COBEAL

S.A. DE C.V.

LEED v4 for
BUILDING OPERATIONS AND MAINTENANCE

Includes:
LEED O+M: Existing Buildings
LEED O+M: Schools
LEED O+M: Retail
LEED O+M: Data Centers
LEED O+M: Hospitality
LEED O+M: Warehouses and Distribution Centers

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LOCATION AND TRANSPORTATION (LT)

LT CREDIT: ALTERNATIVE TRANSPORTATION

EB:O&M
1–15 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–15 points)
- EB:O&M Schools (1–15 points)
- EB:O&M Retail (1–15 points)
- EB:O&M Data Centers (1–15 points)
- EB:O&M Hospitality (1–15 points)
- EB:O&M Warehouses & Distribution Centers (1–15 points)

Intent

To reduce pollution and land development effects from automobile use for transportation.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
None.

PERFORMANCE

Option 1. Transportation Survey (1 point)
Conduct a survey of building occupants on their transportation patterns. Regular building occupants must be surveyed. Transient occupants must be surveyed if either the typical peak or daily average is greater than the number of regular building occupants.

Conduct a transportation survey at least once every five years

OR

Option 2. Alternative Transportation Rate (3–15 points)

Meet the requirements of Option 1.

Demonstrate an alternative transportation rate in accordance with Table 1. Alternative transportation strategies that contribute to this reduction include human-powered conveyances (e.g. walking or biking), *public transit*, telecommuting, rideshare options, compressed workweeks, carpools, and *green vehicles*.

Calculations are performed relative to a baseline case that assumes all regular occupants commute alone in conventional automobiles. The calculations must account for seasonal variations in the use of alternative commuting methods and should indicate the distribution of commuting trips using each type of alternative transportation strategy.

Table 1. Points for alternative transportation rate

Alternative Transportation Rate	Points

10%	3
15%	4
20%	5
25%	6
30%	7
35%	8
40%	9
45%	10
50%	11
55%	12
60%	13
65%	14
70%	15

OR

Option 3. Comprehensive Alternative Transportation Program (2 points)

Meet the requirements of Option 1.

Implement an alternative transportation program to reduce the conventional travel rates of building occupants. Include at least one element from each of the following three categories:

Education strategies
- new-hire orientation;
- employee newsletter, flyer, announcements, memos, letters;
- carpool matching website; or

Basic support strategies
- employer carpool events.
- guaranteed return trip;
- preferential parking for rideshare participants;
- flextime schedule; or
- ride-matching service.

Direct strategies
- telecommuting;
- compressed workweek schedule;
- transit subsidy;
- introduction of a parking fee;
- bicycle program;
- parking cash-out;
- employee clean vehicle purchase program; or
- carpool program.

SUSTAINABLE SITES (SS)

SS PREREQUISITE: SITE MANAGEMENT POLICY
Required

EB:O&M
This credit applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

Intent
To preserve ecological integrity and encourage environmentally sensitive site management practices that provide a clean, well-maintained, and safe building exterior while supporting high-performance building operations and integration into the surrounding landscape.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Create and implement a site management policy that employs best management practices to reduce harmful chemical use, energy waste, water waste, air pollution, solid waste, and/or chemical runoff for all of the following operational elements on the building and grounds:

- use of low emissions maintenance equipment;
- snow and ice removal;
- cleaning of building exterior, pavement, and other impervious surfaces;
- erosion and sedimentation control (for ongoing operations and for construction activity);
- organic waste management (returned to the site or diverted from landfills);
- invasive and exotic plant species management (through monitoring and eradication);
- fertilizer use (testing soils before using fertilizer to prevent overapplication of nutrients);
- irrigation management (monitor irrigation systems manually or with automated systems at least every two weeks during the operating season for appropriate water usage, system times, leaks, or breaks); and
- storage of materials and equipment.

PERFORMANCE
None.

SS CREDIT: SITE DEVELOPMENT—PROTECT OR RESTORE HABITAT

EB:O&M
1–2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–2 points)
- EB:O&M Schools (1–2 points)
- EB:O&M Retail (1–2 points)
- EB:O&M Data Centers (1–2 points)
- EB:O&M Hospitality (1–2 points)
- EB:O&M Warehouses & Distribution Centers (1–2 points)

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

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

Option 1. On-Site Restoration (2 points)

ESTABLISHMENT
Have in place native or adapted vegetation on 20% of the total site area (including the building footprint), a minimum of 5,000 square feet (465 square meters), to provide habitat and promote biodiversity.

PERFORMANCE
None.

OR

Option 2. Financial Support (1 point)

ESTABLISHMENT
Provide financial support equivalent to at least $0.05 per square foot (US$0.50 per square meter) for the total site area (including the building footprint).

Financial support must be provided annually to a nationally or locally recognized land trust or conservation organization within the same EPA Level III ecoregion or the project's state (or within 100 miles [160 kilometers] for projects outside the U.S.). For U.S. projects, the land trust must be accredited by the Land Trust Alliance.

PERFORMANCE
Provide the specified financial support annually.

SS CREDIT: RAINWATER MANAGEMENT

EB:O&M
1–3 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–3 points)
- EB:O&M Schools (1–2 points)
- EB:O&M Retail (1–3 points)
- EB:O&M Data Centers (1–3 points)
- EB:O&M Hospitality (1–3 points)
- EB:O&M Warehouses & Distribution Centers (1–3 points)

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

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Use *low-impact development (LID)* practices to capture and treat water from 25% of the impervious surfaces for the 95th percentile storm event.

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

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.

SS CREDIT: HEAT ISLAND REDUCTION

EB:O&M
2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (2 points)
- EB:O&M Schools (2 points)
- EB:O&M Retail (2 points)
- EB:O&M Data Centers (2 points)
- EB:O&M Hospitality (2 points)
- EB:O&M Warehouses & Distribution Centers (2 points)

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

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

Choose one of the following options.

Option 1. Nonroof (1 point)

ESTABLISHMENT
Use any combination of the following strategies for a minimum of 50% of the site paving.

- Use the existing plant material or install plants that provide shade over paving areas (including playgrounds) on the site within 10 years of planting. Plants must be in place at the time of certification application.
- Install vegetated planters. Plants must be in place at the time of occupancy permit and cannot include artificial turf.
- Provide shade with structures covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines, .
- Provide 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, use materials with an initial SR of at least 0.33 at installation,
- Provide shade with vegetated structures.
- Use 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, use materials with an initial SR of at least 0.33 at installation.
- Use an *open-grid pavement system* (at least 50% unbound).

PERFORMANCE
Implement a maintenance program that ensures all high-reflectance paving surfaces are cleaned at least every three years to maintain good reflectance.

OR

Option 2. Roof (1 point)

ESTABLISHMENT
Use either roofing materials with a SRI equal to or greater than the values in Table 1 for a minimum of 75% of the roof area, or a vegetated roof for a minimum of 50% of the roof area, or both. If using both high-reflectance and vegetated roof surfaces, meet the following criterion:

$$\frac{\text{Area of High-Reflectance Roof}}{0.75} + \frac{\text{Area of Vegetated Roof}}{0.5} \geq \text{Total Roof Area}$$

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

PERFORMANCE
Implement a maintenance program that ensures all high-reflectance roof surfaces are cleaned at least every three years to maintain good reflectance, and all vegetated roofs are maintained for plant health and good structural condition.

OR

Option 3. Nonroof and Roof (2 points)

ESTABLISHMENT
Meet the following criterion:

$$\frac{\text{Area of Nonroof Measures}}{0.5} + \frac{\text{Area of High-Reflectance Roof}}{0.75} + \frac{\text{Area of Vegetated Roof}}{0.50} \geq \text{Total Site Paving Area} + \text{Total Roof Area}$$

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

Use any combination of the following strategies.

Nonroof Measures
Use the measures listed in Option 1. Plant material must be in place at time of certification application.

High-Reflectance Roof
Use roofing materials that have an SRI equal to or greater than the values in Table 1. Meet the three-year aged SRI value. If three-year aged value information is not available, use materials that 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

Vegetated Roof
Install a vegetated roof.

PERFORMANCE Implement a maintenance program that ensures all high-reflectance surfaces are cleaned at least every three years to maintain good reflectance, and all vegetated roofs are maintained for plant health and good structural condition.

OR

Option 4. Parking under Cover (1 point)

ESTABLISHMENT
Place at least 50% of *parking spaces under cover*. Any roof used to shade or cover parking must (1) have a three-year aged SRI of at least 32 (if three-year aged value information is not available, use materials with an initial SRI of at least 39 at installation), (2) be a vegetated roof, or (3) be covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines.

PERFORMANCE
Implement a maintenance program that ensures all SRI surfaces are cleaned at least every three years to maintain good reflectance, and all vegetated roofs are maintained for plant health and good structural condition.

SS CREDIT: LIGHT POLLUTION REDUCTION

EB:O&M
1 point
This credit applies to

- Existing Buildings: Operations & Maintenance (1 point)
- EB:O&M Schools (1 point)
- EB:O&M Retail (1 point)
- EB:O&M Data Centers (1 point)
- EB:O&M Hospitality (1 point)
- EB:O&M Warehouses & Distribution Centers (1 point)

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

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT

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.

PERFORMANCE
None.

SS CREDIT: SITE MANAGEMENT

EB:O&M
1 point
This credit applies to

- Existing Buildings: Operations & Maintenance (1 point)
- EB:O&M Schools (1 point)
- EB:O&M Retail (1 point)
- EB:O&M Data Centers (1 point)
- EB:O&M Hospitality (1 point)
- EB:O&M Warehouses & Distribution Centers (1 point)

Intent
To preserve ecological integrity and encourage environmentally sensitive site management practices that provide a clean, well-maintained, and safe building exterior while supporting high-performance building operations and integration into the surrounding landscape.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
None.

PERFORMANCE
Demonstrate that the following performance criteria were met:

- Use no calcium chloride or sodium chloride deicers, and/or establish reduced treatment areas equal to 50% of applicable paving area.
- Prevent erosion and sedimentation, and restore any eroded soils.
- Prevent air pollution from construction materials and activities.
- Divert from landfills 100% of plant material waste via low-impact means.
- Prevent the overapplication of nutrients. Use no ammonia-based fertilizers, biosolid-based fertilizers (for continuous application), synthetic quick-release fertilizers, or “weed and feed” formulations. Blanket applications of herbicides are prohibited; turf weeds may be controlled by spot spraying only.
- Monitor irrigation systems manually or with automated systems at least every two weeks 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.

AND

Meet one of the following options:

Option 1. Limited Turf Area
Limit turf to 25% or less of the vegetated area.

Playgrounds and athletic fields in schools or parks are excluded from this option.

OR

Option 2. All Manual or Electric-Powered Equipment
Use all manual or electric-powered equipment in all site management operations.

OR

Option 3. Reduction in Emissions from Site Management Equipment
Show and maintain a 50% reduction in hydrocarbon (HC) and nitrogen oxide (NOx) emissions, and a 75% reduction in carbon monoxide (CO) emissions from *baseline conditions*.

SS CREDIT: SITE IMPROVEMENT PLAN

EB:O&M
1 point
This credit applies to

- Existing Buildings: Operations & Maintenance (1 point)
- EB:O&M Schools (1 point)
- EB:O&M Retail (1 point)
- EB:O&M Data Centers (1 point)
- EB:O&M Hospitality (1 point)
- EB:O&M Warehouses & Distribution Centers (1 point)

Intent
To preserve and improve ecological integrity while supporting high-performance building operations.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Develop a five-year site improvement plan that includes the following:

- documentation of existing site conditions;
- site improvement objectives;
- performance standards to evaluate ongoing progress; and
- monitoring protocols.

The improvement plan must address the following topics.

- *Hydrology.* Protection and improvement of water bodies on-site, rainwater management and reuse opportunities, potable water-use reduction.
- *Vegetation.* Documentation of existing vegetation on-site, turf area reduction, management of native and invasive plants, protection of threatened, endangered or unique species.
- *Soils.* Documentation of general soil structure, preservation of healthy soils, remediation of compacted soils, identification of previously developed area.

The plan must be developed with professionals trained and experienced in the above disciplines.

PERFORMANCE
Show that at least 5% of the site is vegetated. Implement all no-cost and low-cost measures. Develop a new improvement plan and implement all new no-cost and low-cost measures every five years.

SS CREDIT: JOINT USE OF FACILITIES

EB:O&M
1 point
This credit applies to

- EB:O&M Schools

Intent
To integrate the school with the community by sharing the building and its playing fields for nonschool events and functions.

Requirements

SCHOOLS EBOM

ESTABLISHMENT
Option 1. Make Building Space Open to General Public (1 point)
In collaboration with the school authorities, establish at least three of the following types of spaces as accessible to and available for shared use by the general public:

- auditorium;
- gymnasium;
- cafeteria;
- one or more classrooms;
- playing fields and stadiums; and
- joint parking.

Provide access to toilets in joint-use areas after normal school hours.

OR

Option 2. Contract with Specific Organizations to Share Building Space (1 point)
In collaboration with the school authorities, contract with community or other organizations to provide at least two types of dedicated-use spaces in the building, such as the following:

- commercial office;
- health clinic;
- community service centers (provided by state or local offices);
- police offices;
- library or media center;
- parking lot; and
- one or more commercial businesses.

Provide access to toilets in joint-use areas after normal school hours.

OR

Option 3. Use Shared Space Owned by Other Organizations (1 point)
In collaboration with the school authorities, establish at least two of the following six types of spaces (owned by other organizations/agencies) are accessible to students:

- auditorium;
- gymnasium;
- cafeteria;
- one or more classrooms;
- swimming pool; and
- playing fields and stadiums.

Provide direct pedestrian access to these spaces from the school. In addition, provide signed joint-use agreements with the other organizations or agencies that stipulate how these spaces will be shared.

PERFORMANCE
None.

WATER EFFICIENCY (WE)

WE PREREQUISITE: INDOOR WATER USE REDUCTION
Required

EB:O&M
This prerequisite applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

Intent

To reduce indoor water consumption.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

Option 1. Calculated Water Use

ESTABLISHMENT
For the indoor plumbing fixtures and fittings listed in Table 1, reduce water consumption to or below the LEED v4 for Existing Buildings: Operations & Maintenance baseline, calculated assuming 100% of the building's indoor plumbing fixtures and fittings meet the flush and flow rates listed in Table 1.

The LEED v4 for Existing Buildings: Operations & Maintenance water use baseline is set depending on the year of building's occupancy, as follows:

- For a building with a certificate of occupancy dated 1995 or later, the baseline is 120% of the water use that would result if all fixtures met the code requirements in Table 1.
- For a building with a certificate of occupancy dated before 1995, the baseline is 150% of the water use that would result if all fixtures met the code requirements in Table 1.

Table 1. Fixture and fitting code requirements

Fixture or fitting	*Baseline (IP units)*	*Baseline (SI units)*
Toilet (water closet)	1.6 gpf	6 lpf
Urinal	1.0 gpf	3.8lpf
Public lavatory (restroom) faucet	0.5 gpm at 60 psi** all others except private applications	1.9 lpm at 415 kPa, all others except private applications

Private lavatory faucet	2.2 gpm at 60 psi	8.3 lpm at 415 kPa
Kitchen faucet (excluding faucets used exclusively for filling operations)	2.2 gpm at 60 psi	8.3 lpm at 415 kPa
Showerhead	2.5 gpm at 80 psi per shower stall	9.5 lpm at 550 kPa per shower stall

gpf = gallons per flush
gpm = gallons per minute
psi = pounds per square inch
lpf = liters per flush
lpm = liters per minute
kPa = kilopascals

If indoor plumbing systems were renovated after initial occupancy of the building, set a whole-building average baseline by prorating the above limits, based on the proportion of plumbing fixtures installed during the plumbing renovations in each period. Pre-1995 buildings that have had only minor fixture retrofits (e.g., aerators, showerheads, flushing valves) but no plumbing renovations in or after 1995 may use the 150% baseline for the whole building.

Calculate fixture and fitting performance to compare the water use of the as-installed fixtures and fittings with the use of Uniform Plumbing Code or International Plumbing Code-compliant (baseline) fixtures and fittings.

Inspect all existing fittings or fixtures to ensure they are operating properly. Make any repairs needed to bring all fixtures into good working order or permanently turn off water supply to nonfunctional units.

Implement a fixture and fitting replacement and retrofit policy specifying that all newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling be WaterSense labeled (or a local equivalent for projects outside the United States).

Retail, Hospitality and Schools only

Have in place a process and appliance water equipment purchasing policy for the building and site addressing the products listed in Table 2. The policy must cover at least those products purchased within the building and site management's control.

Table 2. Standards for appliances

Appliance	*Requirement*
Residential clothes washer	ENERGY STAR or performance equivalent
Commercial clothes washer	CEE Tier 3A
Residential dishwasher, standard or compact	ENERGY STAR or performance equivalent
Prerinse spray valve	≤ 1.3 gpm (4.9 lpm)
Ice machine	ENERGY STAR or performance equivalent, and use either air-cooled or closed-loop cooling, such as chilled or condenser water system

gpm = gallons per minute

lpm = liters per minute

PERFORMANCE
For building water use, confirm that calculations are up to date. Demonstrate that all applicable purchases made during the performance period meet the requirements of the fixture and fitting replacement and retrofit policy.

For appliances, demonstrate that appliances purchased and installed within the building meet the requirements listed in Table 2. Appliances not listed are not subject to any additional requirements.

Option 2. Metered Water Use

ESTABLISHMENT
Meter fixtures and fittings and record metered data for one year to establish a water-use baseline.

PERFORMANCE
For projects with at least 80% of fixtures and fittings metered, show that the water-use baseline has been maintained.

WE PREREQUISITE: BUILDING-LEVEL WATER METERING
Required

EB:O&M
This prerequisite applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

Intent

To support water management and identify opportunities for additional water savings by tracking water consumption.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Have permanently installed water meters that measure the total potable water use for the building and associated grounds. Metering of any gray or reclaimed water supplied to the building is encouraged but not required.

PERFORMANCE
Record meter data on a monthly basis and compile; meter readings can be manual or automated.

Commit to sharing with USGBC the resulting whole-project water usage data for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first.

This commitment must carry forward for five years or until the building changes ownership or lessee.

WE CREDIT: OUTDOOR WATER USE REDUCTION

EB:O&M
1–2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–2 points)
- EB:O&M Schools (1–2 points)
- EB:O&M Retail (1–2 points)
- EB:O&M Data Centers (1–2 points)
- EB:O&M Hospitality (1–2 points)
- EB:O&M Warehouses & Distribution Centers (1–2 points)

Intent

To reduce outdoor water consumption.

Requirements

EBOM, RETAIL, DATA CENTERS, HOSPITALITY, SCHOOLS, WAREHOUSES & DISTRIBUTION CENTERS

Reduce outdoor water use through one of the following options. Nonvegetated surfaces, such as permeable or impermeable pavement, should be excluded from landscape area calculations. Athletic fields and playgrounds (if vegetated) and food gardens may be included or excluded at the project team's discretion.

If landscape irrigation is not submetered, use Option 2.

ESTABLISHMENT

Option 1. No Irrigation Required (2 points)
Show that the landscape does not require irrigation beyond a maximum two-year plant establishment period.

Option 2. No Irrigation Meter Installed: Calculated Water Budget (1–2 points)
Use the existing landscape to calculate the landscape water requirement using the EPA WaterSense Water Budget Tool.

Install an irrigation meter.

Option 3. Irrigation Meter Installed (1–2 points)
The baseline is established using the annual average of at least 3 years of consecutive data out of the last 5 years.
PERFORMANCE

Option 1. No Irrigation Required (2 points)
None.

Option 2. No Irrigation Meter: Calculated Water Budget (1–2 points)
Points are earned according to Table 1.

Option 3. Irrigation Meter Installed (1–2 points)
Demonstrate a reduction in outdoor water use over the most recent 12 months compared with the established baseline. Points are earned according to Table 1.

Table 1. Points for reducing irrigation water

Percentage reduction from baseline	Points
30%	1
40%	2

WE CREDIT: INDOOR WATER USE REDUCTION

EB:O&M
1–5 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–5 points)
- EB:O&M Schools (1–5 points)
- EB:O&M Retail (1–5 points)
- EB:O&M Data Centers (1–4 points)
- EB:O&M Hospitality (1–5 points)
- EB:O&M Warehouses & Distribution Centers (1–5 points)

Intent

To reduce indoor water consumption.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

Option 1. Calculated Water Use (2–5 points except Data Centers, 2–4 points Data Centers)

ESTABLISHMENT
None.

PERFORMANCE
Have fixtures that use less water than the baseline calculated in WE Prerequisite Indoor Water-Use Reduction. Points are awarded according to Table 1.

Table 1. Points for reducing calculated water use beyond the prerequisite level.

Additional percentage reduction	Points (except Data Centers)	Points (Data Centers)
10%	1	1
15%	2	2
20%	3	3
25%	4	4
30%	5	

Confirm that calculations are up to date. Demonstrate that all purchases made since the end of the performance period meet the design performance requirements.

OR

Option 2. Metered Water Use (4 points)
ESTABLISHMENT
Meter fixtures and fittings, and record meter data for one year to establish a water-use baseline.
PERFORMANCE
For projects with at least 80% of fixtures and fittings metered, show a reduction from the baseline year of meter data.

Table 2. Points for reducing metered water use

percentage reduction	Points (except Data Centers)	Points (Data Centers)
<5%	1	1
5%	2	2
10%	3	3
15%	4	4
20%	5	--

WE CREDIT: COOLING TOWER WATER USE

EB:O&M
2–4 points
This credit applies to

- Existing Buildings: Operations & Maintenance (2–3 points)
- EB:O&M Schools (2–3 points)
- EB:O&M Retail (2–3 points)
- EB:O&M Data Centers (2–4 points)
- EB:O&M Hospitality (2–3 points)
- EB:O&M Warehouses & Distribution Centers (2–3 points)

Intent

To conserve water used for cooling tower makeup while controlling microbes, corrosion, and scale in the condenser water system.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
For cooling towers and evaporative condensers, conduct a potable water analysis within five years of submission for certification, measuring at least the five control parameters listed in Table 1.

Table 1. Maximum concentrations for parameters in condenser water

Parameter	*Maximum level*
Ca (as $CaCO_3$)	1,000 ppm
Total alkalinity	1,000 ppm
iO_2	100 ppm
Cl^-	250 ppm
Conductivity	2000 µS/cm

ppm = parts per million
µS/cm = micro siemens per centimeter

Calculate the number of cooling tower cycles by dividing the maximum allowed concentration level of each parameter by the actual concentration level of each parameter found in the potable makeup water. Limit cooling tower cycles to avoid exceeding maximum values for any of these parameters.

Table 2. Points for cooling tower cycles

Cooling tower cycles	*Points (except Data Centers)*	*Points (Data Centers)*
Maximum number of cycles achieved without exceeding any filtration levels or affecting operation of condenser water system (up to maximum of 10 cycles)	2	2

Achieve a minimum 10 cycles by increasing the level of treatment in condenser or make-up water OR Meet the minimum number of cycles to earn 1 point and use a minimum 20% recycled nonpotable water	3	4

PERFORMANCE

None.

WE CREDIT: WATER METERING

EB:O&M
2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (2 points)
- EB:O&M Schools (2 points)
- EB:O&M Retail (2 points)
- EB:O&M Data Centers (2 points)
- EB:O&M Hospitality (2 points)
- EB:O&M Warehouses & Distribution Centers (2 points)

Intent

To support water management and identify opportunities for additional water savings by tracking water consumption.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS
ESTABLISHMENT
Establish permanently installed meters; 1 point for two water subsystems, 2 points for four or more water subsystems:

- *Irrigation.* Meter water systems serving at least 80% of the irrigated landscaped area. Calculate the percentage of irrigated landscape area as the total metered irrigated landscape area divided by the total irrigated landscape area. Landscape areas fully covered with xeriscaping or native vegetation that requires no routine irrigation may be excluded from the calculation.

- *Indoor plumbing fixtures and fittings.* Meter water systems serving at least 80% of the indoor plumbing fixtures and fittings listed in WE Prerequisite Indoor Water-Use Reduction, either directly or by deducting all other measured water use from the measured total water consumption of the building and grounds,

- *Cooling towers.* Meter replacement water use of all cooling towers serving the facility.

- *Domestic hot water.* Meter water use of at least 80% of the installed domestic hot water heating capacity (including both tanks and on-demand heaters).

- *Reclaimed water.* Meter reclaimed water, regardless of rate. A reclaimed water system with a makeup water connection must also be metered so that the true reclaimed water component can be determined.

- *Other process water.* Meter at least 80% of expected daily water consumption for process end uses, such as humidifiers, dishwashers, clothes washers, and pools.

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PERFORMANCE

All meters, including whole-building meters, must be recorded at least weekly and used in a regular analysis of time trends.

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

Commit to sharing with USGBC the resulting water usage data for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first.

ENERGY AND ATMOSPHERE

EA PREREQUISITE: ENERGY EFFICIENCY BEST MANAGEMENT PRACTICES Required

EB:O&M
This prerequisite applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

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

EBOM, SCHOOLS, RETAIL, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
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.

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

- a current sequence of operations for the building
- the building occupancy schedule;
- equipment run-time schedules;
- setpoints for all HVAC equipment;
- setpoints for lighting levels throughout the building;
- 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 building; and
- a preventive maintenance plan for building 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.

PERFORMANCE
None.

EA PREREQUISITE: MINIMUM ENERGY PERFORMANCE
Required

EB:O&M
This prerequisite applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

Intent

To reduce the environmental and economic harms associated with excessive energy use by establishing a minimum level of operating energy performance.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

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

PERFORMANCE
Meter the building's energy use for a full 12 months of continuous operation and achieve the levels of efficiency set forth in the options below. Each building's energy performance must be based on actual metered energy consumption for both the LEED project building(s) and all comparable buildings used for the benchmark.

Case 1. ENERGY STAR Rating
For buildings eligible to receive an energy performance rating using the Environmental Protection Agency (EPA) ENERGY STAR® Portfolio Manager tool, achieve an energy performance rating of at least 75. For projects outside the U.S., consult ASHRAE/ASHRAE/IESNA Standard 90.1–2010, Appendixes B and D, to determine the appropriate climate zone.

Case 2. Projects Not Eligible for ENERGY STAR Rating
Projects not eligible to use EPA's rating system may compare their buildings' energy performance with that of comparable buildings, using national averages or actual buildings, or with the previous performance of the project building.

Option 1. Benchmark against Typical Buildings

Path 1. National Average Data Available
Demonstrate energy efficiency performance that is 25% better than the median energy performance of similar buildings by benchmarking against the national source energy data provided in the Portfolio Manager tool.

Path 2. National Average Data Not Available
If national average source energy data are unavailable for buildings of similar type, benchmark against the building site energy data of at least three similar buildings, normalized for climate, building use, and occupancy. Demonstrate a 25% improvement.

OR

Option 2. Benchmark against Historical Data
If national average source energy data are unavailable, compare the building's site energy data for the previous 12 months with the data from three contiguous years of the previous five, normalized for climate, building use, and occupancy. Demonstrate a 25% improvement.

EA PREREQUISITE: BUILDING-LEVEL ENERGY METERING
Required

EB:O&M
This prerequisite applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

Intent

To support energy management and identify opportunities for additional energy savings by tracking building-level energy use.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Install new or use existing building-level energy meters or submeters that can be aggregated to provide building-level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, etc). Utility-owned meters capable of aggregating building-level resource use are acceptable.

PERFORMANCE
Compile meter data into monthly and annual summaries; meter readings can be manual or automated.

Commit to sharing with USGBC the resulting energy consumption data and electrical demand data (if metered) for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first. At a minimum, energy consumption must be tracked at one-month intervals.

This commitment must carry forward for five years or until the building changes ownership or lessee.

EA PREREQUISITE: FUNDAMENTAL REFRIGERANT MANAGEMENT Required

EB:O&M
This prerequisite applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

Intent
To reduce stratospheric ozone depletion.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
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 building, 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.

PERFORMANCE
None.

EA CREDIT: EXISTING BUILDING COMMISSIONING—ANALYSIS

EB:O&M
2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (2 point)
- EB:O&M Schools (2 point)
- EB:O&M Retail (2 point)
- EB:O&M Data Centers (2 point)
- EB:O&M Hospitality (2 point)
- EB:O&M Warehouses & Distribution Centers (2 point)

Intent

To use the existing building commissioning process to improve building operations, energy, and resource efficiency.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Evaluate the current performance of the project building against the performance specifications in the current facilities requirements and the operations and maintenance plan.

Identify the systems and components in the facility to be investigated and analyzed as part of the existing building commissioning or energy auditing process. Provide a breakdown of estimated resource use for each of these systems.

Option 1. Existing Building Commissioning
Develop an existing building commissioning plan to effectively inventory and evaluate specific opportunities within the systems being analyzed. The commissioning plan must include the following:

- updated current facilities requirements;
- the commissioning team members and their roles and responsibilities during the commissioning process;
- a description of the approach for identifying and analyzing facility improvement opportunities;
- the process for reviewing and prioritizing identified opportunities with the owner and developing an implementation plan;
- the format and content of the eventual deliverables from the commissioning process; and
- the proposed schedule.

Option 2. Energy Audit
Develop an energy audit plan following the requirements of ASHRAE Level 2, Energy Survey and Analysis, to evaluate efficiency opportunities. The audit plan must include the following:

- the audit team members and their roles and responsibilities during the audit process;
- a description of the approach for identifying and analyzing facility improvement opportunities;
- the process for reviewing and prioritizing identified opportunities with the owner and developing an implementation plan;
- the format and content of the eventual deliverables from the audit process; and
- the proposed schedule.

PERFORMANCE

Apply the requirements below to all direct energy-consuming or energy-producing systems, including lighting, process loads, HVAC&R, domestic water heating, and renewable energy.

Update the systems and components to be addressed as part of the existing building commissioning or energy auditing process. Provide a breakdown of estimated resource use for each of these systems.

Option 1. Existing Building Commissioning
Update and execute the existing building commissioning plan.

Option 2. Energy Audit
Update and execute the energy audit plan following the requirements of ASHRAE Level 2, Energy Survey and Analysis.

For each opportunity, describe the potential improvement, estimated implementation costs, and anticipated savings.

Data Centers only
In addition to the requirements above, data centers must use the Department of Energy's Save Energy Now Program's on-line DC Pro Energy Assessment Tools for data center critical systems.

EA CREDIT: EXISTING BUILDING COMMISSIONING—IMPLEMENTATION

EB:O&M
2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (2 points)
- EB:O&M Schools (2 points)
- EB:O&M Retail (2 points)
- EB:O&M Data Centers (2 points)
- EB:O&M Hospitality (2 points)
- EB:O&M Warehouses & Distribution Centers (2 points)

Intent

To use the existing building commissioning process to improve building operations, energy and resource efficiency.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Meet the requirements of EA Credit Existing Building Commissioning—Analysis.
PERFORMANCE

Apply the requirements below to all direct energy-consuming or energy-producing systems, including lighting, process loads, HVAC&R, domestic water heating, and renewable energy.

Implement no- or low-cost operational improvements and develop a five-year plan for equipment replacement and major modifications or upgrades based on the analysis phase.

Confirm training of building operations staff so that they can efficiently operate all new or substantially altered building equipment or systems.

Develop a tracking and verification program for all projects implemented as part of the existing building commissioning process. Note factors such as effectiveness, financial costs and benefits, and observed or estimated environmental and human health and comfort benefits.

Update the operations and maintenance plan and the current facilities requirements to incorporate the newly implemented improvements.

EA CREDIT: ONGOING COMMISSIONING

EB:O&M
3 points
This credit applies to

- Existing Buildings: Operations & Maintenance (3 points)
- EB:O&M Schools (3 points)
- EB:O&M Retail (3 points)
- EB:O&M Data Centers (3 points)
- EB:O&M Hospitality (3 points)
- EB:O&M Warehouses & Distribution Centers (3 points)

Intent

To use the existing building commissioning process to improve building operations, energy, and resource efficiency.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Meet the requirements of EA Credit Existing Building Commissioning–Analysis and EA Credit Existing Building Commissioning–Implementation.

Establish an ongoing commissioning process that includes planning, point monitoring, system testing, performance verification, corrective action response, ongoing measurement, and documentation to proactively address operating problems in the systems being commissioned.

Develop an on-going commissioning plan that defines the following:

- roles and responsibilities;
- measurement requirements (meters, points, metering systems, data access);
- the points to be tracked, with frequency and duration for trend monitoring;
- the limits of acceptable values for tracked points and metered values;
- the review process that will be used to evaluate performance;
- an action plan for identifying and correcting operational errors and deficiencies
- planning for repairs needed to maintain performance;
- the frequency of analyses in the first year (at least quarterly); and
- the subsequent analysis cycle (at least every 24 months).

PERFORMANCE

Apply the requirements below to all direct energy-consuming or energy-producing systems, including lighting, process loads, HVAC&R, domestic water heating, and renewable energy.

- Update the systems manual with any modifications or new settings, and give the reason for any modifications from the original design. Define methods for improving operations and maintenance.
- Include quarterly reports during the first year of implementation and annual reports on the performance of building systems.

Continue to update the facility's operating and maintenance plan and current facilities requirements to reflect actual conditions and issue annual revisions of these documents.

Only activities associated with ongoing commissioning completed within two years of the LEED application may be included to show progress.

EA CREDIT: OPTIMIZE ENERGY PERFORMANCE

EB:O&M
1–20 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–20 points)
- EB:O&M Schools (1–20 points)
- EB:O&M Retail (1–20 points)
- EB:O&M Data Centers (1–20 points)
- EB:O&M Hospitality (1–20 points)
- EB:O&M Warehouses & Distribution Centers (1–20 points)

Intent

To reduce environmental and economic harms associated with excessive energy use by achieving higher levels of operating energy performance

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
None.

PERFORMANCE
Demonstrate increased energy efficiency or efficiency improvement beyond EA Prerequisite Minimum Energy Performance as described below. Each building must provide actual metered energy data. A full 12 months of continuous energy data is required.
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Case 1. ENERGY STAR Rating (1–20 points)

For buildings eligible to receive an energy performance rating using the EPA ENERGY STAR's Portfolio Manager tool, points are awarded for ENERGY STAR scores above 75, according to Table 1. For projects outside the U.S., consult ASHRAE/ASHRAE/IESNA Standard 90.1–2010, Appendixes B and D, to determine the appropriate climate zone.

Table 1. Points for ENERGY STAR performance ratings

ENERGY STAR rating	Points
76	3
77	4
78	5
79	6
80	7
81	8
82	9
83	10

84	11
85	12
86	13
87	14
88	15
89	16
90	17
91	18
93	19
95	20

Case 2. Projects Not Eligible for ENERGY STAR Rating

Projects not eligible to use EPA's rating system may compare their buildings' energy performance with that of comparable buildings, using national averages or actual buildings, or with the previous performance of the project building.

Option 1. Benchmark against Typical Buildings (1–20 points)

Path 1. National Average Data Available (1–20 points)

Demonstrate energy efficiency performance that is at least 26% better than the median energy performance for typical buildings of similar type by benchmarking against national average source energy data provided in the Portfolio Manager tool. Points are awarded according to Table 2.

Table 2. Points for percentage improvement over national average (Option 1, Path 1) or comparable buildings and historical data (Option 3)

Percentage improvement	Points
26	**1**
27	2
28	3
29	4
30	5
31	6
32	7
33	8
34	9

35	10
36	11
37	12
38	13
39	14
40	15
41	16
42	17
43	18
44	19
45	20

Path 2. National Average Data Not Available (2–14 points)
If national average source energy data are unavailable for buildings of similar type, benchmark against the building site energy data of at least three similar buildings, normalized for climate, building use, and occupancy. Points are awarded according to Table 3.

OR

Option 2. Benchmark against Historical Data
If national average source energy data are unavailable, compare the building's site energy data for the previous 12 months with the data from three contiguous years of the previous five, normalized for climate, building use, and occupancy. Use Table 3 to determine points.

Table 3. Points for percentage improvement over comparable buildings (Option 1, Path 2) or historical data (Option 2)

Percentage improvement	Points
27	2
30	4
33	6
36	8
39	10
42	12
45	14

OR

Option 3. Benchmark against Both Similar Buildings and Historical Data
Follow the requirements of both Option 1, Path 2, and Option 2 to benchmark against the site energy data for the three similar buildings and the building's historic data. Use Table 2 to determine points.

EA CREDIT: ADVANCED ENERGY METERING

EB:O&M
2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (2 points)
- EB:O&M Schools (2 points)
- EB:O&M Retail (2 points)
- EB:O&M Data Centers (2 points)
- EB:O&M Hospitality (2 points)
- EB:O&M Warehouses & Distribution Centers (2 points)

Intent

To support energy management and identify opportunities for additional energy savings by tracking building-level and system-level energy use.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Install *advanced energy metering* for the following:

- all whole-building energy sources used by the building; and
- major end uses that represent 20% or more of the total annual consumption of the building minus plug load use.

The advanced energy metering must have the following characteristics.

- Meters must be permanently installed, record at intervals of one hour or less, and transmit data to a remote location.
- Electricity meters must record both consumption and demand. Whole-building electricity meters should record the power factor, if appropriate.
- The data collection system must use a local area network, building automation system, wireless network, or comparable communication infrastructure.
- The system must be capable of storing all meter data for at least 36 months.
- The data must be remotely accessible.
- All meters in the system must be capable of reporting hourly, daily, monthly, and annual energy use.

PERFORMANCE
Program the facility's energy management system to set an alarm whenever the energy consumption and peak demand rise above the anticipated amount by more than 5%. The anticipated consumption and peak should be determined by analyzing historical facility performance and weather and operating conditions and should be set on at least monthly, preferably daily.

Demand measurements must be taken in time increments no longer than the increments used for utility billing or in one-hour increments, whichever is less time.

On at least a monthly basis, report the facility's utility peak demand and total consumption and compare it with the data for the previous month and the same month from the previous year.

EA CREDIT: DEMAND RESPONSE

EB:O&M
1–3 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–3 points)
- EB:O&M Schools (1–3 points)
- EB:O&M Retail (1–3 points)
- EB:O&M Data Centers (1–3 points)
- EB:O&M Hospitality (1–3 points)
- EB:O&M Warehouses & Distribution Centers (1–3 points)

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

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
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 (3 points)

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 peak electricity demand. Peak demand is based on electric utility bills.
- 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.

Case 2. Demand Response Program Not Available (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 shed at least 10% of the annual 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.
- Contact local utility representatives to discuss participation in future DR programs.

Case 3: Permanent Load Shifting (2 points)

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 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.

PERFORMANCE

None.

EA CREDIT: RENEWABLE ENERGY AND CARBON OFFSETS

EB:O&M
1–5 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–5 points)
- EB:O&M Schools (1–5 points)
- EB:O&M Retail (1–5 points)
- EB:O&M Data Centers (1–5 points)
- EB:O&M Hospitality (1–5 points)
- EB:O&M Warehouses & Distribution Centers (1–5 points)

Intent

To encourage the reduction of greenhouse gas emissions through the use of local and grid-source renewable energy technologies and carbon mitigation projects..

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Demonstrate one or both of the following for at least a portion of the building's total energy use.

- Total energy use is met directly with renewable energy systems.
- A minimum two-year contract is in place, with the commitment to renew on an ongoing basis, to purchase qualified resources that will be delivered at least annually. Resources must have come online after January 1, 2005.

PERFORMANCE
Meet at least some of the building's total energy use directly with renewable energy systems, or engage in a contract to purchase green power, carbon offsets, or Renewable Energy Certificates (RECs).

Green power and RECs must be Green-e Energy Certified or the equivalent. RECs can be used only to mitigate the effects of Scope 2, electricity use.

Carbon offsets may be used to mitigate Scope 1 or Scope 2 emissions on a metric ton of carbon dioxide–equivalent basis and must be Green-e Climate certified, or the equivalent.

For U.S. projects, the offsets must come from greenhouse gas emissions reduction projects within the U.S.
Use the following equation to calculate credit, up to the 5-point limit:

$$\text{Points} = \frac{\text{Renewable energy generated \%}}{1.5\%} + \frac{\text{Energy purchased/offset \% (Not to exceed 100\%)}}{25\%}$$

EA CREDIT: ENHANCED REFRIGERANT MANAGEMENT

EB:O&M
1 point
This credit applies to

- Existing Buildings: Operations & Maintenance (1 point)
- EB:O&M Schools (1 point)
- EB:O&M Retail (1 point)
- EB:O&M Data Centers (1 point)
- EB:O&M Hospitality (1 point)
- EB:O&M Warehouses & Distribution Centers (1 point)

Intent

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

Requirements

EBOM, SCHOOLS, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT

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**
$\frac{LCGWP}{1} + \frac{LCODP}{1} \times \frac{10}{5} \leq 100$	$\frac{LCGWP}{1} + \frac{LCODP}{1} \times \frac{10}{5} \leq 13$
Calculation definitions for LCGWP + LCODP x $10^5 \leq 100$ (IP units)	**Calculation definitions for LCGWP + LCODP x $10^5 \leq 13$ (SI units)**
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 CO_2/Ton-Year)	LCGWP: Lifecycle Direct Global Warming Potential (kg CO_2/kW-year)

GWPr: Global Warming Potential of Refrigerant (0 to 12,000 lb CO_2/lbr)	GWPr: Global Warming Potential of Refrigerant (0 to 12,000 kg CO_2/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**
$\frac{\sum (LCGWP + LCODP \times 10^5) \times Qunit}{Qtotal} \leq 100$	$\frac{\sum (LCGWP + LCODP \times 10^5) \times Qunit}{Qtotal} \leq 13$

Calculation definitions for $[\sum (LCGWP + LCODP \times 10^5) \times Qunit] / Qtotal \leq 100$ (IP units)	**Calculation definitions for $[\sum (LCGWP + LCODP \times 10^5) \times Qunit] / Qtotal \leq 13$ (SI units)**
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 EBOM

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.

PERFORMANCE
None.

MATERIALS AND RESOURCES (MR)

MR PREREQUISITE: ONGOING PURCHASING AND WASTE POLICY Required

EB:O&M
This prerequisite applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

Intent

To reduce the environmental harm from materials purchased, used, and disposed of in the operations within buildings.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT

Environmentally Preferable Purchasing

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

- Ongoing Purchases
    - The five most purchased product categories based on total annual purchases.
    - Paper, toner cartridges, binders, batteries, and desk accessories.
    - Lamps (indoor and outdoor, hard-wired and portable fixtures)
    - Food (required for EBOM Schools and Hospitality only)
- Durable Goods Purchases
    - Office equipment, appliances, and audiovisual equipment
    - Electric powered equipment

The policy should address the criteria in the following credits:

- Materials and Resources Credit: Purchasing—Ongoing
- Materials and Resources Credit: Purchasing—Lamps

The policy must cover at least those product purchases within the building and site management's control.
Solid Waste Management

Establish storage locations for recyclable materials, including mixed paper, corrugated cardboard, glass, plastics, and metals. Establish safe storage areas for batteries and mercury-containing lamps.

Have in place an environmentally preferable solid waste management policy that addresses reuse, recycling, or composting of products purchased during regular operations of the building. Include at a minimum:

- Ongoing waste
  - The five most purchased product categories based on total annual purchases.
  - Food (required for EBOM Schools and Hospitality only)
- Durable goods waste
  - Office equipment, appliances, and audiovisual equipment
  - Electric powered equipment
- Hazardous waste
  - Safe disposal of batteries and lamps (indoor and outdoor, hard-wired and portable fixtures)

The policy must cover at least those product purchases within the building and site management's control.

EBOM RETAIL

In addition to the requirements above, retail projects should promote environmentally responsible sourcing of retail merchandise through one of the four following options.

Option 1. Supply Chain Survey
Establish a supply chain survey.
The survey should collect information from each supplier regarding the following:

- social equity practices;
- energy and carbon reduction measures;
- material selection practices for products, packaging, and distribution;
- waste reduction and waste management measures; and
- human health protection measures.

OR

Option 2. Supply Chain Education Program for Retail Employees and/or Retail Tenant Representatives
Establish a program to inform employees and tenants engaged in merchandise purchasing, packaging, and distribution about environmentally preferable supply chain strategies.
Include the following in the education program:

- environmental best practices for supply chain decisions;
- resources for additional information; and
- internal contacts for more information.

OR

Option 3. Supply Chain Environmental Criteria List
Establish criteria for retail products encouraging an environmentally preferable supply chain strategy addressing the following areas:

- purchasing;
- materials handling and packaging;
- inventory;
- materials recovery during manufacturing;
- waste disposal; and
- product *take-back*.

OR

Option 4. Sustainable Purchasing Education for Customers

Install an educational program display for customers displaying environmental initiatives that the store has implemented. The educational display should incorporate information that includes the supply chain environmental criteria listed in Option 3.

PERFORMANCE

Maintain a high-performing solid waste management program by conducting a waste stream audit of ongoing consumables at least once every five years or by diverting 75% of ongoing waste and achieving Materials and Resources Credit Solid Waste Management—Ongoing.

MR PREREQUISITE: FACILITY MAINTENANCE AND RENOVATION POLICY Required

EB:O&M
This prerequisite applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

Intent

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

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT

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

The policy should address the criteria in the following credits:

- MR Credit: Purchasing—Facility Maintenance and Renovation

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.

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.

PERFORMANCE
None.

MR CREDIT: PURCHASING—ONGOING

EB:O&M
1–2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–2 points)
- EB:O&M Schools (1–2 points)
- EB:O&M Retail (1–2 points)
- EB:O&M Data Centers (1–2 points)
- EB:O&M Hospitality (1–2 points
- EB:O&M Warehouses & Distribution Centers (1–2 points)

Intent

To reduce environmental harm from materials used in the operations and maintenance of buildings.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, EBOM HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
None.

PERFORMANCE

Ongoing Consumables
Purchase at least 60%, by cost, of total ongoing consumables that meet at least one of the following criteria. Include the product categories identified in the Materials and Resources prerequisite: Ongoing Purchasing and Waste Policy. Lamps are excluded from the calculation. Each purchase can receive credit for each criterion met.

- *Postconsumer recycled content.* 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.

- *Sustainable agriculture.* Food and beverages 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 of food and beverages.* The food or beverage must contain raw materials harvested and produced within 100 miles (160 kilometers) of the site.

- *Bio-based materials.* 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.

Electric-Powered Equipment
Purchase at least 40%, by cost, electric-powered equipment that meets at least one of the following criteria. Include product categories specified in Materials and Resources prerequisite: Ongoing Purchasing and Waste Policy. 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.

<u>EBOM Schools and EBOM Hospitality only</u>

Purchase at least 25%, 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.

MR CREDIT: PURCHASING—LAMPS

EB:O&M
1 point
This credit applies to

- Existing Buildings: Operations & Maintenance (1 points)
- EB:O&M Schools (1 points)
- EB:O&M Retail (1 points)
- EB:O&M Data Centers (1 points)
- EB:O&M Hospitality (1 points)
- EB:O&M Warehouses & Distribution Centers (1 points)

Intent

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

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
None.

PERFORMANCE

Implement the lighting purchasing plan that specifies an overall building average of 70 picograms of mercury per lumen-hour or less for all mercury-containing lamps purchased for the building and associated grounds within the project boundary. Include lamps for both indoor and outdoor fixtures, as well as both hard-wired and portable fixtures. Lamps containing no mercury may be counted only if their energy efficiency at least equals that of their mercury-containing counterparts.

MR CREDIT: PURCHASING—FACILITY MAINTENANCE AND RENOVATION

EB:O&M
1–2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–2 points)
- EB:O&M Schools (1–2 points)
- EB:O&M Retail (1–2 points)
- EB:O&M Data Centers (1–2 points)
- EB:O&M Hospitality (1–2 points)
- EB:O&M Warehouses & Distribution Centers (1–2 points)

Intent

To reduce the environmental harm from materials used in building renovations.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
None.

PERFORMANCE

Option 1. Products and Materials (1 point)

Purchase at least 50%, by cost, of the total maintenance and renovation materials that meet at least one of the following criteria. Include products specified in Materials and Resources prerequisite: Facility Maintenance and Renovation Policy. There is no minimum scope of renovation or new construction work required for eligibility of this credit. Each purchase can receive credit for each criterion met.

- *Recycled content.* Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content.

- *Wood products.* Wood products must be certified by the Forest Stewardship Council or USGBC-approved equivalent.

- *Bio-based materials.* 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.

- *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. Products valued at 50% of their cost.

- *GreenScreen v1.2 Benchmark***.** Products that have fully inventoried chemical ingredients to 100 ppm that have no Benchmark 1 hazards.
    - If any ingredients are assessed with the GreenScreen List Translator, value these products at 100% of cost.
    - If all ingredients are have undergone a full GreenScreen Assessment, value these products at 150% of cost.

- *Cradle to Cradle Certified***.** End use products are certified Cradle to Cradle. Products will be valued as follows:
    - Cradle to Cradle v2 Gold: 100% of cost
    - Cradle to Cradle v2 Platinum: 150% of cost
    - Cradle to Cradle v3 Silver: 100% of cost
    - Cradle to Cradle v3 Gold or Platinum: 150% of cost

- *International Alternative Compliance Path – REACH Optimization*. End use products and materials that do not contain substances that meet REACH criteria for substances of very high concern. If the product contains no ingredients listed on the REACH Authorization or Candidate list, value at 100% of cost.

- *Product Manufacturer Supply Chain Optimization*. Use building products that:
    - 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

- *Low emissions of volatile organic compounds.* The following products must either be inherently nonemitting or be tested and determined compliant in accordance with California Department of Public Health Standard Method V1.1–2010, using the applicable exposure scenario. The default scenario is the private office scenario; classroom furniture may use the school classroom scenario. Both first-party and third-party statements of product compliance must follow the guidelines in CDPH SM V1.1–2010, 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. Projects outside the United States may use (1) the CDPH standard method or (2) the German AgBB Testing and Evaluation Scheme (2010). Test products either with (1) ISO 16000-3: 2010, ISO 16000-6: 2011, ISO 16000-9: 2006, ISO 16000-11:2006, or (2) the DIBt testing method (2010). U.S. projects must follow the CDPH standard method.
    - thermal and acoustic insulation
    - flooring materials and finishes
    - ceiling materials and finishes
    - wall materials and finishes

    - *VOC content requirements for wet-applied products.* In addition to meeting the general requirements for VOC emissions (above), on-site wet-applied products must not contain excessive levels of VOCs, for the health of the installers and other tradesworkers who are exposed to these products. To demonstrate compliance, a product or layer 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.
- For projects outside North America, all paints, coatings, adhesives, and sealants wet-applied on site must either meet the technical requirements of the above regulations, or comply with applicable national VOC control regulations, such as the European Decopaint Directive (2004/42/EC), the Canadian VOC Concentration Limits for Architectural Coatings, or the Hong Kong Air Pollution Control (VOC) Regulation.
- 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.

- *Low emissions of formaldehyde.* 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.

- *USGBC approved program.* Other USGBC approved programs meeting leadership extraction criteria.

For credit achievement calculation, products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site are valued at 200% of their base contributing cost.

AND/OR

Option 2. Furniture (1 point)

Purchase at least 75%, by cost, of total furniture and furnishings that meet one or more of the following criteria. Each purchase can receive credit for each criterion met.

- *Recycled content.* Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on cost.

- *Wood products.* Wood products must be certified by the Forest Stewardship Council or USGBC-approved equivalent.

- *Bio-based materials.* 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.

- *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. Products valued at 50% of their cost.

- *GreenScreen v1.2 Benchmark***.** Products that have fully inventoried chemical ingredients to 100 ppm that have no Benchmark 1 hazards.
    - If any ingredients are assessed with the GreenScreen List Translator, value these products at 100% of cost.
    - If all ingredients are have undergone a full GreenScreen Assessment, value these products at 150% of cost.

- *Cradle to Cradle Certified***.** End use products are certified Cradle to Cradle. Products will be valued as follows:
    - Cradle to Cradle v2 Gold: 100% of cost
    - Cradle to Cradle v2 Platinum: 150% of cost
    - Cradle to Cradle v3 Silver: 100% of cost
    - Cradle to Cradle v3 Gold or Platinum: 150% of cost

- *International Alternative Compliance Path – REACH Optimization*. End use products and materials that do not contain substances that meet REACH criteria for substances of very high concern. If the product contains no ingredients listed on the REACH Authorization or Candidate list, value at 100% of cost.

- *Product Manufacturer Supply Chain Optimization*. Use building products that:
    - 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

- *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, Sections 7.6.1 (valued at 50% cost) or 7.6.2 (valued at 100% cost), using either the concentration modeling approach or the emissions factor approach. For classroom furniture, use the standard school classroom model in CDPH Standard Method v1.1. 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.

- *USGBC approved program.* Other USGBC approved programs meeting leadership extraction criteria that.

For credit achievement calculation, products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site are valued at 200% of their base contributing cost.

OR

Option 3. No Alterations or Furniture Purchasing (1 point)

Make no alterations to the project space and do not purchase any furniture.

MR CREDIT: SOLID WASTE MANAGEMENT—ONGOING

EB:O&M
2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (2 points)
- EB:O&M Schools (2 points)
- EB:O&M Retail (2 points)
- EB:O&M Data Centers (2 points)
- EB:O&M Hospitality (2 points)
- EB:O&M Warehouses & Distribution Centers (2 points)

Intent

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

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
None.

PERFORMANCE
Maintain a waste reduction and recycling program that reuses, recycles, or composts the following:

- at least 50% of the ongoing waste as specified in Materials and Resources Prerequisite: Ongoing Purchasing and Waste Policy (by weight or volume); and
- at least 75% of the durable goods waste as specified in Materials and Resources Prerequisite: Ongoing Purchasing and Waste Policy (by weight, volume or replacement value).

In addition, safely dispose of the following:

- all discarded batteries; and
- all mercury-containing lamps.

Schools EBOM only

K–12 schools may exclude food waste from the final performance calculations of the total building waste stream by meeting both of the following requirements.

- Provide documentation that food waste composting services are not available in the region or are not economically feasible, based on the school or district's operational budget for solid waste management.
- During the performance period, implement an awareness program that encourages occupants to reduce food waste. Compliant programs should include at least two of the following:
    a. signage in food service and cafeteria areas;
    b. food service employee training on reducing waste in food preparation and selecting menu options to reduce the potential for food waste; and
    c. extracurricular activities or student organizations that promote awareness of the environmental benefits associated with composting food waste.

MR CREDIT: SOLID WASTE MANAGEMENT—FACILITY MAINTENANCE AND RENOVATION

EB:O&M
2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (2 points)
- EB:O&M Schools (2 points)
- EB:O&M Retail (2 points)
- EB:O&M Data Centers (2 points)
- EB:O&M Hospitality (2 points)
- EB:O&M Warehouses & Distribution Centers (2 points)

Intent

To divert construction, renovation, and demolition debris from disposal in landfills and incinerators and recover and recycle reusable materials.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
None.

PERFORMANCE
Divert at least 70% of the waste (by weight or volume) generated by facility maintenance and renovation activities from disposal in landfills and incinerators. Include base building elements as specified in the Materials and Resources prerequisite: Facility Maintenance and Renovation Policy.

Exclude furniture and furnishings that pose human health concerns (e.g., mold) as well as components not considered base building elements; mechanical, electrical, and plumbing components; and specialty items, such as elevators.

INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ PREREQUISITE: MINIMUM INDOOR AIR QUALITY PERFORMANCE Required

EB: O&M
This prerequisite applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

Intent

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

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT

Each air-handling unit in the building must comply with either Case 1 or Case 2. If some air-handling units can provide the outdoor airflow required by Case 1 and others cannot, those that can must do so.

Mechanically Ventilated Spaces
For mechanically ventilated spaces (and for mixed-mode systems when the mechanical ventilation is activated), chose one of the following:

Case 1. Systems Able to Meet Required Outdoor Airflow Rates

Option 1. ASHRAE Standard 62.1-2010
Modify or maintain each outdoor air intake, supply air fan, and ventilation distribution system to meet the outdoor air intake flow rates, using the ASHRAE ventilation rate procedure or a local equivalent, whichever is more stringent and meet the minimum requirements of ASHRAE Standard 62.1–2010, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata), or a local equivalent, whichever is more stringent.

Option 2. CEN Standards EN 15251–2007 and EN 13779–2007
Projects outside the U.S. may instead meet the minimum outdoor air requirements of Annex B of Comité Européen de Normalisation (CEN) Standard EN 15251–2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics; and meet the requirements of CEN Standard EN 13779–2007, Ventilation for nonresidential buildings, Performance requirements for ventilation and room conditioning systems, excluding Section 7.3, Thermal environment; 7.6, Acoustic environment; A.16; and A.17.

Case 2. Systems Unable to Meet Required Outdoor Airflow Rates
If meeting the outdoor airflow rates in Case 1 is not feasible because of the physical constraints of the existing ventilation system, complete an engineering assessment of the system's maximum outdoor air

delivery rate. Supply the maximum possible to reach the minimum setpoint in Case 1 and not less than 10 cubic feet per minute (5 liters per second) of outdoor air per person.

Naturally Ventilated Spaces
For naturally ventilated spaces (and for mixed-mode systems when the mechanical ventilation is inactivated), determine the minimum outdoor air opening and space configuration requirements using the natural ventilation procedure from ASHRAE Standard 62.1–2010 or a local equivalent, whichever is more stringent. Confirm that natural ventilation is an effective strategy for the project by following the flow diagram in the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual AM10, March 2005, Natural Ventilation in Nondomestic Buildings, Figure 2.8 and meet the requirements of ASHRAE Standard 62.1–2010, Section 4, or a local equivalent, whichever is more stringent.

All Spaces
The indoor air quality procedure defined in ASHRAE Standard 62.1–2010 may not be used to comply with this prerequisite.

PERFORMANCE
Show compliance through measurements taken at the system level within five years of the end of the performance period.

Implement and maintain an HVAC system maintenance program, based on ASHRAE 62.1–2010, Section 8, or a local equivalent, whichever is more stringent, to ensure the proper operations and maintenance of HVAC components as they relate to outdoor air introduction and exhaust.

EQ PREREQUISITE: ENVIRONMENTAL TOBACCO SMOKE CONTROL
Required

EB:O&M
This prerequisite applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

Intent

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

Requirements

EBOM, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
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.

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

Signage must be posted within 10 feet (3 meters) of all building entrances indicating the no-smoking policy.

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

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. The no-smoking policy also applies to spaces outside the property line used for business purposes.

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

Signage must be posted within 10 feet (3 meters) of all building entrances indicating the no-smoking policy.

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 for a future 30% improvement.

SCHOOLS

Prohibit smoking on site.

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

PERFORMANCE

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

None.

Residential only

Demonstrate on a regular basis (at least once every five years) 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).

Projects that do not meet the leakage requirement may demonstrate a 30% improvement over the most recent baseline. The current measurement establishes the new baseline.

EQ PREREQUISITE: GREEN CLEANING POLICY
Required

EB:O&M
This prerequisite applies to

- Existing Buildings: Operations & Maintenance
- EB:O&M Schools
- EB:O&M Retail
- EB:O&M Data Centers
- EB:O&M Hospitality
- EB:O&M Warehouses & Distribution Centers

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

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

Option 1. In-House Green Cleaning Policy

ESTABLISHMENT
Have in place a green cleaning policy for the building and site addressing the green cleaning credits, goals and strategies, and personnel listed below. At a minimum, the policy must cover green cleaning procedures, materials, and services that are within the building and site management's control, and include the organization responsible for cleaning the building and building site.

Address the requirements of the following credits:

- EQ Credit: Green Cleaning—Purchase of Cleaning Products and Materials
- EQ Credit: Green Cleaning—Cleaning Equipment

Goals and Strategies

- Establish standard operating procedures addressing how an effective cleaning and hard floor and carpet maintenance system will be consistently used, managed, and audited.
- Address protection of vulnerable building occupants during cleaning.
- Address selection and appropriate use of disinfectants and sanitizers.
- Develop guidelines addressing the safe handling and storage of cleaning chemicals used in the building, including a plan for managing hazardous spills and mishandling incidents.
- Develop goals and strategies for reducing the toxicity of the chemicals used for laundry, ware washing, and other cleaning activities.
- Develop goals and strategies for promoting the conservation of energy, water, and chemicals used for cleaning.
- Develop strategies for promoting and improving hand hygiene.

Personnel

- Develop requirements for maintenance personnel. Specifically address 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.
- Determine the timing and frequency of training for maintenance personnel in the hazards of use, disposal, and recycling of cleaning chemicals, dispensing equipment, and packaging.

PERFORMANCE
Implement a high-performance cleaning program based on the above policy and track performance goals associated with this policy.

Option 2. Certified Cleaning Service

ESTABLISHMENT
None.

PERFORMANCE
Clean the building with a cleaning service provider, either in-house custodial staff or a contracted service contractor, certified 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.

Confirm that the building was audited by the third party within 12 months of the end of the performance period.

In addition, the cleaning contractor must develop goals and strategies for promoting the conservation of energy, water, and chemicals used for cleaning the building.

EQ CREDIT: INDOOR AIR QUALITY MANAGEMENT PROGRAM

EB:O&M
2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (2 points)
- EB:O&M Schools (2 points)
- EB:O&M Retail (2 points)
- EB:O&M Data Centers (2 points)
- EB:O&M Hospitality (2 points)
- EB:O&M Warehouses & Distribution Centers (2 points)

Intent

To maintain the well-being of occupants by preventing and correcting indoor air quality problems.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Develop and implement an indoor air quality (IAQ) management program based on the EPA Indoor Air Quality Building Education and Assessment Model (I-BEAM).Include the IAQ management program in the project's current facilities requirements and operations and maintenance Plan. .

PERFORMANCE
Conduct an I-BEAM audit on a regular basis (at least once every five years) and revise the IAQ management program as appropriate.

EQ CREDIT: ENHANCED INDOOR AIR QUALITY STRATEGIES

EB:O&M
1–2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–2 points)
- EB:O&M Schools (1–2 points)
- EB:O&M Retail (1–2 points)
- EB:O&M Data Centers (1–2 points)
- EB:O&M Hospitality (1–2 points)
- EB:O&M Warehouses & Distribution Centers (1–2 points)

Intent

To promote occupants' comfort, well-being, and productivity by improving indoor air quality.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

Option 1. Entryway Systems (1 point)

ESTABLISHMENT
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.

PERFORMANCE
Confirm that entryway systems have been maintained on a weekly basis.

Option 2. Additional Enhanced IAQ Strategies (1 point)

Comply with the requirements of at least one of the following.

Filtration for Mechanically Ventilated Spaces

ESTABLISHMENT
Each ventilation system that supplies outdoor air to occupied spaces must have particle filters or air cleaning devices. These filters or devices must meet one of the following filtration media requirements:

- minimum efficiency reporting value (MERV) of 13 or higher, in accordance with ASHRAE Standard 52.2–2007;
- Class F7 or higher as defined by CEN Standard EN 779–2002, Particulate Air Filters for General Ventilation, Determination of the Filtration Performance.

Establish a regular schedule for maintenance and replacement of filtration media according to the manufacturer's recommended interval.

Data Centers only
The above filtration media requirements are required only for ventilation systems serving regularly occupied spaces.

PERFORMANCE

Follow theschedule for maintenance and replacement of filtration media.

Carbon Dioxide Monitors

ESTABLISHMENT

Have in place CO_2 monitors in all densely occupied spaces. Rooms smaller than 150 square feet (14 square meters) are exempt. CO_2 monitors must be between 3 and 6 feet (900 and 1 800 millimeters) above the floor.

Configure the system to generate a visual alarm to the system operator if the differential CO_2 concentration in any zone rises more than 15% above that corresponding to the minimum outdoor air rate required in the ventilation section of EQ Prerequisite Minimum Indoor Air Quality Performance.

Test and calibrate CO_2 sensors to have an accuracy of no less than 75 parts per million or 5% of the reading, whichever is greater.

PERFORMANCE

Sensors must be tested and calibrated at least once every five years or per the manufacturer's recommendation, whichever is shorter.

Monitor CO_2 sensors with a system configured to trend CO_2 concentrations in intervals no greater than 30 minutes.

Outdoor Air Monitoring for Mechanically Ventilated Spaces

ESTABLISHMENT

For variable air volume systems, provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor air intake flow for at least 80% of the outdoor air flow. This device must measure the minimum outdoor air intake flow with an accuracy of +/–10% of the design minimum outdoor airflow rate required in the ventilation section of EQ Prerequisite Minimum Indoor Air Quality Performance. An alarm must indicate when the outdoor airflow value varies by 15% or more from the outdoor airflow setpoint.

For constant-volume systems, balance outdoor airflow to the design minimum outdoor airflow rate required in the ventilation section of EQ Prerequisite Minimum Indoor Air Quality Performance, or higher. Install a current transducer on the supply fan, an airflow switch, or similar monitoring device.

PERFORMANCE

Calibrate all measurement devices within the manufacturer's recommended interval.

Outdoor Air Monitoring for Naturally Ventilated Spaces

ESTABLISHMENT

Provide a direct exhaust airflow measurement device capable of measuring the exhaust airflow. This device must measure the exhaust airflow with an accuracy of +/–10% of the design minimum exhaust airflow rate. An alarm must indicate when airflow values vary by 15% or more from the exhaust airflow setpoint.

PERFORMANCE

Calibrate all measurement devices within the manufacturer's recommended interval.

Alarmed Openings for Naturally Ventilated Spaces

ESTABLISHMENT

Provide automatic indication devices on all openings intended to meet the minimum opening requirements. An alarm must indicate when any one of the openings is closed during occupied hours.

PERFORMANCE

None.

EQ CREDIT: THERMAL COMFORT

EB:O&M
1 point
This credit applies to

- Existing Buildings: Operations & Maintenance (1 point)
- EB:O&M Schools (1 point)
- EB:O&M Retail (1 point)
- EB:O&M Data Centers (1 point)
- EB:O&M Hospitality (1 point)
- EB:O&M Warehouses & Distribution Centers (1 point)

Intent

To promote occupants' productivity, comfort, and well-being by providing quality thermal comfort.

Requirements

Meet the requirements for both thermal comfort design and thermal comfort control.

Thermal Comfort Design

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Have in place a system for continuous tracking and optimization of systems that regulate indoor comfort and conditions (air temperature, radiant temperature, humidity, and air speed) in occupied spaces.

Option 1. ASHRAE 55–2010
Have a permanent monitoring system to ensure ongoing building performance to the desired comfort criteria, as specified by ASHRAE Standard 55–2010, Thermal Comfort Conditions for Human Occupancy, Section 5.2 or 5.3, with errata, or a local equivalent.

OR

Option 2. ISO and CEN Standards
Have a permanent monitoring system to ensure ongoing building performance of the desired comfort criteria, as specified by the applicable standard:

- ISO 7730:2005 Ergonomics of the Thermal Environment, analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria; and
- CEN Standard EN 15251:2007, Indoor Environmental Input Parameters for Design and Assessment of Energy Performance of Buildings, addressing indoor air quality, thermal environment, lighting, and acoustics, Section A2.

Data Centers only
Meet the above requirements for occupants in regularly occupied spaces.

Hospitality only
Guest rooms are assumed to provide adequate thermal comfort and are therefore not included in the credit calculations.

PERFORMANCE
The monitoring system must meet the following requirements.

- *Continuous monitoring.* Monitor at least air temperature and humidity in occupied spaces, at sampling intervals of 15 minutes or less.
- *Periodic testing.* Monitor air speed and radiant temperature in occupied spaces. Using handheld meters is permitted.
- *Alarms.* An alarm must indicate conditions that require system adjustment or repair.
- *Prompt repair.* Specify procedures for adjustments or repairs to be made in response to problems identified.
- *Calibration.* All monitoring devices must be calibrated within the manufacturer's recommended interval.

EQ CREDIT: INTERIOR LIGHTING

EB:O&M
1–2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–2 points)
- EB:O&M Schools (1–2 points)
- EB:O&M Retail (1–2 points)
- EB:O&M Data Centers (1–2 points)
- EB:O&M Hospitality (1–2 points)
- EB:O&M Warehouses & Distribution Centers (1–2 points)

Intent

To promote occupants' productivity, comfort, and well-being by providing high-quality lighting.

Requirements

EBOM, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT

Option 1. Lighting Control (1 point)
For at least 50% of individual occupant spaces, have in place individual lighting controls that enable occupants to adjust the lighting to suit their individual tasks and preferences, with at least three lighting levels or scenes (on, off, midlevel). Midlevel is 30% to 70% of the maximum illumination level (not including daylight contributions).

For all shared multi-occupant spaces, meet all of the following requirements.

- Have in place multizone control systems that enable occupants to adjust the lighting to meet group needs and preferences, with at least three lighting levels or scenes (on, off, midlevel).
- Lighting for any presentation or projection wall must be separately controlled.
- Switches or manual controls must be located in the same space as the controlled luminaires. A person operating the controls must have a direct line of sight to the controlled luminaires.

Hospitality only
Guest rooms are assumed to have adequate lighting controls and are therefore not included in the credit calculations.

AND/OR

Option 2. Lighting Quality (1 point)
Choose four of the following strategies.

A. For all regularly occupied spaces, have in place light fixtures with a luminance of less than 2,500cd/m^2 between 45 and 90 degrees from nadir.
   Exceptions include wallwash fixtures properly aimed at walls, as specified by manufacturer's data, indirect uplighting fixtures, provided there is no view down into these uplights from a regularly occupied space above, and any other specific applications (i.e. adjustable fixtures).
B. For the entire project, have in place light sources with a CRI of 80 or higher. Exceptions include lamps or fixtures specifically designed to provide colored lighting for effect, site lighting, or other special use.
C. For at least 75% of the total connected lighting load, have in place light sources that have a rated life (or L70 for LED sources) of at least 24,000 hours (at 3-hour per start, if applicable).

D. Have in place direct-only overhead lighting for 25% or less of the total connected lighting load for all regularly occupied spaces.
E. For at least 90% of the regularly occupied floor area, meet or exceed the following thresholds for area-weighted average surface reflectance: 85% for ceilings, 60% for walls, and 25% for floors.
F. Meet or exceed the following thresholds for area-weighted average surface reflectance: 45% for work surfaces and 50% for movable partitions.
G. For at least 75% of the regularly occupied floor area, meet an average ratio of wall surface illuminance (excluding fenestration) to average work surface illuminance that does not exceed 1:10. Must also meet strategy E, strategy F, or demonstrate area-weighted surface reflectance of at least 60% for walls.
H. For at least 75% of the regularly occupied floor area, meet an average ratio of ceiling illuminance (excluding fenestration) to work surface illuminance that does not exceed 1:10. Must also meet strategy E, strategy F, or demonstrate area-weighted surface reflectance of at least 85% for ceilings.

PERFORMANCE
None.

EQ CREDIT: DAYLIGHT AND QUALITY VIEWS

EB:O&M
2–4 points
This credit applies to

- Existing Buildings: Operations & Maintenance (2–4 points)
- EB:O&M Schools (2–4 points)
- EB:O&M Retail (2–4 points)
- EB:O&M Data Centers (2–4 points)
- EB:O&M Hospitality (2–4 points)
- EB:O&M Warehouses & Distribution Centers (2–4 points)

Intent

To connect building occupants with the outdoors, reinforce circadian rhythms, and reduce the use of electrical lighting by introducing daylight and views into the space.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT

Option 1. Daylight Measurement (2 points)

Achieve illuminance levels between 300 lux and 3,000 lux for at least 50% of the regularly occupied floor area.

With furniture, fixtures, and equipment in place, measure illuminance levels as follows:

- Measure at appropriate work plane height during any hour between 9 a.m. and 3 p.m.
- Take one measurement in any regularly occupied month, and take a second as indicated in Table 1.
- For spaces larger than 150 square feet (14 square meters), take measurements on a maximum 10 foot (3 meter) square grid.
- For spaces 150 square feet (14 square meters) or smaller, take measurements on a maximum 3 foot (900 millimeter) square grid.

Table 1. Timing of measurements for illuminance

If first measurement is taken in …	*take second measurement in …*
January	May-September
February	June-October
March	June-July, November-December
April	August-December
May	September-January
June	October-February
July	November-March
August	December-April
September	December-January, May-June
October	February-June
November	March-July
December	April-August

AND/OR

Option 2. Quality Views (2 points)

Achieve a direct line of sight to the outdoors via vision glazing for 50% of all regularly occupied floor area. View glazing in the contributing area must provide a clear image of the exterior, not obstructed by frits, fibers, patterned glazing, or added tints that distort color balance.

Additionally, 50% of all regularly occupied floor area must have at least two of the following four kinds of views:

- multiple lines of sight to vision glazing in different directions at least 90 degrees apart;
- views that include at least two of the following: (1) flora, fauna, or sky; (2) movement; and (3) objects at least 25 feet (7.5 meters) from the exterior of the glazing;
- unobstructed views located within the distance of three times the head height of the vision glazing; and
- views with a view factor of 3 or greater, as defined in “Windows and Offices; A Study of Office Worker Performance and the Indoor Environment.”

Include in the calculations any permanent interior obstructions (e.g., lab hoods, fixed partitions, demountable opaque full- or partial-height partitions). Movable furniture and partitions may be excluded.

Views into interior atria may be used to meet up to 30% of the required area.

Warehouses & Distribution Centers only

For the office portion of the building, meet the requirements above.

For the bulk storage, sorting, and distribution portions of the building, Meet the requirements above for 25% of the regularly occupied floor area.

PERFORMANCE
None.

EQ Credit: Green Cleaning—Custodial Effectiveness Assessment

EB:O&M
1 point
This credit applies to

- Existing Buildings: Operations & Maintenance (1 point)
- EB:O&M Schools (1 point)
- EB:O&M Retail (1 point)
- EB:O&M Data Centers (1 point)
- EB:O&M Hospitality (1 point)
- EB:O&M Warehouses & Distribution Centers (1 point)

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

EBOM, Schools, Retail, Data Centers, Hospitality, Warehouses & Distribution Centers

ESTABLISHMENT
None.

PERFORMANCE
Implement the strategies set forth in the facility's green cleaning policy and perform routine inspection and monitoring. This inspection must verify that the specified strategies have been implemented and must 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, whichever is more stringent, to determine the appearance level of the facility. The facility must score 2.5 or better.

EQ CREDIT: GREEN CLEANING—PRODUCTS AND MATERIALS

EB:O&M
1 point
This credit applies to

- Existing Buildings: Operations & Maintenance (1 point)
- EB:O&M Schools (1 point)
- EB:O&M Retail (1 point)
- EB:O&M Data Centers (1 point)
- EB:O&M Hospitality (1 point)
- EB:O&M Warehouses & Distribution Centers (1 point)

Intent

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

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
None.

PERFORMANCE
Purchase green cleaning materials and products such as floor finishes and strippers, disposable janitorial paper products, and trash bags. Include items used by in-house staff or outsourced service providers.

At least 75%, by cost, of the total annual purchases of these products must meet at least one of the following standards.

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;
- Environmental Choice CCD-110, for cleaning and degreasing compounds;
- Environmental Choice CCD-146, for hard-surface cleaners;
- Environmental Choice CCD-148, for carpet and upholstery care;
- Green Seal GS-40, for industrial and institutional floor care products;
- Environmental Choice CCD-147, for hard-floor care;
- EPA Design for the Environment Program's Standard for Safer Cleaning Products; 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.):

- Environmental Choice CCD-112, for digestion additives for cleaning and odor control;
- Environmental Choice CCD-113, for drain or grease trap additives;
- Environmental Choice CCD-115, 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 Design for the Environment Program's standard for safer cleaning products; 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;
- Environmental Choice CCD-082, for toilet tissue;
- Environmental Choice CCD-086, for hand towels;
- Janitorial paper products derived from rapidly renewable resources or made from tree-free fibers;
- 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;
- Environmental Choice CCD-104, for hand cleaners and hand soaps;
- Environmental Choice CCD-170, for hand sanitizers;
- EPA Design for the Environment Program's standard for safer cleaning products.

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 Environmental Choice standards.

EQ CREDIT: GREEN CLEANING—EQUIPMENT

EB:O&M
1 point
This credit applies to

- Existing Buildings: Operations & Maintenance (1 point)
- EB:O&M Schools (1 point)
- EB:O&M Retail (1 point)
- EB:O&M Data Centers (1 point)
- EB:O&M Hospitality (1 point)
- EB:O&M Warehouses & Distribution Centers (1 point)

Intent

To reduce chemical, biological, and particulate contaminants from powered cleaning equipment.

Requirement

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
Create an inventory of existing interior and exterior equipment, including what is brought on site by vendors. At least 40% of all powered janitorial equipment (purchased, leased, or used by contractors) must meet the following criteria. For existing equipment that does not meet the criteria, develop a phase-out plan for its replacement with environmentally preferable products at the end of its useful life.
All powered 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.

Powered floor maintenance equipment, such as vacuums, guards, or other devices for capturing fine particulates, must operate with a maximum sound level of 70 dBA, in accordance with ISO 11201.

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.

PERFORMANCE

At least 40% of all powered janitorial equipment (purchased, leased, or used by contractors) must meet the above criteria. For existing equipment that does not meet the criteria, develop a phase-out plan for its replacement with environmentally preferable products at the end of its useful life.

EQ CREDIT: INTEGRATED PEST MANAGEMENT

EB:O&M
2 points
This credit applies to

- Existing Buildings: Operations & Maintenance (2 points)
- EB:O&M Schools (2 points)
- EB:O&M Retail (2 points)
- EB:O&M Data Centers (2 points)
- EB:O&M Hospitality (2 points)
- EB:O&M Warehouses & Distribution Centers (2 points)

Intent

To minimize pest problems and exposure to pesticides.

Requirement

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
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. 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.

PERFORMANCE

Implement the strategies set forth in the IPM plan and evaluate the plan annually. This evaluation must verify that the strategies specified in the IPM plan have been implemented and identify any chemical applications that did not comply with the plan.

Perform recordkeeping and documentation required under the IPM plan. Maintain records of IPM team participation and decisions, as well as pesticide applications.

A project meets the requirements if the IPM service is provided by a certified member in good standing of GreenPro, EcoWise, or GreenShield, or a program with equivalent IPM standards, who complies with the program's standards.

EQ CREDIT: OCCUPANT COMFORT SURVEY

EB:O&M
1 point
This credit applies to

- Existing Buildings: Operations & Maintenance (1 point)
- EB:O&M Schools (1 point)
- EB:O&M Retail (1 point)
- EB:O&M Data Centers (1 point)
- EB:O&M Hospitality (1 point)
- EB:O&M Warehouses & Distribution Centers (1 point)

Intent

To assess building occupants' comfort.

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

ESTABLISHMENT
None.

PERFORMANCE

Administer at least one occupant comfort survey to collect anonymous responses regarding at least the following:

- acoustics;
- building cleanliness;
- indoor air quality;
- lighting; and
- thermal comfort.

The responses must be collected from a representative sample of building occupants making up at least 30% of the total occupants.

Document survey results. Develop and implement a corrective action plan to address comfort issues if the results indicate that more than 20% of occupants are dissatisfied.

Perform at least one survey and implement corrective actions. At a minimum, perform one new survey at least once every 2 years.

INNOVATION (IN)

IN CREDIT: INNOVATION

EB:O&M
1–5 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1–5 points)
- EB:O&M Schools (1–5 points)
- EB:O&M Retail (1–5 points)
- EB:O&M Data Centers (1–5 points)
- EB:O&M Hospitality (1–5 points)
- EB:O&M Warehouses & Distribution Centers

Intent

To encourage projects to achieve exceptional or innovative performance

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

Project teams can use any combination of innovation, pilot, and exemplary performance strategies.

Option 1. Innovation (1 point)
Achieve significant, measurable environmental performance using a strategy not addressed in the LEED green building rating system.

Identify the following:

- the intent of the proposed innovation credit;
- proposed requirements for compliance;
- proposed submittals to demonstrate compliance; and
- the design approach or strategies used to meet the requirements.

AND/OR

Option 2. Pilot (1 point)
Achieve one pilot credit from USGBC's LEED Pilot Credit Library

AND/OR

Option 3. Additional Strategies

- **Innovation (1-3 points)**
  Defined in Option 1 above.
- **Pilot (1-3 points)**
  Meet the requirements of Option 2.
- **Exemplary Performance (1–2 points)**
  Achieve exemplary performance in an existing LEED v4 prerequisite or credit that allows exemplary performance, as specified in the LEED Reference Guide, v4 edition. An exemplary performance point is typically earned for achieving double the credit requirements or the next incremental percentage threshold.

IN CREDIT: LEED ACCREDITED PROFESSIONAL

EB:O&M
1 point
This credit applies to

- Existing Buildings: Operations & Maintenance (1 point)
- EB:O&M Schools (1 point)
- EB:O&M Retail (1 point)
- EB:O&M Data Centers (1 point)
- EB:O&M Hospitality (1 point)
- EB:O&M Warehouses & Distribution Centers (1 point)

Intent

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

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

At least one principal participant of the project team must be a LEED Accredited Professional (AP) with a specialty appropriate for the project.

REGIONAL PRIORITY (RP)

RP CREDIT: REGIONAL PRIORITY

EB:O&M
4 points
This credit applies to

- Existing Buildings: Operations & Maintenance (1-4 points)
- EB:O&M Schools (1-4 points)
- EB:O&M Retail (1-4 points)
- EB:O&M Data Centers (1-4 points)
- EB:O&M Hospitality (1-4 points)
- EB:O&M Warehouses & Distribution Centers (1-4 points)

Intent

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

Requirements

EBOM, SCHOOLS, RETAIL, DATA CENTERS, HOSPITALITY, WAREHOUSES & DISTRIBUTION CENTERS

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

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

APPENDICES

APPENDIX 1. USE TYPES AND CATEGORIES

The following table is used for all related Building Design & Construction, Interior Design & Construction, and Neighborhood Development prerequisites and credits. Use types are classified in categories.

Category	Use type
Food retail	Supermarket
	Other food store with produce section
Community-serving retail	Convenience store
	Farmers market
	Hardware store
	Pharmacy
	Other retail
Services	Bank
	Family entertainment venue (e.g., theater, sports)
	Gym, health club, exercise studio
	Hair care
	Laundry, dry cleaner
	Restaurant, café, diner (excluding those with only drive-thru service)
Civic and community facilities	Adult or senior care (licensed)
	Child care (licensed)
	Community or recreation center
	Cultural arts facility (museum, performing arts)
	Education facility (e.g., K—12 school, university, adult education center, vocational school, community college)
	Government office that serves public on-site
	Medical clinic or office that treats patients
	Place of worship
	Police or fire station
	Post office
	Public library
	Public park
	Social services center
Community anchor uses (BD&C and ID&C only)	Commercial office (100 or more full-time equivalent jobs)
	Housing (100 or more dwelling units)

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

APPENDIX 2. DEFAULT OCCUPANCY COUNTS

Because of the speculative nature of core and shell construction, a project team may not know the final occupant count during the LEED certification process.
Core and Shell projects that do not have final occupancy counts must use the default occupancy counts provided here.

Projects that know the tenant occupancy must use the actual numbers, as long as the gross floor area per employee does not exceed the default occupancy numbers; a lower figure for gross floor area per occupant is acceptable.

Default occupancy counts are provided for typical core and shell project types. For circumstances not covered below, provide documentation for comparable buildings' average gross floor area per occupant.

Table 1. Default Occupancy Numbers

	Gross square feet per occupant		Gross square meters per occupant	
	Employees	Transients	Employees	Transients
General office	250	0	23	0
Retail, general	550	130	51	12
Retail or service (e.g., financial, auto)	600	130	56	12
Restaurant	435	95	40	9
Grocery store	550	115	51	11
Medical office	225	330	21	31
R&D or laboratory	400	0	37	0
Warehouse, distribution	2,500	0	232	0
Warehouse, storage	20,000	0	1860	0
Hotel	1,500	700	139	65
Educational, daycare	630	105	59	10
Educational, K–12	1,300	140	121	13
Educational, postsecondary	2,100	150	195	14

Sources:
ANSI/ASHRAE/IESNA Standard 90.1–2004 (Atlanta, GA, 2004).
2001 Uniform Plumbing Code (Los Angeles, CA)
California Public Utilities Commission, 2004–2005 Database for Energy Efficiency Resources (DEER) Update Study (2008).
California State University, Capital Planning, Design and Construction Section VI, Standards for Campus Development Programs (Long Beach, CA, 2002).
City of Boulder Planning Department, Projecting Future Employment—How Much Space per Person (Boulder, 2002).
Metro, 1999 Employment Density Study (Portland, OR 1999).
American Hotel and Lodging Association, Lodging Industry Profile Washington, DC, 2008.
LEED for Core & Shell Core Committee, personal communication (2003 - 2006).
LEED for Retail Core Committee, personal communication (2007)
OWP/P, Medical Office Building Project Averages (Chicago, 2008).
OWP/P, University Master Plan Projects (Chicago, 2008).
U.S. General Services Administration, Childcare Center Design Guide (Washington, DC,2003).

The figures above may be used to determine occupancy for the following credits:

- LT Credit: Bicycle Facilities
- LT Credit: Reduced Parking Footprint
- WE Prerequisite: Indoor Water Use Reduction
- WE Credit: Indoor Water Use Reduction
- EA Prerequisite: Minimum Energy Performance
- EA Credit: Optimized Energy Performance
- EQ Prerequisite: Minimum Indoor Air Quality Performance
- EQ Credit: Enhanced Indoor Air Quality Strategies
- EQ Credit: Thermal Comfort
- EQ Credit: Daylight
- EQ Credit: Quality Views
- EQ Credit: Interior Lighting

The defaults provided above are based on gross floor area per occupant, not net or leasable floor area per occupant. Gross floor area is defined as the sum of all areas on all floors of a building included within the outside faces of the exterior wall, including common areas, mechanical spaces, circulation areas, and all floor penetrations that connect one floor to another. To determine gross floor area, multiply the building footprint (in square feet or square meters) by the number of floors in the building. Projects with underground or structured parking may exclude that area from the calculation.

APPENDIX 3. RETAIL PROCESS LOAD BASELINES

Table 1a. Commercial kitchen appliance prescriptive measures and baseline for energy cost budget (IP units)

	Baseline energy usage for energy modeling path				Levels for prescriptive path	
Appliance type	Fuel	Function	Baseline efficiency	Baseline idle rate	Prescriptive efficiency	Prescriptive idle rate
Broiler, underfired	Gas	Cooking	30%	16,000 Btu/h/ft^2 peak input	35%	12000 Btu/h/ft^2 peak input
combination ovens: steam mode (P = pan capacity)	elec	cooking	40% steam mode	0.37P+4.5 kW	50% steam mode	0.133P+0.6400 kW
combination ovens: steam mode	gas	cooking	20% steam mode	1,210P+35,810 BTU/h	38% steam mode	200P+6,511 BTU/h
combination ovens: convection mode	elec	cooking	65% convection mode	0.1P+1.5 kW	70% convection mode	0.080P+0.4989 kW
combination ovens: convection mode	gas	cooking	35% convection mode	322P+13,563 BTU/h	44% convection mode	150P+5,425 BTU/h
Convection oven, full-size	Elec	Cooking	65%	2.0 kW	71%	1.6 kW
Convection oven, full-size	Gas	Cooking	30%	18000 Btu/h	46%	12000 Btu/h
Convection oven, half-size	Elec	Cooking	65%	1.5 kW	71%	1.0 kW
Conveyor oven > 25-inch belt	Gas	Cooking	20%	70,000 Btu/h	42%	57,000 Btu/h
Conveyor oven < 25-inch belt	Gas	Cooking	20%	45,000 Btu/h	42%	29,000 Btu/h
Fryer	Elec	Cooking	75%	1050 W	80%	1000 W
Fryer	Gas	Cooking	35%	14000 Btu/h	50%	9000 Btu/h
Griddle (based on 3' model)	Elec	Cooking	60%	400 W/ft2	70%	320 W/ft2
Griddle (based on 3' model)	Gas	Cooking	30%	3500 Btu/h/ft2	38%	2650 Btu/h/ft2
hot food holding	elec	cooking	na	40 W/ft3	na	21.5 V Watts

cabinets (excluding drawer warmers and heated display) 0 < V < 13 ft³ (V = volume)						
hot food holding cabinets (excluding drawer warmers and heated display) 13 ≤ V < 28 ft³	elec	cooking	na	40 W/ft3	na	2.0 V + 254 Watts
hot food holding cabinets (excluding drawer warmers and heated display) 28 ft³ ≤ V	elec	cooking	na	40 W/ft3	na	3.8 V + 203.5 Watts
Large vat fryer	Elec	Cooking	75%	1350 W	80%	1100 W
Large vat fryer	Gas	Cooking	35%	20000 Btu/h	50%	12000 Btu/h
Rack oven, double	Gas	Cooking	30%	65000 Btu/h	50%	35000 Btu/h
Rack oven, single	Gas	Cooking	30%	43000 Btu/h	50%	29000 Btu/h
Range	Elec	Cooking	70%		80%	
Range	Gas	Cooking	35%	—	40% and no standing pilots	—
Steam cooker, batch cooking	Elec	Cooking	26%	200 W/pan	50%	135 W/pan
Steam cooker, batch cooking	Gas	Cooking	15%	2500 Btuh/pan	38%	2100 Btu/h/pan
Steam cooker, high production or cook to order	Elec	Cooking	26%	330 W/pan	50%	275 W/pan
Steam cooker, high production or cook to	Gas	Cooking	15%	5000 Btuh/pan	38%	4300 Btu/h/pan

order						
Toaster	Elec	Cooking	—	1.8 kW average operating energy rate	—	1.2 kW average operating energy rate
Ice machine, ice-making head, H ≥ 450 lb/day	Elec	Ice	6.89 - 0.0011H kWh/100 lb ice	—	$37.72*H^{-0.298}$ kWh/100 lb ice	—
Ice machine, ice-making head, H ≤ 450 lb/day	Elec	Ice	10.26 – 0.0086H kWh/100 lb ice	—	$37.72*H^{-0.298}$ kWh/100 lb ice	—
Ice machine RCU (w/o remote compressor) , H < 1,000 lb/day	Elec	Ice	8.85 - .0038H kWh/100lb ice	—	$22.95*H^{-0.258}$ + 1.00kWh/100 lb ice	—
ice machine RCU (remote condensing unit) 1600 > H ≥ 1000 lb/day	elec	ice	5.10 kWh/100lb ice	na	$22.95*H^{-0.258}$ + 1.00 kWh/100 lb ice	na
ice machine RCU (remote condensing unit) H ≥ 1600 lb/day	elec	ice	5.10 kWh/100lb ice	na	-0.00011*H + 4.60 kWh/100 lb ice	na
Ice machine self-contained unit, H < 175 lb/day	Elec	Ice	18.0 - 0.0469H kWh/100lb ice	—	$48.66*H^{-0.326}$ + 0.08kWh/100 lb ice	—
Ice machine self-contained unit, H ≥ 175 lb/day	Elec	Ice	9.80 kWh/100lb ice	—	$48.66*H^{-0.326}$ + 0.08kWh/100 lb ice	—
Ice machine, water-cooled ice-making head, H ≥ 1436 lb/day (must be on chilled loop)	Elec	Ice	4.0 kWh/100lb ice	—	3.68 kWh/100lb ice	—
Ice machine,	Elec	Ice	5.58 – 0.0011H	—	5.13 - 0.001H	—

water-cooled ice-making head, 500 lb/day < H > 1436 (must be on chilled loop)			kWh/100lb ice		kWh/100lb ice	
Ice machine, water-cooled ice-making head, H < 500 lb/day (must be on chilled loop)	Elec	Ice	7.80 – 0.0055H kWh/100 lb ice	—	7.02 - 0.0049H kWh/100 lb ice	—
Ice machine water-cooled once-through (open loop)	Elec	Ice	Banned	Banned	Banned	Banned
Ice machine, water-cooled self-contained unit, H < 200 lb/day (must be on chilled loop)	Elec	Ice	11.4 – 0.0190H kWh/100lb ice	—	10.6 - 0.177H kWh/100lb ice	—
Ice machine, water-cooled self-contained unit, H ≥ 200 lb/day (must be on chilled loop)	Elec	Ice	7.6 kWh/100lb ice	—	7.07 kWh/100lb ice	—
Chest freezer, solid or glass door	Elec	Refrig	0.45V + 0.943 kW/day	—	≤ 0.270 V + 0.130 kWh/day	—
Chest refrigerator, solid or glass door	Elec	Refrig	.1V + 2.04 kWh/day	—	≤ 0.125 V + 0.475 kWh/day	—
Glass-door reach-in freezer 0 ≤ V < 15 ft^3	Elec	Refrig	.75V + 4.10 kWh/day	—	≤ 0.607 V + 0.893 kWh/day	—
Glass-door	Elec	Refrig	.75V + 4.10	—	≤ 0.733 V –	—

reach-in freezer 15 ≤ V < 30 ft³			kWh/day		1.00 kWh/day	
Glass-door reach-in freezer, 30 ≤ V < 50 ft³	Elec	Refrig	.75V + 4.10 kWh/day	—	≤ 0.250 V + 13.50 kWh/day	—
Glass-door reach-in freezer, 50 ≤ V ft³	Elec	Refrig	.75V + 4.10 kWh/day	—	≤ 0.450 V + 3.50 kWh/day	—
Glass-door reach-in refrigerator, 0 ≤ V < 15 ft³	Elec	Refrig	.12V + 3.34 kWh/day	—	≤ 0.118 V + 1.382 kWh/day	—
Glass-door reach-in refrigerator, 15 ≤ V < 30 ft³	Elec	Refrig	.12V + 3.34 kWh/day	—	≤ 0.140 V + 1.050 kWh/day	—
Glass-door reach-in refrigerator, 30 ≤ V < 50 ft³	Elec	Refrig	.12V + 3.34 kWh/day	—	≤ 0.088 V + 2.625 kWh/day	—
Glass-door reach-in refrigerator, 50 ≤ V ft³	Elec	Refrig	.12V + 3.34 kWh/day	—	≤ 0.110 V + 1.500 kWh/day	—
Solid-door reach-in freezer, 0 ≤ V < 15 ft³	Elec	Refrig	0.4V + 1.38 kWh/day	—	≤ 0.250 V + 1.25 kWh/day	—
Solid-door reach-in freezer, 15 ≤ V < 30 ft³	Elec	Refrig	0.4V + 1.38 kWh/day	—	≤ 0.400 V – 1.000 kWh/day	—
Solid-door reach-in freezer, 30 ≤ V < 50 ft³	Elec	Refrig	0.4V + 1.38 kWh/day	—	≤ 0.163 V + 6.125 kWh/day	—
Solid-door reach-in freezer, 50 ≤ V ft³	Elec	Refrig	0.4V + 1.38 kWh/day	—	≤ 0.158 V + 6.333 kWh/day	—
Solid-door reach-in refrigerator, 0 ≤ V < 15 ft³	Elec	Refrig	.1V + 2.04 kWh/day	—	≤ 0.089 V + 1.411 kWh/day	—
Solid-door reach-in refrigerator,	Elec	Refrig	.1V + 2.04 kWh/day	—	≤ 0.037 V + 2.200 kWh/day	—

15 ≤ V < 30 ft³						
Solid-door reach-in refrigerator, 30 ≤ V < 50 ft³	Elec	Refrig	.1V + 2.04 kWh/day	—	≤ 0.056 V + 1.635 kWh/day	—
Solid-door reach-in refrigerator, 50 ≤ V ft³	Elec	Refrig	.1V + 2.04 kWh/day	—	≤ 0.060 V + 1.416 kWh/day	—
Clothes washer	Gas	Sanitation	1.72 MEF		2.00 MEF	
Door-type dish machine, high temp	Elec	Sanitation	—	1.0 kW	—	.70 kW
Door-type dish machine, low temp	Elec	Sanitation	—	0.6 kW	—	0.6 kW
Multitank rack conveyor dish machine, high temp	Elec	Sanitation	—	2.6 kW	—	2.25 kW
Multitank rack conveyor dish machine, low temp	Elec	Sanitation	—	2.0 kW	—	2.0 kW
Single-tank rack conveyor dish machine, high temp	Elec	Sanitation	—	2.0 kW	—	1.5 kW
Single-tank rack conveyor dish machine, low temp	Elec	Sanitation	—	1.6 kW	—	1.5 kW
Undercounter dish machine, high temp	Elec	Sanitation	—	0.9 kW	—	0.5 kW
Undercounter dish machine, low temp	Elec	Sanitation	—	0.5 kW	—	0.5 kW
The energy efficiency, idle energy rates, and water use requirements, where applicable, are based on the following test methods:						

ASTM F1275 Standard Test Method for Performance of Griddles
ASTM F1361 Standard Test Method for Performance of Open Deep Fat Fryers
ASTM F1484 Standard Test Methods for Performance of Steam Cookers
ASTM F1496 Standard Test Method for Performance of Convection Ovens
ASTM F1521 Standard Test Methods for Performance of Range Tops
ASTM F1605 Standard Test Method for Performance of Double-Sided Griddles
ASTM F1639 Standard Test Method for Performance of Combination Ovens
ASTM F1695 Standard Test Method for Performance of Underfired Broilers
ASTM F1696 Standard Test Method for Energy Performance of Single-Rack Hot Water Sanitizing, ASTM Door-Type Commercial Dishwashing Machines
ASTM F1704 Standard Test Method for Capture and Containment Performance of Commercial Kitchen Exhaust Ventilation Systems
ASTM F1817 Standard Test Method for Performance of Conveyor Ovens
ASTM F1920 Standard Test Method for Energy Performance of Rack Conveyor, Hot Water Sanitizing, Commercial Dishwashing Machines
ASTM F2093 Standard Test Method for Performance of Rack Ovens
ASTM F2140 Standard Test Method for Performance of Hot Food Holding Cabinets
ASTM F2144 Standard Test Method for Performance of Large Open Vat Fryers
ASTM F2324 Standard Test Method for Prerinse Spray Valves
ASTM F2380 Standard Test Method for Performance of Conveyor Toasters
ARI 810-2007: Performance Rating of Automatic Commercial Ice Makers
ANSI/ASHRAE Standard 72–2005: Method of Testing Commercial Refrigerators and Freezers with temperature setpoints at 38°F for medium-temp refrigerators, 0°F for low-temp freezers, and -15°F for ice cream freezers

Table 2. Supermarket refrigeration prescriptive measures and baseline for energy cost budget

Item	Attribute	Prescriptive measure	Baseline
Evaporator	Evaporator fan speed control	Variable-speed evaporator fan	Constant volume, constant operation
	Evaporator design approach temperature	10°F (-12°C)	10°F (-12°C)
Condenser	Air-cooled condenser fan speed control	Variable-speed condenser fan (electronically commutated motors if single phase and less than 1 hp (0.75 kW))	Cycling one-speed fan
	Air-cooled condenser design approach	Floating head pressure, min of 70°F (21°C), 5°F (3°C) drybulb offset	10°F to 15°F (-12°C to -9°C) depending on suction temperature
	Air-cooled condenser fan power	80 Btu/Watt-hr (84.4 kJ/W-hr) at 10°F (-12°C) approach temperature	53 Btu/Watt-hr (55.9 kJ/W-hr) at 10°F (-12°C) approach temperature
	Evaporative condenser fan speed control	Variable-speed condenser fan (electronically commutated motors if single phase and less than 1 hp (0.75 kW))	Cycling one speed fan
	Evaporative condenser design approach temperature	Floating head pressure, min of 70°F (21°C), 9°F (5°C) wetbulb offset	18°F (-13°C) to 25°F (-4°C) based on design wetbulb temperature
	Evaporative condenser fan and pump power	400 Btu/Watt-hr (422.1 kJ/W-hr) at 100°F (38°C) saturated condensing temperature and 70°F(21°C) wetbulb temperature	330 Btu/Watt-hr (348.3 kJ/W-hr) at 100°F (38°C) saturated condensing temperature and 70°F (21°C) wetbulb temperature
Refrigeration system	Suction pressure control	Not addressed	Not addressed
	Condensing temperature control	85°F (30°C), minimum condensing temperature, fixed setpoint	85°F (30°C) minimum condensing temperature, fixed setpoint
	Defrost control	No electrical defrost, hot gas defrost only	Not addressed
Compressor	Compressor capacity modulation	Variable-speed drive trim compressor	Slide valves on screw compressors, multiple compressor racks on reciprocating compressor plants

Table 3. Walk-in coolers and freezers prescriptive measures and baseline for energy cost budget

Item	Attribute	Prescriptive measure	Baseline

Envelope	Freezer insulation	R-46 (R-8.1 in (m^2-K/W))	R-36 (R-6.34 in (m^2-K/W))
	Cooler insulation	R-36 (R-6.34 in (m^2-K/W))	R-20 (R-3.52 in (m^2-K/W))
	Automatic closer doors	Yes	No
	High-efficiency low- or no-heat reach-in doors	40W/ft (130W/m) of door frame (low temperature), 17W/ft (55W/m) of door frame (medium temperature)	40W/ft (130W/m) of door frame (low temperature), 17W/ft (55W/m) of door frame (medium temperature)
Evaporator	Evaporator fan motor and control	Shaded pole and split phase motors prohibited; use PSC or EMC motors	Constant-speed fan
	Hot gas defrost	No electric defrosting.	Electric defrosting
Condenser	Air-cooled condenser fan motor and control	Shaded pole and split phase motors prohibited; use PSC or EMC motors; add condenser fan controllers	Cycling one-speed fan
	Air Cooled condenser design approach	Floating head pressure controls or ambient subcooling	10°F (-12°C) to 15°F (-9°C) dependent on suction temperature
Lighting	Lighting power density (W/sq.ft.)	0.6 W/sq.ft. (6.5 W/sq. meter)	0.6 W/sq.ft. (6.5 W/sq. meter)

Table 4. Commercial kitchen ventilation prescriptive measures and baseline for energy cost budget

Strategies	**Prescriptive measure**	**Baseline**
Exhaust rate control	Demand control package	Constant volume