	0.44	U.S. DOE National average for a 2014 Nissan Leaf: fueleconomy.gov
Bus	0.68	American Bus Association Foundation. Updated Comparison of Energy Use & CO2 Emissions from Different Transportation Modes, 2008.
Car (solo)	0.93	EPA: <a href="http://www.epa.gov/cleanenergy/energy-resources/refs.html">http://www.epa.gov/cleanenergy/energy-resources/refs.html</a>

2. For each occupant, CO2e is calculated using Equation 2:

$$\text{Equation 2: CO2e for individual occupant (lbs.)} = (\sum \text{CO2e for route}) / \# \text{ routes}$$

For visitors, calculations include one route (as their survey includes only one way and one day)

For regular building occupants, calculations may include more than one route (as their survey requests information regarding two way commutes over one week, and includes all seasons/yearly variations). Each route is weighed equally.

An average emissions value is calculated by taking an average of the individual emissions, using Equation 3.

$$\text{Equation 3: Project CO2e per one-way trip per occupant (lbs.)} = (\sum \text{CO2e for individual occupant}) / \# \text{ occupants in survey}$$

The project's average CO2e per one-way trip per occupant (lbs.) value is then input into the transportation scoring function (see Figure 2) to produce a transportation performance score:

Figure 2: Transportation scoring function

Transportation score

Average lbs. of CO<sub>2</sub>e per one-way trip per occupant

The transportation scoring function was developed using transportation patterns reported by LEED buildings, certified under LEED O+M v2009. The data set includes buildings that earned [SS credit 4, Alternative Commuting Transportation](#).

## Guidance

This prerequisite allows you to gain insight about your occupants' preferred transportation methods and the resulting greenhouse gas emissions as a CO<sub>2</sub>e from that transportation.

Transportation patterns from your building occupants are gathered via a transportation survey conducted in the system at least once in the year.

The average greenhouse gas emissions (CO<sub>2</sub>e) associated with the occupants' transportation methods is translated into a Transportation performance score.

### Step-by-step

#### Step 1. Conduct a transportation survey

Use the system to administer a transportation survey for the building. The survey may be conducted at any time in the year, but once per season is encouraged. The available transportation survey responses include: walk, bike, telecommute, motorcycle or scooter, light rail (trolley, tram, or streetcar), rapid transit (subway/metro), carpool (2-3 people), alternative fuel vehicle, bus, and car (solo).

Decide whether visitors will be included in the survey. While not required, it is recommended to include visitors if the daily average number of visitors are greater than the number of building occupants. See the *How it Works* section, step 4 for more information on defining and calculating visitors and regular building occupants.

#### Step 2. Achieve required response rate from the survey

Review the rating system to determine how many building occupants are required to complete the survey.

#### Step 3. Determine transportation performance score

A transportation performance score will generate for your project once data is entered and a minimum survey response rate is achieved



#### **Step 4. Prepare documentation for certification review**

Complete the prerequisite information. See Required Documentation below.

#### **Further Explanation**

##### **Improving your score**

The following strategies may help your project improve your transportation performance score:

- ▶ Educate building occupants on transportation options: new-hire orientation; employee newsletter, flyer, announcements, memos, letters; carpool/vanpool matching website; or employer carpool/vanpool events.
- ▶ Support building occupants with guaranteed ride home program; preferential parking for rideshare participants; flextime schedule; or ride-matching service.
- ▶ Implement telecommuting; compressed workweek schedule; transit subsidy; introduction of a parking fee; bicycle program; parking cash-out; employee clean vehicle purchase program; or carpool program.

#### **Required Documentation**

- ▶ Confirmation of weighted occupancy and if visitors were included
- ▶ Completed transportation survey. The survey is completed in the platform. Data from surveys conducted outside of the platform are not accepted at this time.
- ▶ Calculated transportation performance score. A minimum performance score of 40/100 is required

#### **Changes from LEED v4**

- ▶ Transportation survey must be conducted using the USGBC system
- ▶ Visitors are encouraged, but not required to be surveyed.
- ▶ Removed Option 2. The alternative transportation rate performance metric was replaced by the transportation performance score. The alternative transportation rate in LEED v4 O+M is based on the percentage reduction in conventional commuting trips (commute alone in automobile) whereas the transportation performance score is based on CO<sub>2</sub>e per one-way trip per occupant.
- ▶ Removed Option 3. An alternative transportation program may be used to improve the Transportation Score

# SS Credit: Rainwater Management

This credit applies to

- ▶ O+M: Existing Buildings (1 point)

## Intent

To reduce runoff volume and improve water quality by replicating the natural hydrology and water balance of the site, based on historical conditions and undeveloped ecosystems in the region.

## Requirements

Use low-impact development (LID) practices to infiltrate, evapotranspire, collect and reuse water onsite from 25% of the impervious surfaces for the 95th percentile storm event.

Establish and implement an annual inspection and maintenance program of all rainwater management facilities to assure continued performance.

Document the annual inspections, including identification of areas of erosion, maintenance needs, and repairs. Perform necessary maintenance, repairs, or stabilization within 60 days of inspection.

## Guidance

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

## Required Documentation

- ▶ Rainfall events calculator
- ▶ Calculations that demonstrate how the volume of runoff from 25% of impervious surfaces and the volume managed by green infrastructure measures were calculated
- ▶ Documents that thoroughly depict the green infrastructure techniques used
- ▶ Description of proposed practices to be implemented on the project site and what qualifies these strategies as green infrastructure techniques that best replicate natural site hydrology processes.
- ▶ Document or narrative describing the annual inspection and maintenance program

## Changes from LEED v4

- ▶ Minor edits for clarification

# SS Credit: Heat Island Reduction

This credit applies to

- ▶ O+M: Existing Buildings (1 point)

## Intent

To minimize effects on microclimates and human and wildlife habitats by reducing heat islands.

## Requirements

Have in place strategies to minimize the project's overall contribution to heat island effects and that meet the following criterion:

$$\begin{array}{ccccccc} \text{Area of} & & \text{Area of High-} & & \text{Area of} & & \\ \text{Nonroof} & & \text{Reflectance} & & \text{Vegetated} & & \\ \text{Measures} & & \text{Roof} & & \text{Roof} & & \\ \\ \text{-----} & + & \text{-----} & + & \text{-----} & \geq & \\ & & & & & \text{Total Site} & + \\ & & & & & \text{Paving Area} & \text{Total Roof} \\ & & & & & & \text{Area} \\ \\ 0.50 & & 0.75 & & 0.50 & & \end{array}$$

Alternatively, an SRI and SR weighted average approach may be used to calculate compliance.

Use any combination of the following strategies.

### Nonroof Measures

- ▶ Plants that provide shade over paving areas (including playgrounds) on the site. For newly installed plants, base shade area on 10-year canopy width at noon.
- ▶ Vegetated planters.
- ▶ Shade with structures covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines.
- ▶ Shade with architectural devices or structures that have a three-year aged solar reflectance (SR) value of at least 0.28. If three-year aged value information is not available meet an initial SR of at least 0.33.
- ▶ Shade with vegetated structures.
- ▶ Paving materials with a three-year aged solar reflectance (SR) value of at least 0.28. If three-year aged value information is not available, meet an initial SR of at least 0.33.
- ▶ Open-grid pavement system (at least 50% unbound).

### High-Reflectance Roof

Roofing materials with an SRI equal to or greater than the values in Table 1. Meet the three-year aged SRI value if available, otherwise, meet the initial SRI value.

Table 1. Minimum solar reflectance index value, by roof slope

	Slope	Initial SRI	3-year aged SRI
Low-sloped roof	≤ 2:12	82	64
Steep-sloped roof	> 2:12	39	32

Roof area that consists of functional, usable spaces (such as helipads, recreation courts, and similar amenity areas) may meet the requirements of nonroof measures. Applicable roof area excludes roof area covered by mechanical equipment, solar energy panels, skylights, and any other appurtenances.

#### Vegetated Roof

Vegetated roof. If newly installed, sufficient growing medium and plant material must be in place to provide full vegetative cover within 3-years.

Have in place a maintenance program that ensures all high-reflectance surfaces are cleaned at least annually to maintain good reflectance, all vegetation is maintained for plant health, and any vegetated structures or vegetated roofs are maintained for good structural condition.

#### Guidance

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide for Option 3.

#### Required Documentation

- ▶ Nonroof and/or roof area calculations
- ▶ Site plan highlighting Nonroof elements and measurements, hardscape area, and area of each Nonroof measure
- ▶ Document or narrative describing the maintenance program for cleaning high reflectance surfaces and/or vegetated roof as applicable

#### Changes from LEED v4

- ▶ Compliance is based on total site paving area and total roof area. Individual compliance options for Nonroof, roof, and parking under cover have been removed, requiring projects to consider the site as a whole. This ensures the credit achievement is based on the overall impact of heat island mitigation practices on the site.
- ▶ Revised credit language to clarify all strategies must be in place and more specifically address the existing building context that much of the strategies will be existing, not newly installed.

# SS Credit: Light Pollution Reduction

This credit applies to

- ▶ O+M: Existing Buildings (1 point)

## Intent

To increase night sky access, improve nighttime visibility, and reduce the consequences of development for wildlife and people.

## Requirements

Meet the requirements of one of the options below:

### Option 1. Fixture Shielding

Shield all exterior fixtures (where the sum of the mean lamp lumens for that fixture exceeds 2,500) such that the installed fixtures do not directly emit any light at a vertical angle more than 90 degrees from straight down.

OR

### Option 2. Perimeter Measurements

Measure the night illumination levels at regularly spaced points on the project boundary, taking the measurements with the building's exterior and site lights both on and off. At least eight measurements are required, at a maximum spacing of 100 feet (30 meters) apart. The illumination level measured with the lights on must not be more than 20% above the level measured with the lights off.

## Guidance

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

The requirements of either option are considered fulfilled, with no further documentation needed, if the project building was previously certified under a LEED Building Design and Construction rating system and earned the Light Pollution Reduction credit.

## Required Documentation

- ▶ Option 1.
  - Confirmation that all exterior fixtures, where the sum of the mean lamp lumens for the fixture exceeds 2,500 lamp lumens, are shielded such that no light is directly emitted at a vertical angle more than 90 degrees from straight down.
  - Shielding information for each luminaire with total mean lamp lumens greater than 2,500.
- ▶ Option 2.
  - Site lighting measurements
  - Percent increase in illumination from lights off to lights on
  - Site plan, with scale, showing the project boundary, location of all measurement points, distance between measurement points (must be no more than 100 ft [30 m] apart), existing and proposed light fixtures, and any related site features

## Changes from LEED v4

- ▶ None

# SS Credit: Site Management

This credit applies to

- ▶ O+M: Existing Buildings (1 point)

## Intent

To provide environmentally sensitive site management practices that protect and enhance habitat, reduce pollutants and waste, protect soils and hydrology and reduce site domestic water use.

## Requirements

Conduct a site assessment to identify and document natural areas providing habitat.

Have in place a site management plan that demonstrates how the following best practices are met:

- ▶ Monitor and eradicate invasive and exotic plant species from natural habitat areas.
- ▶ Manage snow and ice in ways that limit degradation of water quality, surrounding plants and soil health from chemical deicer applications.
- ▶ Prevent erosion by maintaining vegetative cover, and restore any eroded soils.
- ▶ Reduce noise and air pollution resulting from gasoline powered equipment.
- ▶ Divert from landfills 100% of plant material waste for composting reuse.
- ▶ Reduce fertilizer use to only as needed for plant health applications based on soil testing. Eliminate preventive applications of herbicides, pesticides and fungicides applying only as needed for occurrences.
- ▶ Prepare an Integrated Pest Management plan.
- ▶ Add one or more inches of organic matter mulch, such as compost, to soil surfaces in planting areas annually.
- ▶ Irrigate vegetation, other than planted containers, only with automatic controlled systems utilizing either rain shutoff, moisture sensing or weather based controls.
- ▶ Monitor irrigation systems at least bi-weekly during the operating season and correct any leaks, breaks, inappropriate water usage, or incorrect timing.
- ▶ Store materials and equipment to prevent air and site contamination.

## Guidance

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

## Further Explanation

Table 1 is similar to LEED v4, with the following modification:

Operational element	Example site maintenance activities
Snow and ice removal	<ul style="list-style-type: none"> <li>• Use environmentally preferred deicers rather than calcium chloride or sodium chloride. Examples include those that contain calcium magnesium acetate. For more guidance on environmentally preferred products, refer to the EPA’s Safer Choice standard for deicers:</li> <li>• Reduce area treated with calcium chloride or sodium chloride to 50% of total deiced area by discontinuing deicer applications in low-traffic areas or converting some areas to environmentally preferred deicer.</li> </ul>

	<ul style="list-style-type: none"> <li>• If deicer blend containing calcium chloride or sodium chloride in addition to other compounds is used, demonstrate compliance via reduced treatment area path.</li> </ul>
--	--

**Required Documentation**

- ▶ Results of the site assessment to identify any natural areas providing habitat.
- ▶ Site management plan and/or other documentation demonstrating that the environmentally sensitive site management best practices were met and maintained for each operational element covered by the credit.

**Referenced Standards:**

EPA, Safer Choice Standards for Deicers

**Changes from LEED v4**

- ▶ Added requirement to conduct site assessment to identify natural areas providing habitat.
- ▶ Credit is now based on management practices being used, not comparing performance goals from a Site Management policy.
- ▶ Revised requirement for management of snow and ice to better align with SITES rating system.
- ▶ Revised requirements for fertilizers to better align with LEED v4 prerequisite Site management policy and to provide more flexibility for meeting the intent.
- ▶ Added requirement for organic matter mulch in planting areas.
- ▶ Added requirement for vegetation irrigating, using controlled systems.
- ▶ Removed performance requirements for limited turf area / all manual or electric powered equipment/ Reduction in emissions from site management equipment / protect or restore habitat

# WE Prerequisite: Water Performance

This prerequisite applies to

- ▶ O+M: Existing Buildings (6–15 points)
- ▶ O+M: Interiors (6–15 points)

## Intent

To support water management and reduce water consumption.

## Requirements

Have permanently installed water meters that measure the total potable water use for the project and associated grounds. All potable or reclaimed water supplied to the project must be metered.

For Interiors projects, have permanently installed sub-meters that measure total potable water use for any fixtures or fittings in the project scope. Alternately, interiors projects may pro-rate water use, using occupancy and base building water use over twelve consecutive months.

Measure total potable water use on a monthly basis for twelve consecutive months (one full year).

Input the twelve months of potable water use data and calculate a water performance score for the project.

Obtain a minimum water performance score of 40. Additional points for this prerequisite are awarded for Water Performance Scores above 40, according to Table 1.

Interiors projects that do not have fixtures or fixture fittings in the project scope are exempt from the requirement to obtain a minimum water performance score of 40. All interiors projects must input twelve months of potable water use data and calculate a water performance score for the project.

Table 1. LEED Points for Water Performance

Water Performance Score	LEED Points
40 (Required)	6 (Required)
44	7
50	8
57	9
64	10
70	11
77	12
84	13
90	14
97	15



### Water performance score

The water performance score rates the building's total water consumption against the total water consumption of comparable high-performing buildings.

The score is a value from 1-100 based on the project's water consumption per occupant and water consumption per floor area.

### Performance score calculation

To calculate a water performance score, the following data is required:

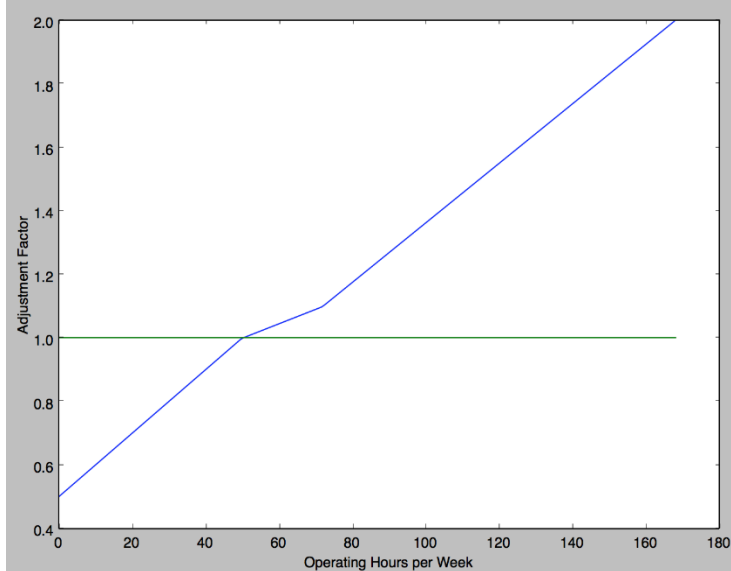
1. Annual water consumption (gallons), with monthly or daily totals
2. Gross floor area (sq. ft. or sq. m.)
3. Weighted occupancy
4. Weighted operating hours

The water consumption is adjusted for weighted operating hours and converted into daily water consumption using Equation 1.

Equation 1: adjusted daily water consumption = annual water consumption \* operating hours adjustment factor / 365 days

The operating hours adjustment factor is determined using Table 2. The adjustment factor accounts for typical LEED buildings operations of 50 hours a week.

Table 2. Operating hours adjustment factor



Daily water consumption per occupant is calculated by dividing the daily water consumption by the weighted occupancy, using Equation 2.

Equation 2: adjusted daily water consumption per occupant = daily water consumption / weighted occupancy

Daily water consumption per floor area is calculated by dividing the daily water consumption by the gross floor area, using Equation 3.

Equation 3: adjusted daily water consumption per floor area = daily water consumption / gross floor area

The project's daily water consumption per occupant AND daily water consumption per floor area are input into the water scoring function for the specific project type to produce a water performance score.

The water scoring functions were developed using water consumption data from high-performing buildings. The data set includes LEED buildings that shared their water consumption data with USGBC as part of the whole-building energy and water usage requirement.

## **Guidance**

This prerequisite allows you to understand how much water your building uses for irrigation, HVAC, restrooms, pantry, cooling towers, and other fixtures.

Your total potable water use measured for a full year is translated into a water performance score.

### **Step-by-Step**

#### **Step 1. Check Meters**

Ensure water meters are installed and functioning properly to capture water usage for all water systems serving the project buildings and grounds. Include all water used for irrigation, indoor plumbing fixtures, domestic hot water, process water, reclaimed water, boiler water, and cooling towers.

For interiors projects, ensure there are sub-meters for water systems included in the project scope OR establish a process for pro-rating water use based on occupancy and base building water use.

#### **Step 2. Measure water use**

Collect total potable water use for 12 consecutive months (one full year).

#### **Step 3. Input data**

Input your building's water consumption. Use one of the following methods:

- ▶ Upload [USGBC data import spreadsheet](#)
- ▶ Share water data from ENERGY STAR Portfolio Manager (Instructions [here](#))
- ▶ Connect existing BAS or meters to platform (to learn more, contact us at <https://www.usgbc.org/contactus>)
- ▶ Enter data manually

You do not have to enter the full year of data at once. Data may be entered at any time for project-defined intervals. Make sure there are no gaps or missing data and that all meters for all water sources are included.

Also input your weighted occupancy and weighted operating hours (see *Appendix A. Project Information*) via the USGBC calculator.

#### **Step 4. Determine water performance score**

A water performance score will be produced for your project once data is entered.

#### **Step 5. Prepare documentation for certification review**

Complete the prerequisite information. See *Required Documentation* below.

## Further Explanation

### Improving your score

The following strategies may help you reduce water use and increase your water performance score:

- ▶ [LEED v4 O+M WE prerequisite Indoor Water Use Reduction](#)
- ▶ [LEED v4 O+M WE credit Outdoor Water Use Reduction](#)
- ▶ [LEED v4 O+M WE credit Indoor Water Use Reduction](#)
- ▶ [LEED v4 O+M WE credit Cooling Tower Water Use](#)
- ▶ [LEED v4 O+M WE credit Water Metering](#)

### Required Documentation

- ▶ Utility bills for all water sources, with consumption values and dates highlighted
- ▶ Calculated water performance score. A minimum performance score of 40/100 is required

### Changes from LEED v4

- ▶ This is a new prerequisite that incentivizes teams to focus on reducing total potable water use by compiling and reviewing water performance data. Under LEED v4 O+M, project teams could use calculated or metered water use to document reductions from a baseline; in LEED v4.1 O+M, project teams are rewarded for reporting water use data and increasing water efficiency via the performance score, which measures the intended outcomes of water efficiency strategies

# EA Prerequisite: Energy Efficiency Best Management Practices

This prerequisite applies to

- ▶ O+M: Existing Buildings
- ▶ O+M: Interiors

## 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

Conduct an energy audit that meets both the requirements of the ASHRAE preliminary energy use analysis and an ASHRAE Level 1 walk-through assessment identified in the ASHRAE Procedures for Commercial Building Energy Audits or equivalent. Projects in Europe may use the energy audit procedure defined in EN 16247-2:2014.

Prepare and maintain a current facilities requirements and operations and maintenance plan that contains the information necessary to operate the project efficiently. The plan must include the following:

- ▶ a current sequence of operations for the building;
- ▶ the project occupancy schedule;
- ▶ equipment run-time schedules;
- ▶ setpoints for all HVAC equipment;
- ▶ setpoints for lighting levels throughout the project;
- ▶ minimum outside air requirements;
- ▶ any changes in schedules or setpoints for different seasons, days of the week, and times of day;
- ▶ a systems narrative describing the mechanical and electrical systems and equipment in the project; and
- ▶ a preventive maintenance plan for equipment described in the systems narrative.

## Data Centers

Use the U.S. Department of Energy's DC PRO Profiling Tool to perform a preliminary assessment of energy consumption in data center spaces for critical systems.

## Guidance

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

## Required Documentation

- ▶ Audit date
- ▶ ASHRAE preliminary energy use analysis and ASHRAE Level 1 audit summary
- ▶ Current facility requirements (CFR) and operations and maintenance plan (OMP) or an excerpt thereof
- ▶ For data centers, preliminary assessment results from the DC Pro Profiling Tool

## Changes from LEED v4

- ▶ Incorporated international alternative compliance path (ACP) allowing projects in Europe to use the energy audit procedure defined in EN 16247-2:2014
- ▶ Minor edits to improve applicability for Interiors

# EA Prerequisite: Fundamental Refrigerant Management

This prerequisite applies to

- ▶ O+M: Existing Buildings
- ▶ O+M: Interiors

## Intent

To reduce stratospheric ozone depletion.

## Requirements

Do not use chlorofluorocarbon (CFC)-based refrigerants in heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems unless a third-party audit shows that system replacement or conversion is not economically feasible or unless a phase-out plan for CFC-based refrigerants is in place. Phase-out plans should be scheduled for completion within 10 years. The replacement or conversion of HVAC&R equipment is considered not economically feasible if the simple payback of the replacement or conversion is greater than 10 years. Perform the following economic analysis:

$$\text{Simple payback} = \frac{\text{Cost of replacement or conversion}}{\text{Resulting annual energy cost difference} + \text{Resulting annual maintenance and refrigerant cost difference}} > 10$$

If CFC-based refrigerants are maintained in the project, reduce annual leakage to 5% or less using the procedures in the Clean Air Act, Title VI, Rule 608, governing refrigerant management and reporting (or a local equivalent for projects outside the U.S.), 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 pound [225 grams] of refrigerant), standard refrigerators, small water coolers, and any other cooling equipment that contains less than 0.5 pound (225 grams) of refrigerant are exempt

## Guidance

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

## Required Documentation

- ▶ Confirmation that no CFC-based refrigerants are included in any new mechanical cooling or refrigeration equipment serving the project. This prerequisite does not address equipment with less than 0.5 lb. (225g) of refrigerant.
- ▶ Fundamental Refrigerant Management Calculator
- ▶ Confirmation that comprehensive phase-out plan for CFC-based refrigerants is in place
- ▶ Confirmation that Refrigerant leakage rate or quantity requirements have been met
- ▶ If applicable, details of audit conducted demonstrating CFC phase-out is not economically feasible.

## Changes from LEED v4

- ▶ None

# EA Prerequisite: Energy Performance

This prerequisite applies to

- ▶ O+M: Existing Buildings (13-33 points)
- ▶ O+M: Interiors (13-33 points)

**Intent**

To support energy management and reduce environmental and economic harms associated with excessive energy use by reducing greenhouse gas emissions and achieving higher levels of operating energy performance.

**Requirements**

Have permanently installed energy meters or submeters that measure total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, etc.). Utility-owned meters capable of aggregating total project energy use are acceptable.

For Interiors projects, have permanently installed sub-meters that measure all electricity and fossil fuels for equipment within the project scope. Alternately, interiors projects may pro-rate energy use, using occupancy and base building energy use over twelve consecutive months.

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

Measure the project’s energy use on a monthly basis for twelve consecutive months (one full year). Use the twelve months of energy use data to obtain an energy performance score.

LEED points are based on project energy performance across two metrics: greenhouse gas emissions and source energy.

Table 1. LEED Points for GHG Emissions Score

GHG Emissions Score	LEED Points
40 (Required)	6.5 (Required)
41	7
44	7.5
47	8
50	8.5
54	9
57	9.5
60	10
63	10.5

66	11
69	11.5
72	12
75	12.5
78	13
81	13.5
84	14
87	14.5
90	15
93	15.5
96	16
99	16.5

AND

Table 2. LEED Points for Source Energy Score

Source Energy Score	LEED Points
40 (Required)	6.5 (Required)
41	7
44	7.5
47	8
50	8.5
54	9
57	9.5
60	10
63	10.5
66	11
69	11.5
72	12

75	12.5
78	13
81	13.5
84	14
87	14.5
90	15
93	15.5
96	16
99	16.5

LEED points are calculated based on the project score for each metric; the GHG emissions score and source energy score are each weighted 50% of the energy performance score. LEED points are rounded up to the nearest whole number and awarded according to Table 3.

Table 3. LEED Points for Energy Performance Score

Energy Performance Score	LEED Points
40 (Required)	13 (Required)
41	14
44	15
47	16
50	17
54	18
57	19
60	20
63	21
66	22
69	23
72	24
75	25



78	26
81	27
84	28
87	29
90	30
93	31
96	32
99	33

### GHG emissions score

The GHG emissions score rates the building’s total greenhouse gas emissions against the total greenhouse gas emissions of comparable high-performing buildings.

The score is a value from 1-100 based on the project’s GHG emissions per occupant and GHG emissions per floor area.

### GHG emissions score calculation

To calculate a GHG emissions score, the following data is required:

- ▶ Annual Energy consumption (kBtu), with monthly or daily totals and distinguished by fuel type
- ▶ Gross floor area (sq. ft. or sq. m.)
- ▶ Weighted occupancy
- ▶ Weighted operating hours
- ▶ Outside air temperature
- ▶ Location

The energy consumption is converted into equivalent GHG emissions, using the latest U.S. Environmental Protection Agency’s (EPA) regional grid mix coefficients for U.S. and Canadian projects, and national grid mix coefficients from the International Energy Agency. The grid mix coefficient values are kept up to date with U.S. EPA and IEA release updates.

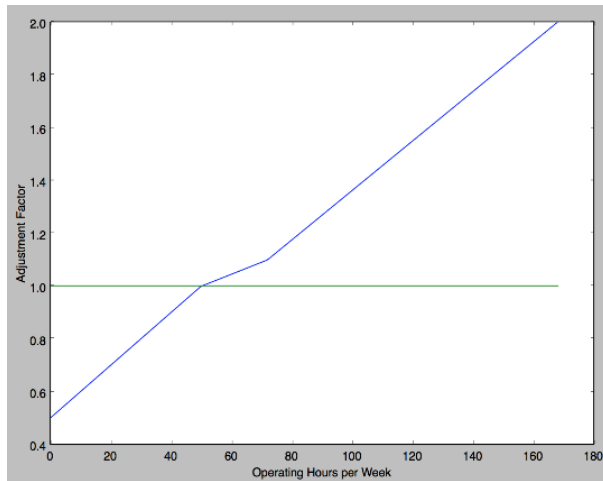
This is the Annual Emissions (mTCO<sub>2</sub>e)

GHG emissions are adjusted for weighted operating hours and outside temperature and converted into daily GHG emissions using Equation 1.

Equation 1: adjusted GHG emissions = (GHG emissions \* outside temperature adjustment factor \* operating hours adjustment factor) / 365 days

The operating hours adjustment factor is determined using Figure 1. The adjustment factor accounts for typical LEED buildings operations of 50 hours a week.

Figure 1. Operating hours adjustment factor



GHG emissions per occupant is calculated by dividing the adjusted GHG emissions by the weighted occupancy

Equation 2. GHG emissions per occupant = adjusted GHG emissions / weighted occupancy

GHG emissions per floor area is calculated by dividing the adjusted GHG emissions by the gross floor area.

Equation 3: GHG emissions per floor area = adjusted GHG emissions / gross floor area

The project's calculated GHG emissions per occupant and GHG emissions per floor area are input into the energy scoring function for the specific project type.

The energy scoring function was developed using energy consumption data from high-performing buildings. The data set includes LEED buildings that shared their energy consumption data with USGBC as part of the whole-building energy and water usage requirement.

### Source energy score

The source energy score rates the building's total energy consumption against the total energy consumption of comparable high-performing buildings.

The score is a value from 1-100 based on the project's source energy consumption per occupant per floor area.

### Source energy score calculation

To calculate a source energy score, the following data is required:

- ▶ Annual Energy consumption, with monthly or daily totals and distinguished by fuel type
- ▶ Gross floor area (sq. ft. or sq. m.)
- ▶ Weighted occupancy
- ▶ Weighted operating hours
- ▶ Outside air temperature
- ▶ Location

### Guidance

This prerequisite allows you to understand how your project gets and uses its power.

The project's measured energy consumption for a full year is translated into an energy performance score, comprised of two sub-scores: a Greenhouse gas emissions score and Source energy score. The two metrics together assesses both your building's greenhouse gas emissions and contributions to climate change, and your building's energy efficiency.

### Step-by-Step

#### Step 1. Check Meters

Ensure energy meters are installed and functioning properly to capture total building energy consumption, distinguished by fuel type (for example: electricity, natural gas, chilled water, steam, fuel oil, propane).

For interiors projects, ensure there are sub-meters to measure consumption for electricity and fossil fuel equipment included in the project scope OR establish a process for pro-rating energy use based on occupancy and base building energy use.

#### Step 2. Measure energy use

Collect energy use, by fuel type for 12 consecutive months (one full year).

#### Step 3. Input data

- ▶ Input your building's energy use. Use one of the following methods:
- ▶ Upload [USGBC data import spreadsheet](#)
- ▶ Share energy data from ENERGY STAR Portfolio Manager (Instructions [here](#))
- ▶ Connect existing BAS or meters to the platform (to learn more, contact us at <https://www.usgbc.org/contactus>)
- ▶ Enter data manually

You do not have to enter the full year of data at once. Data may be entered at any time for project-defined intervals. Make sure there are no gaps or missing data and that all meters for all fuel sources are included.

Also input your weighted occupancy, weighted operating hours, and gross floor area (see *How it Works step 4. Get started*) via the USGBC calculator.

#### Step 4. Determine energy performance score

An energy performance score will automatically generate for your project once data is entered.

#### Step 5. Prepare documentation for certification review

Complete the prerequisite information. See *Required Documentation* below.

### Further Explanation

Improving your score

The following strategies may help you reduce your GHG emissions or source energy use and increase your energy performance score:

- ▶ Commissioning
  - [LEED v4 O+M EA prerequisite Existing Building Commissioning—Analysis](#)
  - [LEED v4 O+M EA credit Existing Building Commissioning—Implementation](#)
  - [LEED v4 O+M EA credit Ongoing Commissioning](#)
- ▶ [LEED v4 O+M EA credit Advanced Energy Metering](#)
- ▶ [LEED v4 O+M EA credit Demand Response](#)
- ▶ [LEED v4 O+M EA credit Renewable Energy and Carbon Offsets](#)
- ▶ Use the Environmental Protection Agency (EPA) Energy Star® Portfolio Manager tool to track and assess energy for your building

### **Required Documentation**

- ▶ Utility bills for all fuels, with consumption values and dates highlighted
- ▶ Calculated energy performance score, calculated GHG emissions score, calculated source energy score. A minimum performance score of 40/100 is required

### **Changes from LEED v4**

- ▶ This is a new prerequisite that incentivizes teams to focus on reducing total energy use and resulting greenhouse gas emissions by compiling and reviewing energy performance data. Under LEED v4 O+M, projects earn LEED points by documenting strategies to improve energy efficiency; under LEED v4.1 O+M, projects are rewarded for benchmarking and reducing actual energy use via the performance score, which measures the intended outcomes of energy efficiency strategies.

# EA Credit: Enhanced Refrigerant Management

This credit applies to

- ▶ O+M: Existing Buildings (1 point)
- ▶ O+M: Interiors (1 point)

**Intent**

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

**Requirements**

**Option 1. No Refrigerants or Low-Impact Refrigerants (1 point)**

Do not use refrigerants, or use only refrigerants (naturally occurring or synthetic) that have an ozone depletion potential (ODP) of zero and a global warming potential (GWP) of less than 50.

OR

**Option 2. Calculation of Refrigerant Impact (1 point)**

Select refrigerants that are used in heating, ventilating, air-conditioning, and refrigeration (HVAC&R) equipment to minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change. The combination of all new and existing base building and tenant HVAC&R equipment that serve the project must comply with the following formula:

IP units	SI units
$\frac{LCGW}{P} + \frac{LCOD}{P} \times \frac{10}{5} \leq 100$	$\frac{LCGW}{P} + \frac{LCOD}{P} \times \frac{10}{5} \leq 13$
<b>Calculation definitions for LCGWP + LCODP x 105 ≤ 100 (IP units)</b>	<b>Calculation definitions for LCGWP + LCODP x 105 ≤ 13 (SI units)</b>
LCODP = [ODPr x (Lr x Life +Mr) x Rc]/Life	LCODP = [ODPr x (Lr x Life +Mr) x Rc]/Life
LCGWP = [GWPr x (Lr x Life +Mr) x Rc]/Life	LCGWP = [GWPr x (Lr x Life +Mr) x Rc]/Life
LCODP: Lifecycle Ozone Depletion Potential (lb CFC 11/Ton-Year)	LCODP: Lifecycle Ozone Depletion Potential (kg CFC 11/(kW/year))
LCGWP: Lifecycle Direct Global Warming Potential (lb CO2/Ton-Year)	LCGWP: Lifecycle Direct Global Warming Potential (kg CO2/kW-year)
GWPr: Global Warming Potential of Refrigerant (0 to 12,000 lb CO2/lbr)	GWPr: Global Warming Potential of Refrigerant (0 to 12,000 kg CO2/kg r)

ODPr: Ozone Depletion Potential of Refrigerant (0 to 0.2 lb CFC 11/lbr)	ODPr: Ozone Depletion Potential of Refrigerant (0 to 0.2 kg CFC 11/kg r)
Lr: Refrigerant Leakage Rate (2.0%)	Lr: Refrigerant Leakage Rate (2.0%)
Mr: End-of-life Refrigerant Loss (10%)	Mr: End-of-life Refrigerant Loss (10%)
Rc: Refrigerant Charge (0.5 to 5.0 lbs of refrigerant per ton of gross AHRI rated cooling capacity)	Rc: Refrigerant Charge (0.065 to 0.65 kg of refrigerant per kW of AHRI rated or Eurovent Certified cooling capacity)
Life: Equipment Life (10 years; default based on equipment type, unless otherwise demonstrated)	Life: Equipment Life (10 years; default based on equipment type, unless otherwise demonstrated)

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

IP units	SI units
$\sum ( LCGWP + LCODP \times 105 ) \times Q_{unit}$	$\sum ( LCGWP + LCODP \times 105 ) \times Q_{unit}$
----- $\leq 100$	----- $\leq 13$
----	—
Qtotal	Qtotal

<b>Calculation definitions for [ <math>\sum ( LCGWP + LCODP \times 105 ) \times Q_{unit} ] / Q_{total} \leq 100</math> (IP units)</b>	<b>Calculation definitions for [ <math>\sum ( LCGWP + LCODP \times 105 ) \times Q_{unit} ] / Q_{total} \leq 13</math> (SI units)</b>
Qunit = Gross ARI rated cooling capacity of an individual HVAC or refrigeration unit (Tons)	Qunit = Eurovent Certified cooling capacity of an individual HVAC or refrigeration unit (kW)
Qtotal = Total gross ARI rated cooling capacity of all HVAC or refrigeration	Qtotal = Total Eurovent Certified cooling capacity of all HVAC or refrigeration (kW)

Retail

Meet Option 1 or 2 for all HVAC systems.

Stores with commercial refrigeration systems must comply with the following.

- ▶ Use only non-ozone-depleting refrigerants.
- ▶ Achieve an average HFC refrigerant charge of no more than 1.75 pounds of refrigerant per 1,000 Btu/h (2.72 grams of refrigerant per kW) total evaporator cooling load.
- ▶ Achieve a store-wide annual refrigerant emissions rate of no more than 15%.

Alternatively, stores with commercial refrigeration systems may provide proof of attainment of EPA GreenChill's silver-level store certification for fully operational food retail stores.

## **Guidance**

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

### Required Documentation

- ▶ For Option 1:
  - Description of the low-impact refrigerants used or description of why no refrigerants are needed.
- ▶ For Option 2:
  - Fundamental refrigerant management calculator
  - Refrigerant charge calculations (for VRF systems only)
  - Refrigerant equipment schedule or GreenChill certification (for commercial refrigeration systems only)
  - Leak test results (for commercial refrigeration systems only)

### Changes from LEED v4

- ▶ None

# EA Credit: Grid Harmonization

This credit applies to

- ▶ O+M: Existing Buildings (1 point)

## Intent

To increase participation in demand response technologies and programs that make energy generation and distribution systems more efficient, increase grid reliability, and reduce greenhouse gas emissions.

## Requirements

Evaluate building systems and equipment for participation in a demand response program. On-site electricity generation does not meet the intent of this credit.

### Case 1. Demand Response Program Available and Participation (1 point)

- ▶ Participate in an existing demand response (DR) program and complete the following activities.
- ▶ Have in place a system with the capability for real-time, fully automated DR based on external initiation by a DR program provider. Semi-automated DR may be utilized in practice.
- ▶ Enroll in a minimum one-year DR participation amount contractual commitment with a qualified DR program provider, with the intention of multiyear renewal, for at least 10% of the annual on-peak electricity demand. On-peak demand is based on electric utility bills with an on-peak demand period defined by the local utility. The on-peak demand may vary based on the utility climate and pricing structures.
- ▶ Develop a comprehensive plan for meeting the contractual commitment during a Demand Response event.
- ▶ Include the DR processes in the current facilities requirements and operations and maintenance plan.
- ▶ Initiate at least one full test of the DR plan.

OR

### Case 2. Demand Response Capable Building (1 point)

- ▶ Have infrastructure in place to take advantage of future demand response programs or dynamic, real-time pricing programs and complete the following activities. Develop a comprehensive plan for shedding at least 10% of the annual on-peak electricity demand. Peak demand is based on electric utility bills.
- ▶ Include the DR processes in the current facilities requirements and operations and maintenance plan.
- ▶ Initiate at least one full test of the DR plan as part of the building commissioning program.
- ▶ Contact local utility representatives to discuss participation in future DR programs.

OR

### Case 3: Load Flexibility and Management Strategies (1 point)

Analyze the building's annual load shape and peak load based on metered electricity use and electric utility bills. Review the regional grid load profile using the metric of peak load or peak carbon emissions. The U.S. Environmental Protection Agency's (EPA) AVOIDed Emissions and geneRation Tool (AVERT) provides regional grid emissions data; local utilities may also provide this data.

Coordinate review of building load shape and peak load with review of the regional grid profile to identify the best value load management strategies that the building can provide.



Implement one or more of the load flexibility and management strategies described below. All projects must install interval recording meters with communications and the ability for the building automation system to accept an external price signal.

Load Flexibility and Management Strategies:

- ▶ Peak Load Optimization: demonstrate that strategy reduces on-peak load by at least 10% as compared to peak electrical demand (1 point)
- ▶ Flexible Operating Scenarios: demonstrate that strategy moves at least 10% of peak load by a time period of 2 hours (1 point)
- ▶ On-site thermal and/or electricity storage: demonstrate that strategy reduces on-peak load by at least 10% as compared to peak electrical demand (1 point)
- ▶ Grid resilience technologies: project served by utilities with resilience programs in place, which leverage strategies such as islanding and part-load operation, automatically achieve this credit (1 point)

Include the installed technology in the Current Facilities Requirements and Operations and Maintenance Plan. Include load flexibility and management strategies and installed technologies in the building systems manual.

Contact local utility representatives to discuss participation in future DR programs and to inform utility of building load flexibility and management strategies.

#### **Case 2. Demand Response Capable Building (1 point)**

- ▶ Have infrastructure in place to take advantage of future demand response programs or dynamic, real-time pricing programs and complete the following activities. Develop a comprehensive plan for shedding at least 10% of the annual on-peak electricity demand. Peak demand is based on electric utility bills.
- ▶ Include the DR processes in the current facilities requirements and operations and maintenance plan.
- ▶ Initiate at least one full test of the DR plan as part of the building commissioning program.
- ▶ Contact local utility representatives to discuss participation in future DR programs.

#### **Case 3: Permanent Load Shifting Technologies (1 point)**

Implement electrical load shifting measures with the following requirements:

- ▶ Have in place during the performance period a system which permanently transfers electricity demand from peak hours to off-peak hours as defined by the local utility provider.
- ▶ Demonstrate that the facility is successfully reducing peak demand by at least 10% during the performance period as compared to peak electrical demand by:
  - Identifying all load shifting measures and their intended peak electrical load shift
  - Verifying a corresponding peak electrical load reduction for each measure
  - Verifying a corresponding off-peak electrical load increase for each measure

Include the load shifting measures in the Current Facilities Requirements and Operations and Maintenance Plan.

Installing grid harmonization technologies that provide energy storage capabilities on-site can help facility operators to manage peak energy demand. Eligible technologies may include:

- ▶ Battery storage
- ▶ Flywheel energy storage system
- ▶ Thermal energy storage system, including chilled water, ice, ice on coil, phase change materials, and geothermal

Include the installed technology in the Current Facilities Requirements and Operations and Maintenance Plan.

## **Guidance**

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

### **Required Documentation**

- ▶ Proof of enrollment in DR program (for Case 1)
- ▶ Evidence of ability to shed 10% of peak demand
- ▶ Confirmation of inclusion of DR or load shifting in CFR and O+M plan
- ▶ Comprehensive action plan (for Case 1 and Case 2)
- ▶ Performance of one full test of DR plan (for Case 1 and Case 2)
- ▶ Description of system for load shifting (for Case 3)

### **Changes from LEED v4**

- ▶ Changed title from Demand Response to better reflect options available for teams and credit intent to make energy generation and distribution systems more efficient, increase grid reliability, and reduce greenhouse gas emissions
- ▶ Added details in Case 1 for on-peak demand period
- ▶ Minor edits to Case 2 for clarification
- ▶ Added examples to Case 3 of grid harmonization technologies that support permanent load shifting and provide energy storage capabilities on-site to illustrate how teams can prepare for electrical load shifting

# MR Prerequisite: Purchasing Policy

This prerequisite applies to

- ▶ O+M: Existing Buildings
- ▶ O+M: Interiors

## Intent

To reduce the environmental harm from materials and products purchased and used during operations and maintenance of buildings.

## Requirements

Have in place an environmentally preferable purchasing (EPP) policy for materials and products purchased for the project during regular operations. Include at a minimum:

- ▶ Ongoing Consumables
  - The five most purchased product categories based on total annual purchases.
  - Paper, toner cartridges, binders, batteries, and desk accessories.
  - Food and beverage.
- ▶ Electronic Equipment
  - Lamps (indoor and outdoor, hard-wired and portable fixtures).
  - Office equipment, appliances, and audiovisual equipment.
  - Electric powered equipment.

The policy should address performance targets for purchases that meet the criteria in MR Credit: Purchasing.

The policy must cover at least those product purchases within the building and site management's control. For interiors projects, the policy must cover product purchases within the project's control.

### Interiors

In addition to the requirements above, Interiors projects must recommend best practices for environmentally preferable purchasing for purchases outside of the project's control.

## Guidance

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide for Purchasing.

A [Sample policy template](#) is available for projects to use.

## Required Documentation

- ▶ Purchasing policy

## Changes from LEED v4

- ▶ Changed title from Ongoing Purchasing and Waste Policy.
- ▶ Removed requirements for solid waste management policy. A waste policy is a strategy for the waste performance score.
- ▶ Tracking food and beverage purchases are now required in the policy for all projects.
- ▶ Renamed durable goods purchase to electronic equipment.
- ▶ Moved lamps under electronic equipment
- ▶ Removed retail requirements for environmentally responsible sourcing of retail merchandise.
- ▶ New requirements added for Interiors adaptation.

# MR Prerequisite: Facility Maintenance and Renovation Policy

This prerequisite applies to

- ▶ O+M: Existing Buildings
- ▶ O+M: Interiors

## Intent

To reduce the environmental harms associated with the materials purchased, installed, and disposed of during maintenance and renovation activities.

## Requirements

Have in place a facility maintenance and renovation policy that includes guidelines for renovation and maintenance activities, using LEED rating system strategies, to be implemented at the discretion of building owners, operators, or tenants. Renovation activities include building improvements and tenant fit-outs. Maintenance activities include general repair and replacement.

The policy must cover at least those product purchases within the building and site management's control. The policy must address purchasing, waste management and indoor air quality.

### Purchasing Policy for Maintenance and Renovations

Have in place a purchasing policy for product and materials purchased for facility maintenance and renovation activities. Include at a minimum:

- ▶ Base building elements permanently or semi- permanently attached to the building (mechanical, electrical and plumbing components and specialty items such as elevators are excluded). Exclude fixtures, and equipment, which are not considered base building elements;
- ▶ Furniture and furnishings as well as components and parts needed to maintain them

### Waste Management Policy for Maintenance and Renovations

Have in place a waste management policy addressing the following:

- ▶ *Facility maintenance waste.* The policy should address safe storage and recycling and diversion of waste associated with maintenance activities.
- ▶ *Renovation waste.* The policy should describe the procedure for creating an individual plan for each renovation project. Each renovation project should establish waste diversion goals, target five materials for diversion, approximate the volume of waste anticipated, and identify waste diversion strategies to be used.
- ▶ *Separation of facility maintenance and renovation waste from ongoing waste:* The policy should indicate that facility maintenance and renovation waste are handled separately from ongoing waste.
- ▶ *Furniture waste (Multifamily only).* The policy should address storage locations for furniture and reuse or recycling of furniture waste.

The policy should address the criteria in the following credits:

- ▶ MR Credit: Waste Performance

### Indoor Air Quality Policy for Maintenance and Renovations

Have in place an indoor air quality policy for facility maintenance and renovation activities addressing the criteria below. For maintenance activities implement the policy as applicable. For renovation activities create an individual plan for each renovation project as outlined in the policy.

- ▶ Follow the recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition (2007), ANSI/SMACNA 008-2008, Chapter 3
  - Protect stored on-site and installed absorptive materials from moisture damage.
  - Do not operate permanently-installed air handling equipment during construction unless filtration media with a minimum efficiency reporting value (MERV) of 8, as determined by ASHRAE 52.2-2007, with errata (or equivalent filtration media class of F5 or higher, as defined by CEN Standard EN 779-2002, Particulate Air Filters for General Ventilation, Determination of the Filtration Performance), are installed at each return air grille and return or transfer duct inlet opening such that there is no bypass around the filtration media.
- ▶ Develop a procedure to, before occupancy, replace all filtration media with the final design filtration media.
- ▶ Develop a plan to determine whether a flush-out or air quality testing is needed after construction ends and all interior finishes are installed but before occupancy.

### **Guidance**

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

A [Sample policy template](#) is available for projects to use.

### **Required Documentation**

- ▶ Facility maintenance and renovation policy

### **Changes from LEED v4 and rationale**

- ▶ Added requirement to separate facility maintenance and renovation waste from ongoing waste.

# MR Prerequisite: Waste Performance

This prerequisite applies to

- ▶ O+M: Existing Buildings (3-8 points)
- ▶ O+M: Interiors (3-8 points)

**Intent**

To track and reduce the waste that is generated by building occupants and hauled to and disposed of in landfills and incinerators.

**Requirements**

Have in place storage locations for recyclable materials, including mixed paper, corrugated cardboard, glass, plastics, and metals. Safely store and dispose of batteries and all lamps (indoor and outdoor, hard-wired and portable fixtures).

Track and measure all ongoing waste and durable goods waste.

Measure the total weight of waste (in lbs., kg, or tons) that is generated, and the total weight that is diverted from landfills and incineration facilities for one full year or from a waste analysis. Exclude any facility renovations waste.

Input generated and diverted waste totals and calculate a Waste Performance Score for the project.

Obtain a minimum waste performance score of 40. Additional points for this prerequisite are awarded for waste performance scores above 40, according to Table 1.

Table 1. LEED Points for Waste Performance

Waste Performance Score	LEED Points
40 (Required)	3 (Required)
44	4
57	5
69	6
82	7
94	8

**Waste performance score**

The waste performance score rates the resource consumption and resource use efficiency of the building (waste generated and diverted) against the consumption and efficiency of comparable high-performing buildings.

The score is a value from 1-100 based on the project’s total weight of waste generated and the total weight of waste diverted from landfills and incineration facilities.

## Waste performance score calculation

To calculate waste performance score, the following data is required:

- ▶ Total waste generated (lbs., kg, or tons)
- ▶ Total waste diverted (lbs., kg, or tons)
- ▶ Weighted occupancy

The waste generated is converted into an average daily waste generated per occupant, using Equation 1.

Equation 1. Average daily waste generated = (waste generated / # days associated with waste total) / occupancy

The waste diverted is converted into a daily waste undiverted per occupant, using Equation 2.

Equation 2. Daily waste undiverted per occupant = (waste diverted / # days associated with waste total) / occupancy

The daily undiverted waste is calculated using Equation 3.

Equation 3. Daily undiverted waste per occupant = daily waste generated per occupant - daily waste diverted per occupant

The project's calculated average daily waste generated per occupant AND average daily waste undiverted per occupant are input into the waste scoring function to calculate the waste performance score.

The waste scoring function was developed using waste information reported by high-performing buildings. The data set includes LEED buildings that pursued MR credit 6. Solid waste management - waste stream audit.

## Guidance

This prerequisite allows you to better understand how much waste your project has generated and diverted from landfills and incineration facilities.

Your measured waste generation and diversion is translated into a waste performance score.

### Step-by-Step

#### Step 1. Establish storage areas

Determine how recyclable materials are being stored in the building. Make sure the storage meets the credit requirements.

#### Step 2. Develop waste tracking system

Determine how all waste for the project will be measured and tracked. For this prerequisite and to receive a waste performance score, waste must be reported in weight.

Waste is considered diverted if it is not sent to a landfill or incineration facility. Composting and recycling are considered as diversion methods.

If actual weight cannot be measured, the waste quantity may be converted to weight using an appropriate volume to weight conversion factor. Facility-specific or regional conversion factors may be available. The EPA also publishes volume to weight conversion factors (see their document [Volume-to-weight conversion factors for solid waste](#)). Waste quantity estimates based on the amount of waste in the waste container must take into account how full the container is (as opposed to assuming the waste container is full).

If the project shares waste collection with other buildings or spaces, pro-rating based on total number of occupants or other appropriate methodology (e.g. space type or square footage) is acceptable.

Make sure that furniture, furnishings, or construction waste from facility maintenance and renovation activities are separately measured and excluded from the total amounts reported for this prerequisite.

### **Step 3. Measure waste**

Collect data on the total amounts of waste disposed of and diverted over one full year, or conduct at least one waste audit during the year.

### **Step 4. Input data**

Input your project's waste information. Use one of the following methods:

- ▶ [Upload USGBC data import spreadsheet](#)
- ▶ Enter data manually

Provide the total waste generated (which includes both the diverted and nondiverted waste amount) and the total amount diverted from landfill and incineration. You do not have to enter the full year of data (or data for multiple audits) at once. Data for waste generated and diverted may be entered at any time, for project-defined intervals. Make sure all waste streams are included.

### **Step 5. Determine waste performance score**

A waste performance score will automatically generate for your project once data is entered.

### **Step 6. Prepare documentation for certification review**

Complete the prerequisite information. See *Required Documentation* below.

## **Further Explanation**

### **Improving your score**

- ▶ Minimize the total waste generation with better purchasing decisions. See [LEED v4 prerequisite MR Ongoing Purchasing and Waste Policy](#) and LEED v4.1 beta credit Purchasing.
- ▶ Consider best practices for ensuring diversion actually occurs. For example:
  - Communicating about recyclables and/ or compostable collection to building occupants and staff
  - Sizing collection bins appropriately and placing them in convenient locations
  - Training janitorial staff in collecting, transporting, and storing of diverted materials
  - Contracting with recycling vendors to haul the recyclables
- ▶ Develop a Waste Policy, see [LEED v4 prerequisite MR Ongoing Purchasing and Waste Policy](#).
- ▶ Conduct a Waste audit, see [LEED v4 prerequisite MR Ongoing Purchasing and Waste Policy](#).

### **Required Documentation**

- ▶ Description of collection, storage and disposal process for recyclable materials (including mixed paper, corrugated cardboard, glass, plastics, and metals), batteries and all lamps (indoor and outdoor, hard-wired and portable fixtures).
- ▶ Hauler reports, waste analysis reports, third party reports, calculations, or bills, as applicable, verifying the data provided.
- ▶ Calculated waste performance score

### **Changes from LEED v4**

- ▶ Credit renamed from Solid Waste Management – Ongoing to Waste Performance
- ▶ Credit is now a prerequisite, minimum waste performance score of 40 is now required.
- ▶ Waste must now be tracked in weight, volume option is no longer available
- ▶ 50% ongoing waste and 75% durable goods waste thresholds have been replaced with waste performance score.



# MR Credit: Purchasing

This credit applies to

- ▶ O+M: Existing Buildings (1 point)
- ▶ O+M: Interiors (1-4 points)

## Intent

To reduce environmental harm from materials and products purchased, used, installed, and disposed of during the operations and maintenance of buildings.

## Requirements

Interiors projects may select up to four options, to earn 4 points.

### Option 1. Ongoing Consumables (1 point, 1-2 points Interiors only)

For at least one month, track all ongoing consumable purchases. Purchase at least 50% (1 point) or 75% (2 points, Interiors only), by cost, of total ongoing consumables that meet at least one of the following criteria.

- ▶ *Recycled materials and products.* The content of purchases must meet or exceed the levels listed in the U.S. Environmental Protection Agency Comprehensive Procurement Guidelines. Products not covered by the Guidelines can get credit for their recycled content with no minimum.
- ▶ *Extended use.* Batteries must be rechargeable. Toner cartridges for laser printers must be remanufactured.
- ▶ *Bio-based products.* Bio-based products must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material.
- ▶ *Paper and wood products.* Paper and wood products must be certified by the Forest Stewardship Council or USGBC-approved equivalent.
- ▶ *Materials reuse.* Reuse includes salvaged, refurbished, or reused products.
- ▶ *Extended producer responsibility.* Products purchased from a manufacturer (producer) that participates in an extended producer responsibility program or is directly responsible for extended producer responsibility.
- ▶ *Cradle to Cradle Certified.* Products purchased have earned Cradle to Cradle certification of any level, Version 3 or newer.

### Option 2. Building Materials (1 point, 1-2 points Interiors only)

For at least one month, track all building material purchases (including furniture) used and/or installed as part of space reconfigurations, additions/alternations, or renovations. Purchase at least 50% (1 point) or 75% (2 points, Interiors only), by cost, of total building materials that meet at least one of the following criteria under Reporting, Optimization, and other attributes.

Reporting:

- ▶ *Health Product Declaration.* The end use product has a published, complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard.
- ▶ *Cradle to Cradle Certified.* Products purchased have earned Cradle to Cradle certification of any level, Version 3 or newer.
- ▶ *Declare.* The Declare label must indicate that all ingredients have been evaluated and disclosed down to 1000 ppm.

- ▶ *ANSI/BIFMA e3 Furniture Sustainability Standard*: Documentation from the assessor or scorecard from BIFMA must demonstrate the product earned at least 3 points under 7.5.1.3 Advanced Level in e3-2014 or 3 points under 7.4.1.3 Advanced Level in e3-2012.
- ▶ *Product Lens certification*
- ▶ Facts - NSF/ANSI 336. Sustainability Assessment for Commercial Furnishings Fabric at any certification level
- ▶ *Environmental product declaration (EPD)*: Products having an environmental product declaration that conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope. The EPD can be either industry-wide (generic) EPD or product specific Type III EPD with third party external verification in which the manufacturer is explicitly recognized as the participant by the program operator.

#### Optimization:

- ▶ GreenScreen v1.2 Benchmark. Products with fully inventoried chemical ingredients to 100 ppm with no Benchmark 1 hazards.
- ▶ Cradle to Cradle certified. Products purchased have earned Cradle to Cradle certification of any level, Version 3 or newer.
- ▶ *EPD Optimization path*: Products with Environmental Product Declarations (EPDs) that are third-party certified and demonstrate impact reduction below industry average in at least three of the following categories:
  - global warming potential (greenhouse gases), in CO<sub>2</sub>e;
  - depletion of the stratospheric ozone layer, in kg CFC-11;
  - acidification of land and water sources, in moles H<sup>+</sup> or kg SO<sub>2</sub>;
  - eutrophication, in kg nitrogen or kg phosphate;
  - formation of tropospheric ozone, in kg NO<sub>x</sub>, kg O<sub>3</sub> eq, or kg ethene; and
  - depletion of nonrenewable energy resources, in MJ.
- ▶ Product Manufacturer Supply Chain Optimization: Purchase products meeting any of the following supply chain optimization criteria:
  - Are sourced from product manufacturers who engage in validated and robust safety, health, hazard, and risk programs which at a minimum document at least 99% (by weight) of the ingredients used to make the building product or building material, and
  - Are sourced from product manufacturers with independent third party verification of their supply chain that at a minimum verifies:
  - Processes are in place to communicate and transparently prioritize chemical ingredients along the supply chain according to available hazard, exposure and use information to identify those that require more detailed evaluation
  - Processes are in place to identify, document, and communicate information on health, safety and environmental characteristics of chemical ingredients
  - Processes are in place to implement measures to manage the health, safety and environmental hazard and risk of chemical ingredients.
  - Processes are in place to optimize health, safety and environmental impacts when designing and improving chemical ingredients.
  - Processes are in place to communicate, receive and evaluate chemical ingredient safety and stewardship information along the supply chain. Safety and stewardship information about the chemical ingredients is publicly available from all points along the supply chain
- ▶ *Extended producer responsibility*. Products purchased from a manufacturer (producer) that participates in an extended producer responsibility program or is directly responsible for extended producer responsibility.
- ▶ *Wood products*. Wood products must be certified by the Forest Stewardship Council or USGBC-approved equivalent.
- ▶ *Materials reuse*. Reuse includes salvaged, refurbished, or reused products.

- ▶ *Recycled content.* Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on cost.
- ▶ *Bio-based products.* Bio-based products must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material.

Other:

- ▶ *Low formaldehyde for composite wood.* Built-in cabinetry and architectural millwork containing composite woods must be constructed from materials documented to have low formaldehyde emissions that meet the California Air Resources Board requirements for ultra-low-emitting formaldehyde (ULEF) resins or no-added formaldehyde based resins. Salvaged and reused architectural millwork more than one year old at the time of occupancy is considered compliant, provided it meets the requirements for any site-applied paints, coatings, adhesives, and sealants.
- ▶ *Low emissions of volatile organic compounds for products other than furniture:* Products (thermal and acoustic insulation, flooring materials and finishes, ceiling materials and finishes and wall materials and finishes) must either be inherently nonemitting or be tested and determined compliant in accordance with California Department of Public Health Standard Method v1.2-2017, using the applicable exposure scenario. For products for school classrooms, the testing should be performed using the classroom scenario, for all other products use the default private office scenario. Both first-party and third-party statements of product compliance must follow the guidelines in CDPH SM v1.2-2017, Section 8. Organizations that certify manufacturers' claims must be accredited under ISO Guide 65. Laboratories that conduct the tests must be accredited under ISO/IEC 17025 for the test methods they use.
- ▶ *VOC content for wet-applied products.* In addition to meeting the requirements for In addition to meeting the requirements for low emissions of volatile organic compounds (above), on-site wet-applied products must not contain excessive levels of VOCs, for the health of the installers and other trades workers who are exposed to these products. To demonstrate compliance, a product must meet the following requirements, as applicable. Disclosure of VOC content must be made by the manufacturer. Any testing must follow the test method specified in the applicable regulation.
  - All paints and coatings wet-applied on site must meet the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011.
  - All adhesives and sealants wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168, July 1, 2005, Adhesive and Sealant Applications, as analyzed by the methods specified in Rule 1168. The provisions of SCAQMD Rule 1168 do not apply to adhesives and sealants subject to state or federal consumer product VOC regulations.
  - If the applicable regulation requires subtraction of exempt compounds, any content of intentionally added exempt compounds larger than 1% weight by mass (total exempt compounds) must be disclosed.
  - If a product cannot reasonably be tested as specified above, testing of VOC content must comply with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.
  - For projects in North America, methylene chloride and perchloroethylene may not be intentionally added in paints, coatings, adhesives, or sealants.
- ▶ *Zero Waste Manufacturing:* Products are made from manufacturers that have achieved certification of their waste minimization during operations. Acceptable certifications include third-party verified TRUE (zero waste certification) and UL Standard 2799.

Furniture specific requirements:

- ▶ Any of the optimization related attributes are applicable to furniture.

- ▶ *Low emissions of volatile organic compounds for furniture:* Low emissions of volatile organic compounds. Products must have been tested, following ANSI/BIFMA Standard Method M7.1-2011, and must comply with ANSI/BIFMA e3-2011 Furniture Sustainability Standard 7.6.2. For classroom furniture, use the standard school classroom model in CDPH Standard Method v1.2. Salvaged and reused furniture more than one year old at the time of use is considered compliant, provided it meets the requirements for any site-applied paints, coatings, adhesives, and sealants.

### **Option 3. Electronic Equipment (1 point)**

For at least one month, track all electronic equipment purchases. Purchase at least 50%, by cost, electronic equipment that meets at least one of the following criteria. In addition, create a phase-out plan to replace remaining products with compliant equipment at the end of their useful life.

- ▶ *EPEAT rating.* The equipment must have a *silver* Electronic Product Environmental Assessment Tool (EPEAT) rating or better.
- ▶ *ENERGY STAR rating.* If the equipment does not yet fall under the EPEAT rating systems, it must be ENERGY STAR® qualified or performance equivalent for projects outside the U.S.
- ▶ *Lamps.* Lamps must contain no mercury (with equivalent energy efficiency as mercury containing lamps) or have an average low mercury content of 25 picograms per lumen-hour or less.

### **Option 4. Food and Beverage (1 point)**

For at least one month, track all food and beverages. Purchase at least 15%, by cost, of total combined food and beverage purchases must meet at least one of the following criteria. Exclude wine, beer, and liquor purchases from the credit calculations.

- ▶ *Sustainable agriculture.* The food or beverage must be labeled USDA Organic, Food Alliance Certified, Rainforest Alliance Certified, Protected Harvest Certified, Fair Trade, or Marine Stewardship Council's Blue Eco-Label, or labeled with the European Community Organic Production logo in accordance with Regulations (EC) No. 834/2007 and (EC) No. 889/2008.
- ▶ *Local sourcing.* The food or beverage must contain raw materials harvested and produced within 100 miles (160 kilometers) of the site.

## **Guidance**

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

### **Required Documentation**

Purchasing calculator

### **Changes from LEED v4**

- ▶ New credit
- ▶ Credit is a combination of Purchasing- Ongoing, Purchasing - Lamps, and Purchasing- Facility Maintenance and Renovation
- ▶ Added points note for Interiors projects
- ▶ Reorganized structure of credit, 4 options available
- ▶ Added/modified purchasing criteria under each option
- ▶ Added new section for building materials
- ▶ Compliance may now be demonstrated with a minimum one month of purchases.
- ▶ Reduced threshold for ongoing consumables from 60% to 50%, increased threshold for electronic equipment from 40% to 50%, reduced threshold for food from 25% to 15%

# EQ Prerequisite: Minimum Indoor Air Quality

This prerequisite applies to

- ▶ O+M: Existing Buildings
- ▶ O+M: Interiors

**Intent**

To contribute to the comfort and well-being of building occupants by establishing minimum standards for indoor air quality (IAQ).

**Requirements**

Maintain the ventilation system equipment and associated components based on Table 8.2 of ASHRAE 62.1-2016. Include information on ventilation system operation and preventative maintenance in the current facilities requirements and operations and maintenance plan required for compliance with EA prerequisite Energy Efficiency Best Management Practices.

For spaces with mechanical exhaust, test and confirm proper operation of the exhaust systems as outlined in the current facilities requirements and operations and maintenance plan.

Ventilate the project spaces mechanically or naturally as follows:

For mechanically ventilated spaces, measure the total quantity of outdoor air delivered and verify the results are within 10 percent of the rates outlined in the current facilities requirements and operations and maintenance plan. Measurements shall quantify the amount of outdoor air for each air handling unit serving the project. Measurements taken within five years prior to project submission are acceptable. The rates must meet the following minimum requirements for each air handling unit:

In IP units:

$$\text{Minimum outdoor air rate in cfm} = 0.06 \text{ cfm/sf} \times \text{gross building area (in sf)} + \text{people outdoor air rate from Table 1 (cfm/person)} \times \text{building occupancy}$$

In SI units:

$$\text{Minimum outdoor air rate in L/s} = 0.3 \text{ L/s} \cdot \text{m}^2 \times \text{gross building area (in m}^2\text{)} + \text{people outdoor air rate from Table 1 (L/s per person)} \times \text{building occupancy}$$

Table 1. People outdoor air rate

Occupancy category*	People outdoor air rate	
	cfm per person	L/s per person
Auditorium seating area Libraries Office space Places of religious worship	5	2.5
Mall common areas Museums	7.5	3.8
Classrooms Daycare General manufacturing	10	5
Health club/aerobics	20	10

\*For additional occupancy categories, see Table 6.2.2.1 of ASHRAE 62.1-2016

Alternatively, the rates may meet the Ventilation Rate Procedure outlined in Section 6.2 of ASHRAE 62.1 editions 2016, 2013, 2010, or 2007.

For naturally ventilated spaces, meet the minimum requirements in Table 2:

Table 2. Minimum opening location and size requirements for naturally ventilated spaces\*

Opening type	Location of opening	Size of opening
	Maximum distance from operable openings**	Minimum opening area***
Single side opening	2 x ceiling height	4% of floor area
Double side opening	5 x ceiling height	4% of floor area
Corner opening	5 x ceiling height (along a line drawn between the two openings that are farthest apart.; for floor area outside line, comply with single side opening)	4% of floor area

\*Adopted from Section 6.4.1 of ASHRAE 62.1-2016

\*\*For ceilings that are increasing in height as distance from the openings is increased, the ceiling height shall be determined as the average height of the ceiling within 6 m (20 ft) from the operable openings.

\*\*\*If the window is covered with louvers, insect screens, or otherwise obstructed, the openable area must be based on the free unobstructed area through the opening.

### Multifamily

For all common areas in the building, meet requirements above.

For residential units, have an operable window in each bedroom with the total openable window area a minimum of 4% of the room floor area or meet the following minimum requirements for the entire unit:

In IP units:

Minimum outdoor air rate in cfm =  $0.03 \text{ cfm/sf} \times \text{dwelling unit floor area (in sf)} + 7.5 \text{ cfm/person} \times (\text{number of bedrooms} + 1)$

In SI units:

Minimum outdoor air rate in L/s =  $0.15 \text{ L/s} \cdot \text{m}^2 \times \text{dwelling unit floor area (in m}^2) + 7.5 \text{ cfm/person} \times (\text{number of bedrooms} + 1)$

In each full bathroom, have either an exhaust fan that vents directly to the outdoors or an operable window.

### **Guidance**

Follow the instructions in the Minimum indoor air quality calculator.

### **Required Documentation**

- ▶ Minimum indoor air quality calculator
- ▶ Confirmation the ventilation system equipment and associated components are maintained in accordance with the plan developed for EA prerequisite Energy Efficiency Best Management Practices.
- ▶ Describe of the method or protocol used to measure the total quantity of outdoor air delivered and exhaust ventilation rates, as applicable. Explain the measurement device or system, its accuracy, and how and when the measurements were taken (if applicable)

### **Changes from LEED v4 and rationale**

- ▶ Prerequisite renamed from Minimum Indoor Air Quality Performance
- ▶ Updated referenced standard from 62.1-2010 to 62.1-2016
- ▶ Revised outdoor air requirements for mechanically ventilated spaces, including removal of Case 2
- ▶ Revised minimum opening and size requirements for naturally ventilated spaces
- ▶ Revised multifamily requirements for residential units for clarity

# EQ Prerequisite: Environmental Tobacco Smoke Control

This prerequisite applies to

- ▶ O+M: Existing Buildings
- ▶ O+M: Interiors

## Intent

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

## Requirements

For this prerequisite smoking includes tobacco smoke, as well as smoke produced from the combustion of cannabis and controlled substances and the emissions produced by electronic smoking devices.

### Existing Buildings

Prohibit smoking in the building.

Prohibit smoking outside the building except in designated smoking areas located at least 25 feet (7.5 meters) from all entries, outdoor air intakes, and operable windows. Also prohibit smoking outside the property line in spaces used for business purposes.

Smoking does not have to be prohibited within 25 feet (7.5 meters) if the code explicitly prohibits it.

Communicate the no-smoking policy to occupants of the building and have in place provisions for enforcement.

### Residential only

#### **Option 1. No Smoking**

Meet the requirements above.

OR

#### **Option 2. Compartmentalization of Smoking Areas**

Prohibit smoking in all common areas of the building.

Prohibit smoking outside the building except in designated smoking areas located at least 25 feet (7.5 meters) from all entries, outdoor air intakes, and operable windows. Also prohibit smoking outside the property line in spaces used for business purposes.

The prohibition must be communicated in building rental or lease agreements or condo or coop association covenants and restrictions. Make provisions for enforcement.

If the requirement to prohibit smoking within 25 feet (7.5 meters) cannot be implemented because of code, provide documentation of these regulations.

Each unit must be compartmentalized to prevent excessive leakage between units:

- ▶ Weather-strip all exterior doors and operable windows in the residential units to minimize leakage from outdoors.



- ▶ Weather-strip all doors leading from residential units into common hallways.
- ▶ Minimize uncontrolled pathways for the transfer of smoke and other indoor air pollutants between residential units by sealing penetrations in the walls, ceilings, and floors and by sealing vertical chases (including utility chases, garbage chutes, mail drops, and elevator shafts) adjacent to the units.
- ▶ Demonstrate a maximum leakage of 0.50 cubic feet per minute per square foot (2.54 liters per second per square meter) at 50 Pa of enclosure (i.e., all surfaces enclosing the apartment, including exterior and party walls, floors, and ceilings) or establish a baseline and demonstrate a 30% improvement in leakage.

### Schools

Prohibit smoking on site.

Signage must be posted at the property line indicating the no-smoking policy.

### Interiors

Prohibit smoking in the project spaces.

Smoking must also be prohibited in all common areas used by the project occupants and any areas of the building served by the same HVAC system as the project.

If smoking is permitted in other areas of the building, ensure that ETS cannot migrate into the project spaces.

Communicate the no-smoking policy to occupants of the project and have in place provisions for enforcement.

### **Guidance**

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

### **Required Documentation**

- ▶ No-smoking policy
- ▶ Site plan or map showing location of non-smoking areas, location of designated smoking areas, the property line, and the site boundary.
- ▶ Description of how the no-smoking policy is communicated to the building occupants and the provisions in place to enforce the policy
- ▶ Documentation for weather-stripping and sealing (if applicable)
- ▶ Documentation for air pressure test report (if applicable)

### **Changes from LEED v4 and rationale**

- ▶ The requirement exterior signage has been removed and replaced with a requirement to communicate the no-smoking policy to occupants and have in place provisions for enforcement. This change was made to give projects more flexibility in the way they manage their no smoking policies and tailor their approach to the project site and local context.
- ▶ New requirements added for Interiors adaptation
- ▶ Added definition for smoking

# EQ Prerequisite: Green Cleaning Policy

This prerequisite applies to

- ▶ O+M: Existing Buildings
- ▶ O+M: Interiors

## Intent

To reduce levels of chemical, biological, and particulate contaminants that can compromise air quality, human health, building finishes, building systems, and the environment.

## Requirements

Operate the project using green cleaning best practices.

### Option 1. In-House Green Cleaning Policy

Have in place a green cleaning policy for the green cleaning procedures, materials, and services that are within the project and site management's control. Include the following elements:

#### *Performance Targets*

- ▶ Use of cleaning products and materials that meet the green cleaning criteria in EQ Credit: Green Cleaning
- ▶ Use of cleaning equipment that meets the criteria in EQ Credit: Green Cleaning

#### *Goals and Strategies*

- ▶ Standard operating procedures for effective cleaning of hard floors and carpets that will be consistently used, managed, and audited.
- ▶ Provisions for addressing protection of building occupants during cleaning, including vulnerable populations.
- ▶ Guidelines for selection and appropriate use of disinfectants and sanitizers.
- ▶ Guidelines for safe handling and storage of cleaning chemicals used in the building, including a plan for managing hazardous spills and mishandling incidents.
- ▶ Strategies for reducing the toxicity of the chemicals used for laundry, ware washing, and other cleaning activities.
- ▶ Strategies for conserving energy, water, and chemicals during cleaning.
- ▶ Strategies for promoting and improving hand hygiene.

#### *Personnel*

- ▶ Requirements for maintenance personnel including contingency planning to manage staffing shortages under a variety of conditions to ensure that basic cleaning services are met and critical cleaning needs are addressed. Include a process to obtain occupant and custodial staff input and feedback after contingency plans are implemented.
- ▶ Timing and frequency of training for maintenance personnel in the hazards of use, disposal, and recycling of cleaning chemicals, dispensing equipment, and packaging.

### Option 2. Certified Cleaning Service

Clean the project with a cleaning service certified and in good standing under one of the following:

- ▶ Green Seal's Environmental Standard for Commercial Cleaning Services (GS-42); or
- ▶ International Sanitary Supply Association (ISSA) Cleaning Industry Management Standard for Green Buildings (CIMS-GB); or

- ▶ Local equivalent for projects outside the U.S.

In addition, work with the cleaning contractor to create goals and strategies for conserving energy, water, and chemicals during cleaning.

### **Guidance**

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

A sample [green cleaning policy template](#) is available for projects to use.

### **Required Documentation**

- ▶ Green cleaning policy (for Option 1)
- ▶ Cleaning contract and contractor's certification details (for Option 2)

### **Changes from LEED v4 and rationale**

- ▶ Minor edits for clarification
- ▶ Under Option 2, deleted auditing requirement but added that the cleaning service must be in good standing.

# EQ Prerequisite: Indoor Environmental Quality Performance

This prerequisite applies to

- ▶ O+M: Existing Buildings (8-20 points)
- ▶ O+M: Interiors (8-20 points)

## Intent

To assess how well the building is performing for the occupants, in particular with regards to indoor air quality and comfort.

## Requirements

Conduct an occupant satisfaction survey and/or an indoor air quality evaluation.

For the occupant satisfaction survey, regular building occupants must be surveyed. The required number of responses that must be received is outlined in Figure 1.

For the indoor air quality evaluation, test for any of the following contaminants:

- ▶ Inorganic Contaminants:
  - Carbon Monoxide (CO)
  - Carbon Dioxide (CO<sub>2</sub>)
  - Ozone (O<sub>3</sub>)
  - PM<sub>2.5</sub>
- ▶ Volatile Organic Compounds:
  - Acetaldehyde (75-07-0)
  - Benzene (71-43-2)
  - Styrene (100-42-5)
  - Toluene (108-88-3)
  - Naphthalene (91-20-3)
  - Dichlorobenzene (1,4-) (106-46-7)
  - Xylenes-total (108-38-3, 95-47-6, and 106-42-3)
  - Formaldehyde (50-00-0)
  - Total volatile organic compounds (TVOC) (as defined in ISO 16000-6)

Points are awarded based on the results from the CO<sub>2</sub> and TVOC measurements.

Take the indoor air measurements in locations representative of all occupied spaces, within the breathing zone (between 3 and 6 feet (900 and 1800 millimeters) above the floor), during normal occupied hours, under typical minimum ventilation conditions.

Conduct the survey at least once per year and calculate an occupant satisfaction score for the project.

Conduct at least one indoor air quality evaluation per year. Input measured contaminant levels and calculate a CO<sub>2</sub> score and TVOC score for the project.

Obtain a minimum human experience Score of 40. Additional points for this prerequisite are awarded for human experience scores above 40, according to Table 1.

The human experience score is based on three components which are weighted differently:

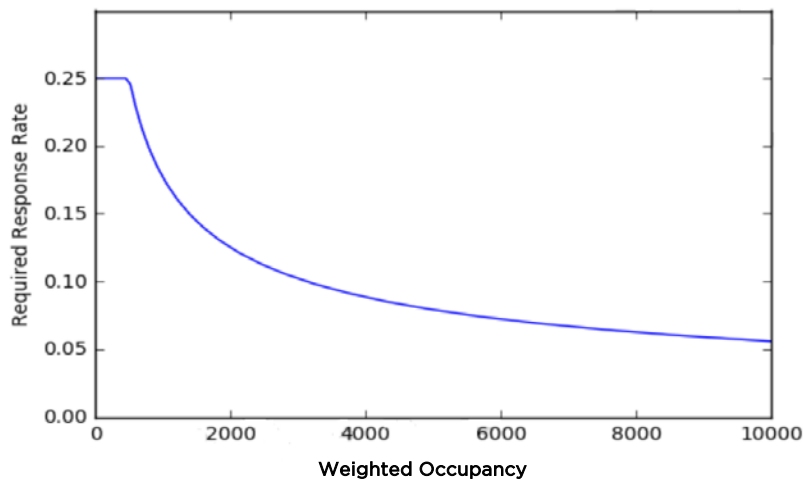
1. Occupant satisfaction score (50% weighting)

- 2. CO2 score (25% weighing)
- 3. TVOC score (25% weighting)

Table 1. LEED Points for Human Experience

Human Experience Score	LEED Points
40 (Required)	8 (Required)
43	9
48	10
53	11
58	12
63	13
68	14
73	15
78	16
83	17
88	18
93	19
98	20

Figure 1. Required Response Rate for Occupant satisfaction survey



Equation: Response rate= 100 \* (0.25 / square root (occupancy / 500))

### **Occupant satisfaction score**

The occupant satisfaction score rates the satisfaction occupants have with the building against satisfaction of occupants of comparable LEED certified buildings.

The score is a value from 1-100 based on the project's average occupant satisfaction level taking and the variance in the occupant responses.

### **Occupant satisfaction score calculation**

To calculate an occupant satisfaction score, the following data is required. All data is collected via the occupant satisfaction survey. At least one survey every 365 days must be conducted:

- ▶ Number of regular building occupants and visitors
- ▶ For Hospitality projects, number of hotel or lodging guests (these occupants may be excluded from the survey)
- ▶ Occupant satisfaction level (for each survey response)

The project's occupant satisfaction score is calculated by taking the average of the satisfaction levels for each building occupant that completes the survey, and considering the variance in the responses, using Equation 1.

Equation 1: Occupant satisfaction score = (Average occupant satisfaction level x 10) - variance in occupant satisfaction level

### **CO2 score**

The CO2 score rates the building's CO2 levels against the industry benchmark level of 1000 ppm.

The score is a value from 1-100 based on the project's average 95th percentile CO2 value.

### **CO2 score calculation**

To calculate a CO2 score, the following data is required:

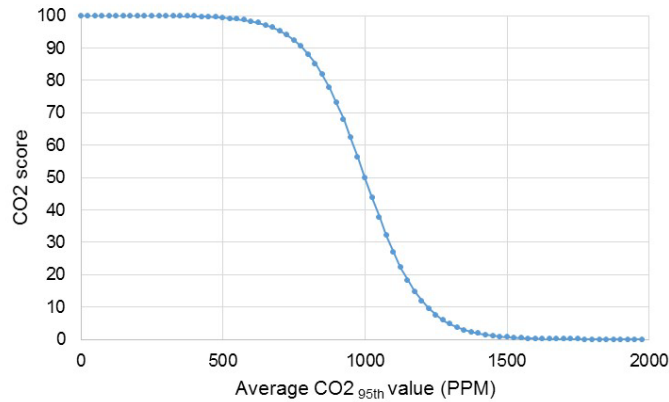
1. Measurement location
2. Date and time for each measurement
3. Measured CO2 concentration (ppm)

The 95th percentile value for each location (CO<sub>2</sub>95th) is calculated. The 95th percentile is the CO<sub>2</sub> value where 95% of the data falls below.

An average CO<sub>2</sub>95th value is calculated for the indoor environmental quality evaluation.

The project's average CO<sub>2</sub>95th value is then input into the CO<sub>2</sub> scoring function (see Figure 2) to produce a CO<sub>2</sub> score for the project.

Figure 2. CO<sub>2</sub> scoring function



The CO2 scoring function was developed based on the industry benchmark level of 1000 ppm.

### TVOC score

The TVOC score rates the building's TVOC levels against the industry benchmark level of 500 µg/m<sup>3</sup>.

The score is a value from 1-100 based on the project's maximum TVOC value.

### TVOC score calculation

To calculate a TVOC score, the following data is required:

- ▶ Measurement location
- ▶ Measurement date(s)
- ▶ Start and end time(s) for each measurement
- ▶ Measured TVOC concentration (µg/m<sup>3</sup>)

An average TVOC level (TVOCavg) is calculated for each location by averaging all of the TVOC measurements taken at that location during the indoor air quality evaluation.

A maximum TVOC level (TVOCmax) is determined by taking the highest TVOCavg value for the indoor environmental quality evaluation.

The project's maximum TVOC level (TVOCmax) is then input into the TVOC scoring function to produce a TVOC score for the project.

The TVOC scoring function was developed based on the LEED TVOC limit of 500 µg/m<sup>3</sup>.

### Guidance

This prerequisite allows you to understand more about the occupant experience in your building.

Occupant satisfaction is gathered via a survey conducted in the system at least once in the year. Indoor air quality is evaluated from interior Carbon dioxide levels (CO<sub>2</sub>) and interior total Volatile Organic compound (TVOC) measurements taken at least once in the year.

The project's satisfaction, CO<sub>2</sub> measurements, and TVOC measurements are translated into a human experience score, comprised of three sub-scores: an occupant satisfaction score, a CO<sub>2</sub> score, and a TVOC score.

At this time the additional inorganic contaminants and volatile organic compounds are not included in the human experience score. For a more comprehensive indoor air quality evaluation, projects are encouraged to include all or some of these additional contaminants in their measurements. An

additional point under the Innovation credit is available for projects that include two additional contaminants.

### **Step-by-step**

Complete steps 1-4 as applicable. For this prerequisite, at least one of the three components of the Human Experience score (occupants satisfaction score, CO2 score, or TVOC score) must be pursued. Projects are encouraged to pursue all three components.

#### **Step 1. Conduct an occupant satisfaction survey**

Use the system to administer an occupant comfort survey for the building. The survey may be conducted at any time in the year, but once per season is encouraged.

#### **Step 2. Achieve required response rate from the survey**

Review the rating system to determine how many building occupants are required to complete the survey.

#### **Step 3. Conduct an indoor air quality evaluation for the project**

Determine how CO2 and TVOCs will be measured for the project. Measurements may come from installed sensors or from one-time air testing. To better understand the indoor air, additional contaminants (listed in the credit requirements) may be included in the measurements. Individual evaluations can be conducted; one for CO2 and one for TVOC.

Measure in locations that are representative of the building.

The project team may use any measurement method capable of measuring CO2 and/or TVOC and use their best judgement when determining the number of sampling locations, and frequency and duration of testing. Laboratory-based test methods for TVOC are recommended but not required. If desired, the measurement methods and testing approaches outlined in following related LEED credits may be used: LEED v4.1 or LEED v4 BD+C credit Indoor Air Assessment, [LEED 2009 BD+C credit Construction Indoor Air Quality Management Plan Before Occupancy](#), and/or the [LEED v4 O+M pilot credit Performance Based Indoor Air Assessment in Existing Buildings](#).

For TVOC, measurements must be provided in  $\mu\text{g}/\text{m}^3$ . Use correction factors and/or conversion factors applicable to the instrument being used when converting from ppm to  $\mu\text{g}/\text{m}^3$  and note any assumptions in the evaluation report.

#### **Step 4. Input data**

Input your project's CO2 and TVOC measurements, using the USGBC calculator. TVOC data must be reported in  $\mu\text{g}/\text{m}^3$ . CO2 data must be reported in ppm.

The USGBC calculator will calculate the project's average 95th percentile CO2 value and maximum TVOC value.

#### **Step 5. Determine Human Experience score**

An occupant satisfaction score, a TVOC score, a CO2 score, and then the resulting Human Experience score for your project will automatically generate when data is entered for each sub-score.

#### **Step 6. Prepare documentation for certification review**

Complete the prerequisite information. See Required Documentation below.

### **Further Explanation**

#### **Improving your score**

The following strategies may help you improve your Human Experience score:



- ▶ [LEED v4 O+M EQ credit Indoor air quality management program](#)
- ▶ [LEED v4 O+M EQ credit Enhanced indoor air quality strategies](#)
- ▶ [LEED v4 O+M EQ credit Thermal comfort](#)
- ▶ [LEED v4 O+M EQ credit Interior lighting](#)
- ▶ [LEED v4 O+M EQ credit Daylight and quality views](#)

#### **Required Documentation**

- ▶ Calculated human experience score, calculated occupant satisfaction score, calculated CO2 score, calculated TVOC score. A minimum Performance Score of 40/100 is required
- ▶ Indoor air quality evaluation report, including narrative explaining how test locations were determined, dates, times, and results of each test, and measurement methods. If TVOC readings were taken in other units (such as ppm), include calculation details with any conversion/correction factors used.

#### **Changes from LEED v4**

- ▶ This is a new prerequisite. The prerequisite includes similar requirements to LEED v4 Occupant comfort survey.

# EQ Credit: Green Cleaning

This credit applies to

- ▶ O+M: Existing Buildings (1 point)
- ▶ O+M: Interiors (1-3 points)

## Intent

To reduce levels of chemical, biological, and particulate contaminants, which can compromise human health, building finishes and systems, and the environment, by implementing effective cleaning procedures.

## Requirements

Interiors projects may select up to three options to earn up to 3 points.

### Option 1. Custodial Effectiveness Assessment

Perform routine inspection and monitoring of the facility's green cleaning policy to verify that the specified strategies are being used and to identify areas in need of improvement.

Additionally, conduct an annual audit in accordance with APPA Leadership in Educational Facilities' Custodial Staffing Guidelines, or a local equivalent, to determine the appearance level of the facility. The facility must score 2.5 or better.

OR

### Option 2. Entryway Systems

Have in place permanent entryway systems at least 10 feet (3 meters) long in the primary direction of travel to capture dirt and particulates entering the building at regularly used exterior entrances. Acceptable entryway systems include permanently installed grates, grilles, slotted systems that allow for cleaning underneath, rollout mats, and any other materials manufactured as entryway systems with equal to or better performance. Maintain all on a weekly basis.

#### Warehouses & Distribution Centers only

Buildings are not required to provide entryway systems at doors leading from the exterior to the loading dock/garage, but must provide them between these spaces and adjacent office areas.

#### Multifamily only

Common area entrances shall meet the requirements above. For residential units with a direct entrance to the exterior, have in place a walk off mat.

OR

### Option 3. Powered janitorial equipment

At least 40%, by cost, of all powered janitorial equipment (purchased, leased, or used by contractors) used to clean the project meets the following criteria.

The equipment must have the following features:

- ▶ safeguards, such as rollers or rubber bumpers, to avoid damage to building surfaces;
- ▶ ergonomic design to minimize vibration, noise, and user fatigue, as reported in the user manual in accordance with ISO 5349-1 for arm vibrations, ISO 2631-1 for vibration to the whole body, and ISO 11201 for sound pressure at operator's ear; and

- ▶ as applicable, environmentally preferable batteries (e.g., gel, absorbent glass mat, lithium-ion) except in applications requiring deep discharge and heavy loads where performance or battery life is reduced by the use of sealed batteries.
- ▶ Vacuum cleaners must be certified by the Carpet and Rug Institute Seal of Approval/Green Label Vacuum Program and operate with a maximum sound level of 70 dBA or less in accordance with ISO 11201.
- ▶ Carpet extraction equipment, for restorative deep cleaning, must be certified by the Carpet and Rug Institute's Seal of Approval Deep Cleaning Extractors and Seal of Approval Deep Cleaning Systems program.
- ▶ Propane-powered floor equipment must have high-efficiency, low-emissions engines with catalytic converters and mufflers that meet the California Air Resources Board or EPA standards for the specific engine size and operate with a sound level of 90 dBA or less, in accordance with ISO 11201.
- ▶ Automated scrubbing machines must be equipped with variable-speed feed pumps and either (1) on-board chemical metering to optimize the use of cleaning fluids or (2) dilution control systems for chemical refilling. Alternatively, scrubbing machines may use tap water only, with no added cleaning products.

OR

#### **Option 4. Cleaning products and materials**

At least 75% of all cleaning products and materials, by cost must meet at least one of the following standards. Compliance may be demonstrated via a product inventory or from total annual purchases.

Cleaning products must meet one or more of the following standards, or a local equivalent for projects outside the U.S.:

- ▶ Green Seal GS-37, for general-purpose, bathroom, glass and carpet cleaners used for industrial and institutional purposes;
- ▶ UL EcoLogo 2792 for cleaning and degreasing compounds;
- ▶ UL EcoLogo 2759 for hard-surface cleaners;
- ▶ UL EcoLogo 2795, for carpet and upholstery care;
- ▶ Green Seal GS-40, for industrial and institutional floor care products;
- ▶ UL EcoLogo 2777 for hard-floor care;
- ▶ EPA Safer Choice Standard; and/or
- ▶ Cleaning devices that use only ionized water or electrolyzed water and have third-party-verified performance data equivalent to the other standards mentioned above (if the device is marketed for antimicrobial cleaning, performance data must demonstrate antimicrobial performance comparable to EPA Office of Pollution Prevention and Toxics and Design for the Environment requirements, as appropriate for use patterns and marketing claims).

Disinfectants, metal polish, or other products not addressed by the above standards must meet one or more of the following standards (or a local equivalent for projects outside the U.S.):

- ▶ UL EcoLogo 2798 for digestion additives for cleaning and odor control;
- ▶ UL EcoLogo 2791 for drain or grease trap additives;
- ▶ UL EcoLogo 2796 for odor control additives;
- ▶ Green Seal GS-52/53, for specialty cleaning products;
- ▶ California Code of Regulations maximum allowable VOC levels for the specific product category;
- ▶ EPA Safer Choice Standard; and/or
- ▶ Cleaning devices that use only ionized water or electrolyzed water and have third-party-verified performance data equivalent to the other standards mentioned above (if the device is marketed for antimicrobial cleaning, performance data must demonstrate antimicrobial performance comparable to EPA Office of Pollution Prevention and Toxics and Design for the Environment requirements, as appropriate for use patterns and marketing claims).

Disposable janitorial paper products and trash bags must meet the minimum requirements of one or more of the following programs, or a local equivalent for projects outside the U.S.:

- ▶ EPA comprehensive procurement guidelines, for janitorial paper;
- ▶ Green Seal GS-01, for tissue paper, paper towels and napkins;
- ▶ UL EcoLogo 175, for toilet tissue;
- ▶ UL EcoLogo 175, for hand towels
- ▶ Janitorial paper products derived from rapidly renewable resources or made from tree-free fibers;
- ▶ FSC certification, for fiber procurement;
- ▶ EPA comprehensive procurement guidelines, for plastic trash can liners; and/or
- ▶ California integrated waste management requirements, for plastic trash can liners (California Code of Regulations Title 14, Chapter 4, Article 5, or SABRC 42290-42297 Recycled Content Plastic Trash Bag Program).

Hand soaps and hand sanitizers must meet one or more of the following standards, or a local equivalent for projects outside the U.S.:

- ▶ no antimicrobial agents (other than as a preservative) except where required by health codes and other regulations (e.g., food service and health care requirements);
- ▶ Green Seal GS-41, for industrial and institutional hand cleaners;
- ▶ UL EcoLogo 2784 for hand cleaners and hand soaps;
- ▶ UL EcoLogo 2783 for hand sanitizers;
- ▶ EPA Safer Choice Standard.

For projects outside the U.S., any Type 1 eco-labeling program as defined by ISO 14024: 1999 developed by a member of the Global Ecolabelling Network may be used in lieu of Green Seal or UL Ecolabel standards.

## Guidance

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

For Option 3 and Option 4, an audit or product inventory may be used to demonstrate compliance. The inventory must take place during the 365-day reporting period. For Option 3, include all equipment that is used to clean the building. For Option 4, include all products and materials used to clean the building.

## Required Documentation

- ▶ Option 1:
  - Description of procedures for routine inspection and monitoring of the work performed by cleaning staff
  - Audit results including audit date, overall score, procedures, and improvement opportunities
- ▶ Option 2:
  - Photos, drawings, or scaled floor plans highlighting permanent entryway systems locations and measurements
  - Confirmation that entryway systems were maintained weekly
- ▶ Option 3:
  - Green cleaning calculator with results of the equipment inventory
- ▶ Option 4:
  - Green cleaning calculator with results from products and materials inventory OR total annual purchases

## Changes from LEED v4

- ▶ New credit

- ▶ Credit is a combination of Green Cleaning- Custodial Effectiveness Assessment, Green Cleaning- Products and Materials, Green Cleaning-Equipment
- ▶ For custodial effectiveness assessment (Option 1), minor edits for clarification
- ▶ Renamed Green cleaning- equipment to Powered janitorial equipment
- ▶ For powered janitorial equipment (Option 3), compliance is now based on percentage of equipment used to clean the project at time of inventory, tracking over the entire year is no longer required.
- ▶ For powered janitorial equipment (Option 3), the requirement for a phase out plan has been removed.
- ▶ For cleaning products and materials (Option 4), tracking total annual purchases is no longer required. Compliance may now be demonstrated with a product inventory or from total annual purchases.

# EQ Credit: Integrated Pest Management

This credit applies to

- ▶ O+M: Existing Buildings (1 point)
- ▶ O+M: Interiors (1 point)

## Intent

To minimize pest problems and exposure to pesticides.

## Requirements

### Option 1. In-house IPM program

Have in place an integrated pest management (IPM) plan for the building and grounds within the project boundary. The IPM plan must include the following elements.

- ▶ Identification of an IPM team. Identify roles for building management, pest management contractors, maintenance staff, and liaisons with building occupants.
- ▶ Provisions for identifying and monitoring pests. Specify inspections, pest population monitoring, and a reporting system that allows occupants, maintenance staff, and others to report evidence of pest infestations.
- ▶ Action thresholds for all pests likely encountered in the building. Also describe a process for modifying action thresholds, if necessary, through active communication between occupants and the IPM team.
- ▶ Nonchemical pest preventive measures, either designed into the structure or implemented as part of pest management activities.
- ▶ Pest control methods to be used when action thresholds are exceeded. For each pest, list all potential control methods considered and adopt the lowest-risk options, considering the risks to the applicator, building occupants, and the environment. The plan must preferentially require nonchemical approaches, with pesticides registered for the site applied only if those approaches fail. Give preference to the use of least-risk pesticides based on inherent toxicity and exposure potential. If a pesticide that is not in the least-risk category is selected, document the reason.
- ▶ A mechanism for documentation of inspection, monitoring, prevention, and control methods and for evaluation of the effectiveness of the IPM plan. Specify the metrics by which performance will be measured, and describe the quality assurance process to evaluate and verify successful implementation of the plan.
- ▶ A strategy for communications between the IPM team and the building occupants (for schools, faculty and staff). This strategy should include education about the IPM plan, participation in problem solving, feedback mechanisms (e.g., a system for recording pest complaints), and provision for notification of pesticide applications. At a minimum, the facility manager must notify any building occupant or employee who requests it and post a sign at the application site, which must remain in place for 24 hours prior to application. Notifications must include the pesticide name, EPA registration number, treatment location, and date of application. Applications of least-risk pesticides do not require notification. For an emergency application of a pesticide, anyone who requested notice must be notified within 24 hours of the application and given an explanation of the emergency.

### Option 2. Certified IPM service

Use an IPM service for the building and grounds within the project boundary that is certified and in good standing with GreenPro, EcoWise, GreenShield, or local equivalent.

## **Guidance**

The credit requirements are similar to LEED v4. Follow the guidance in the LEED v4 reference guide.

### **Required Documentation**

- ▶ Option 1:
  - Integrated pest management plan
  - Examples of the documentation used by the project to log the pest control strategies implemented at the project
- ▶ Option 2:
  - Integrated pest management service contract
  - Information showing the contractor's GreenPro, EcoWise, GreenShield, or local equivalent certification

### **Changes from LEED v4**

- ▶ Minor edits for clarification

# IN Credit: Innovation

This credit applies to

- ▶ O+M: Existing Buildings (1 point)
- ▶ O+M: Interiors (1 point)

## Intent

To encourage projects to achieve exceptional or innovative performance. To encourage integration of LEED expertise and collaboration toward project priorities.

## Requirements

LEED Accredited Professional

At least one principal participant of the project team must be a LEED Accredited Professional (AP) with a specialty in Operations and Maintenance.

AND

## Innovation Strategy

Achieve significant, measurable environmental performance using a strategy not addressed in the rating system, including prerequisites, base points, and strategies contributing to the scores within the five performance categories.

Identify the following:

- ▶ the intent of the proposed innovation strategy;
- ▶ proposed requirements for compliance;
- ▶ submittals to demonstrate compliance and proposed metric(s) for tracking (if applicable); and
- ▶ the design approach or strategies used to meet the requirements.

Examples of strategies may be found in the Innovation Catalog.

OR

## Pilot Credit

Register for, achieve, and submit a feedback survey for one eligible pilot credit from USGBC's LEED Pilot Credit Library.

## Guidance

Other than the simplification of options, the credit requirements are very similar to LEED v4. Follow the guidance in the LEED v4 reference guide for LEED Accredited Professional and Innovation.

## Required Documentation

- ▶ Full name and specialty credential of LEED AP
- ▶ Option 1: innovation narrative and supporting documentation
- ▶ Option 2: confirmation that project registered for pilot credit, completed pilot credit survey, pilot credit specific submittals.

## Changes from LEED v4

- ▶ LEED accredited professional is now required. Due to the very high popularity of the IN credit Accredited Professional and importance of this team member, a credentialed project team member is now a requirement. We recognize the unique O+M expertise required to successfully manage and improve existing buildings and spaces.



- ▶ The options within the credit have been updated. In addition to working with a LEED AP, project teams can choose to pursue one eligible innovation strategy or pilot credit to achieve the point.
- ▶ The Exemplary Performance option has been removed to encourage projects to pursue sustainability strategies not already included in the rating system.