



**Green Building Rating System
For New Construction &
Major Renovations
(LEED[®]-NC)**

Version 2.2

First Public Comment Draft

December 2004

NOTE TO REVIEWERS

Thank you for participating in the first public comment period for the LEED Green Building Rating System for New Construction, Version 2.2. Any member of the public may comment on this rating system, provided that the individual has registered a user profile on our website. The previous revision, Version 2.1, addressed only process and documentation issues and was not required by the bylaws and Foundations Document to be balloted. Version 2.2 contains substantive changes to credits and does require balloting. The process of developing Version 2.2 was started over a year ago. The direction and charge that the LEED-NC Committee was given for this version is as follows:

1. To fix known problems with selected LEED-NC v.2.1 credits
2. To clarify the intent of selected credits
3. To clarify the performance standards for selected credits
4. To expedite these edits
5. To put the recommended changes to membership vote in 2004

Additional guidelines included staying within the present credit structure of 69 points; no points can be added or removed until NC version 3. The main sources of information for the version 2.2 revisions were drawn from market and stakeholder reaction to LEED-NC version 2.1 and the Credit Interpretation Request process. The changes that are proposed attempt to better define the criteria for satisfying a credit and in some cases elevate these requirements. Your input, along with other stakeholders, will help determine if there is consensus for these proposed changes as LEED seeks to further drive market transformation and increase its penetration in various sectors.

In addition to commenting on the specific language proposed, feedback would be appreciated on the potential cost impact, impact on the market, and impact to the certification process of the revision and the methods in place to validate the credit as well as on the overall acceptance of Version 2.2. All responses should be kept brief. Please note that there is a section in the comment form for general comments, as well as sections for all credits.

After receipt of all comments, a revised Version 2.2 second draft will be issued, along with responses to all comments received. The public will be welcomed to comment *only on changes made since the previous draft*, and all comments made in that second review period will be responded to by the NC committee and posted. After that secondary review, a final Version 2.2 will be put out for balloting. This is presently anticipated for the fall of 2005.

Please note that this comment period will end at 5pm Pacific on February 1st 2005. No comments received after that time will be considered or responded to by the committee.

Also please note that the different colors of highlighted text do not differ in any substantive way. All marked changes are suggested changes, regardless of color.

Thank you for your cooperation and dedication. We look forward to working with you.

The LEED NC Committee
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Tom Scarola, vice-chair
Lee Burgett
Craig Kneeland
Joe Higgins
Harry Gordon
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Chris Dixon
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Project Checklist

Sustainable Sites

14 Possible Points

Prereq 1	Erosion & Sedimentation Control	Required
Credit 1	Site Selection	1
Credit 2	Development Density & Community Connectivity	1
Credit 3	Brownfield Redevelopment	1
Credit 4.1	Alternative Transportation , Public Transportation Access	1
Credit 4.2	Alternative Transportation , Bicycle Storage & Changing Rooms	1
Credit 4.3	Alternative Transportation , Low Emitting & Fuel Efficient Vehicles	1
Credit 4.4	Alternative Transportation , Parking Capacity and Carsharing	1
Credit 5.1	Site Development , Protect or Restore Habitat	1
Credit 5.2	Site Development , Maximize Open Space	1
Credit 6.1	Stormwater Design , Volume/Treatment	1
Credit 6.2	Stormwater Design , Channel Protection/Flood Control	1
Credit 7.1	Heat Island Effect , Non-Roof	1
Credit 7.2	Heat Island Effect , Roof	1
Credit 8	Light Pollution Reduction	1

Water Efficiency

5 Possible Points

Credit 1.1	Water Efficient Landscaping , Reduce by 50%	1
Credit 1.2	Water Efficient Landscaping , No Potable Use or No Irrigation	1
Credit 2	Innovative Wastewater Technologies	1
Credit 3.1	Water Use Reduction , 20% Reduction	1
Credit 3.2	Water Use Reduction , 30% Reduction	1

Energy & Atmosphere

17 Possible Points

Prereq 1	Fundamental Commissioning of the Building Energy Systems	Required
Prereq 2	Minimum Energy Performance	Required
Prereq 3	CFC Reduction in HVAC&R Equipment	Required
Credit 1	Optimize Energy Performance	1 – 10
Credit 2.1	Renewable Energy , 5%	1
Credit 2.2	Renewable Energy , 10%	1
Credit 2.3	Renewable Energy , 20%	1
Credit 3	Enhanced Commissioning	1
Credit 4	Refrigerant Selection	1
Credit 5	Measurement & Verification	1
Credit 6	Green Power	1

Materials & Resources

13 Possible Points

Prereq 1	Storage & Collection of Recyclables	Required
Credit 1.1	Building Reuse , Maintain 75% of Existing Walls, Floors & Roof	1
Credit 1.2	Building Reuse , Maintain 95% of Existing Walls, Floors & Roof	1
Credit 1.3	Building Reuse , Maintain 50% of Interior Non-Structural Elements	1
Credit 2.1	Construction Waste Management , Divert 50% from Disposal	1
Credit 2.2	Construction Waste Management , Divert 75% from Disposal	1
Credit 3.1	Resource Reuse , Specify 5%	1
Credit 3.2	Resource Reuse , Specify 10%	1
Credit 4.1	Recycled Content , Specify 10% (post-consumer + ½ pre-consumer)	1

Credit 4.2	Recycled Content , Specify 20% (post-consumer + ½ pre-consumer)	1
Credit 5.1	Regional Materials , 10% Extracted, Processed & Manufactured Regionally	1
Credit 5.2	Regional Materials , 20% Extracted, Processed & Manufactured Regionally	1
Credit 6	Renewable Materials	1
Credit 7	Renewable Materials , Certified Environmentally Responsible Management	1

Indoor Environmental Quality 15 Possible Points

Prereq 1	Minimum IAQ Performance	Required
Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
Credit 1	Outdoor Air Delivery Monitoring	1
Credit 2	Increased Ventilation	1
Credit 3.1	Construction IAQ Management Plan , During Construction	1
Credit 3.2	Construction IAQ Management Plan , Before Occupancy	1
Credit 4.1	Low-Emitting Materials , Adhesives & Sealants	1
Credit 4.2	Low-Emitting Materials , Paints & Coatings	1
Credit 4.3	Low-Emitting Materials , Carpet Systems	1
Credit 4.4	Low-Emitting Materials , Composite Wood & Laminate Adhesives	1
Credit 5	Indoor Chemical & Pollutant Source Control	1
Credit 6.1	Controllability of Systems , Lighting	1
Credit 6.2	Controllability of Systems , Temperature & Ventilation	1
Credit 7.1	Thermal Comfort , Compliance	1
Credit 7.2	Thermal Comfort , Monitoring	1
Credit 8.1	Daylight & Views , Daylight 75% of Spaces	1
Credit 8.2	Daylight & Views , Views for 90% of Spaces	1

Innovation & Design Process 5 Possible Points

Credit 1.1	Innovation in Design	1
Credit 1.2	Innovation in Design	1
Credit 1.3	Innovation in Design	1
Credit 1.4	Innovation in Design	1
Credit 2	LEED Accredited Professional	1

Project Totals 69 Possible Points

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points

Sustainable Sites

SS Prerequisite 1: Erosion & Sedimentation Control Required

Intent

Control erosion to reduce negative impacts on water and air quality.

Requirements

Design a sediment and erosion control plan, specific to the site that conforms to United States Environmental Protection Agency (EPA) Document No. EPA 832/R-92-005 (September 1992), *Storm Water Management for Construction Activities*, Chapter 3, OR local erosion and sedimentation control standards and codes, whichever is more stringent. The plan shall meet the following objectives:

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

Submittals

- Provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, declaring whether the project follows local erosion and sedimentation control standards or the referenced EPA standard. Provide a brief list of the measures implemented. If local standards and codes are followed, describe how they meet or exceed the referenced EPA standard.

Potential Technologies & Strategies

Adopt an erosion and sediment control plan for the project site during construction. Consider employing strategies such as temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps and sediment basins.

SS Credit 1: Site Selection

1 Point

Intent

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

Requirements

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

- Prime farmland as defined by the United States Department of Agriculture in the United States Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5)
- Land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by FEMA.
- Land which is specifically identified as habitat for any species on Federal or State threatened or endangered lists.
- Within 100 feet of any water including wetlands as defined by United States Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR greater than distances given in state or local regulations as defined by local or state rule or law, whichever is more stringent.
- Land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (Park Authority projects are exempt).

Submittals

- Provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, declaring that the project site meets the credit requirements

Potential Technologies & Strategies

During the site selection process, give preference to those sites that do not include sensitive site elements and restrictive land types. Select a suitable building location and design the building with the minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck-under parking, and sharing facilities with neighbors.

SS Credit 2: Development Density & Community Connectivity

1 Point

Intent

Channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources.

Requirements

Construct or renovate building in an established, walkable community with a minimum density of 60,000 square feet per acre net (two-story downtown development),

OR

Construct or renovate building within ½ mile of a residential zone or neighborhood with an average density of 10 units per acre net AND has pedestrian access to, and is located within at least ½ mile of, at least 10 of the basic services listed:

1) Bank; 2) Place of Worship; 3) Convenience Grocery; 4) Day Care; 5) Cleaners; 6) Fire Station; 7) Hair Care; 8) Hardware; 9) Laundry; 10) Library; 11) Medical/Dental; 12) Senior Care Facility; 13) Park; 14) Pharmacy; 15) Post Office; 16) Restaurant; 17) School; 18) Supermarket; 19) Commercial Office; 20) Community Center.

This credit is not available for projects locating in a greenfield development.

Submittals

- Provide the LEED-NC Letter Template, signed by the civil engineer, architect or other responsible party, declaring that the project has met the credit requirement
- Provide density for the building and for the surrounding area with an area plan, highlighting the building location

OR

- Provide an area plan highlighting the building location, the residential zone or neighborhood, and 10 or more of the basic services located within ½ mile of the project space (inclusive of the applicant building).

Potential Technologies & Strategies

During the site selection process, give preference to urban sites with pedestrian access to a variety of services.

SS Credit 3: Brownfield Redevelopment

1 Point

Intent

Rehabilitate damaged sites where development is complicated by real or perceived environmental contamination, reducing pressure on undeveloped land.

Requirements

Develop on a site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment) OR on a site classified as a brownfield by a local, state or federal government agency. Effectively remediate site contamination.

Submittals

- Provide a copy of the pertinent sections of the ASTM E1903-97 Phase II Environmental Site Assessment documenting the site contamination OR provide a letter from a local, state or federal regulatory agency confirming that the site is classified as a brownfield by that agency.
- Provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, declaring the type of damage that existed on the site and describing the remediation performed.

Potential Technologies & Strategies

During the site selection process, give preference to brownfield sites. Identify tax incentives and property cost savings. Develop and implement a site remediation plan using strategies such as pump-and-treat, bioreactors, land farming and in-situ remediation.

SS Credit 4.1: Alternative Transportation– Public Transportation Access

1 Point

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

Locate project within 1/2 mile of an existing, or planned and funded, commuter rail, light rail or subway station or 1/4 mile of two or more public or campus bus lines usable by building occupants.

OR

Connect project to mass transit with shuttle service of adequate capacity running at 10-minute headways during standard commuting times and providing periodic or on-demand service at all other normal business hours.

Submittals

- Provide the LEED-NC Letter Template, signed by an appropriate party, declaring that the project building(s) are located within required proximity to mass transit.
- Provide an area drawing or transit map highlighting the building location and the fixed rail stations and bus lines, and indicate the distances between them. Include a scale bar for distance measurement.
- For projects achieving this credit through a planned fixed rail line, provide additional documentation that funding has been allocated to construct the referenced route and stations.
- For projects achieving the credit through shuttle service, provide documentation of the shuttle service frequency, schedule, and vehicle capacity.

Potential Technologies & Strategies

Perform a transportation survey of future building occupants to identify transportation needs. Site the building near mass transit.

SS Credit 4.2: Alternative Transportation – Bicycle Storage & Changing Rooms

1 Point

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

For commercial or institutional buildings, provide secure bicycle storage with convenient changing/shower facilities (within 200 yards of the building) for 5% or more of regular building occupants. For residential buildings, provide covered storage facilities for securing bicycles for 15% or more of building occupants in lieu of changing/shower facilities.

Submittals

- For commercial projects: provide the LEED-NC Letter Template, signed by the Architect or responsible party, declaring the distance to bicycle storage and showers from the building entrance and demonstrating that these facilities can accommodate at least 5% of building occupants.

OR

- For residential projects: provide the LEED-NC Letter Template, signed by the architect or responsible party, declaring the design occupancy for the buildings, number of covered bicycle storage facilities for securing bicycles, and demonstrating that these facilities can accommodate at least 15% of building occupants.

Potential Technologies & Strategies

Design the building with transportation amenities such as bicycle racks and showering/changing facilities.

SS Credit 4.3: Alternative Transportation – Low Emitting and Fuel Efficient Vehicles

1 Point

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

Provide low emitting and fuel efficient vehicles for 3% of building occupants AND provide preferred parking for these vehicles,

OR

Provide preferred parking for low emitting fuel efficient vehicles for 5% of the total vehicle parking capacity of the site.

OR

Install alternative-fuel refueling stations for three percent of the total vehicle parking capacity of the site (liquid or gaseous fueling facilities must be separately ventilated or located outdoors)

Submittals

Provide the LEED-NC Letter Template and proof of ownership of, or two year lease agreement for, low emitting and fuel efficient vehicles and calculations indicating that the vehicles will serve 3% of building occupants. Provide site drawings or parking plan highlighting preferred parking for low emitting and fuel efficient vehicles.

OR

Provide the LEED-NC Letter template with calculations documenting that preferred parking for low emitting and fuel efficient vehicles is being provided for at least 5% of the total vehicle parking capacity of the site. Provide site drawings or parking plan highlighting preferred parking for low emitting and fuel efficient vehicles. Provide a parking management plan that explains how preferred parking status for low emitting and fuel efficient vehicles will be enforced.

OR

Provide the LEED-NC Letter Template with specifications and site drawings highlighting alternative-fuel refueling stations. Provide calculations demonstrating that these facilities accommodate 3% or more of the total vehicle parking capacity. Provide documentation that the alternative fuel refueling stations proposed will serve current available street legal vehicles.

Potential Technologies & Strategies

Provide transportation amenities such as alternative fuel refueling stations and carpool/vanpool programs. Consider sharing the costs and benefits of refueling stations with neighbors.

SS Credit 4.4: Alternative Transportation– Parking Capacity and Carsharing

1 Point

Intent

Reduce pollution and land development impacts from single occupancy vehicle use.

Requirements

For new construction, size parking capacity to meet, but not exceed, minimum local zoning requirements AND provide preferred parking for carpools or vanpools capable of serving 5% of all building users (measured at peak periods);

OR

For rehabilitation projects, add no new parking AND provide preferred parking for carpools or vanpools capable of serving 5% of all building users (measured at peak periods).

OR

In lieu of preferred carpool/vanpool parking, provide carsharing programs, such as FlexCar™, within ¼ mile of the building and capable of serving 5 % of building users.

OR

In lieu of preferred carpool/vanpool parking, provide a parking cash-out program offering EITHER a taxable subsidy equal to at least 70 percent of the value of parking or a transit/vanpool subsidy equal to the value of the parking.

Submittals

For new projects: provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, stating any relevant minimum zoning requirements and declaring that parking capacity is sized to meet, but not exceed, them. State the number of preferred parking spaces for carpools and include a description of the carpool/vanpool incentive program.

OR

For rehabilitation projects: provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, declaring that no new parking capacity has been added. State the number of preferred parking spaces for carpools and include a description of the carpool/vanpool incentive program.

OR

For carsharing programs: provide calculations demonstrating that the FlexCar™ fleet will serve 5% of building occupants, within a 5% margin of error.

OR

For projects achieving this credit through the parking cash-out option, provide documentation of the program details including availability to employees, publicity through organization and enforcement.

Potential Technologies & Strategies

Minimize parking lot/garage size. Consider sharing parking facilities with adjacent buildings. Consider alternatives that will limit the use of single occupancy vehicles. Measures such as ZipCar[®] encourage people to not own a car, but instead rent on an as-needed basis; well publicized ride boards encourage the sharing of vehicles by matching destination travelers.

SS Credit 5.1: Site Development – Protect or Restore Habitat

1 Point

Intent

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

Requirements

On greenfield sites, limit site disturbance including earthwork and clearing of vegetation to 40 feet beyond the building perimeter, 10 feet beyond surface walkways, patios, surface parking and utilities less than 12 inches in diameter; 15 feet beyond primary roadway curbs and main utility branch trenches, and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas in order to limit compaction in the constructed area;

OR, on previously developed sites, restore a minimum of 50% of the site area (excluding the building footprint) by replacing impervious surfaces with native or adapted vegetation.

Submittals

For greenfield sites: provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, demonstrating and declaring that site disturbance (including earthwork and clearing of vegetation) has been limited to applicable distances as noted in credit requirements. Provide site drawings and specifications highlighting limits of construction disturbance. Provide photographs of the construction site showing how requirements were enforced.

OR

For previously developed sites: provide a LEED-NC Letter Template, signed by the civil engineer or responsible party, declaring and describing restoration of degraded habitat areas. Include highlighted site drawings with area calculations demonstrating that 50% of the site area that does not fall within the building footprint has been restored. Provide list of all plants installed on the site, highlighting the native or adaptive selections.

Potential Technologies & Strategies

On greenfield sites, perform a site survey to identify site elements and adopt a master plan for development of the project site. Select a suitable building location and design the building with a minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck-under parking and sharing facilities with neighbors. Establish clearly marked construction boundaries to minimize disturbance of the existing site and restore previously degraded areas to their natural state. For previously developed sites, utilize local and regional governmental agencies, consultants, educational facilities, and native plant societies as resources for the selection of appropriate native or adapted plant materials. Prohibit plant materials listed as invasive or noxious weed species. Note: restored habitat must be ground-based, except for projects locating in urban areas (and earning SSc2), in which case an appropriately designed green roof may comply with credit requirements.

SS Credit 5.2: Site Development – Maximize Open Space

1 Point

Intent

Conserve existing natural areas and/or provide new open space

Requirements

Reduce the development footprint (defined as entire building footprint, access roads and parking) and/or provide new useable open space to exceed the local zoning's open space requirement for the site by 25%.

OR

For areas with no local zoning requirements (e.g., some university campuses, military bases), designate useable open space area adjacent to the building that is equal to the building footprint.

OR

Where a zoning ordinance exists, but there is no requirement for open space (zero), and the project is located in an urban area (as demonstrated by compliance with SSc2), designate open space equal to 20% of the project's site area. For projects meeting these conditions, green roofs may contribute to credit compliance.

Submittals

- Provide a copy of the local zoning requirements highlighting the criteria for open space. Provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, demonstrating and declaring that the open space exceeds the local zoning open space requirement for the site by 25%.

OR

- For areas with no local zoning requirements (e.g., some university campuses, military bases), provide the LEED-NC Letter Template indicating this condition. Designate open space area adjacent to the building that is equal to the building footprint. Provide a site plan indicating the location of the preserved open space and a letter from the property owner stating that the open space will be conserved for the life of the building.

OR

- For areas where a zoning ordinance exists, but there is no requirement for open space (zero), provide the LEED-NC Letter Template indicating this condition. Designate open space area adjacent to the building that is equal to the building footprint. Provide a site plan indicating the location of the preserved open space and a letter from the property owner stating that the open space will be conserved for the life of the building.

Potential Technologies & Strategies

Perform a site survey to identify site elements and adopt a master plan for development of the project site. Select a suitable building location and design the building with a minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck-under parking and sharing facilities with neighbors to maximize open space on the site. Provide new landscape

areas, or other useable and pedestrian accessible open spaces that provide opportunity for passive or active outdoor recreational opportunity.

SS Credit 6.1: Stormwater Design – Volume/Treatment

1 Point

Intent

Limit disruption of natural hydrology by reducing stormwater runoff, increasing on-site infiltration, and eliminating pollutants.

Requirements

If existing imperviousness is less than or equal to 50%, implement a stormwater management plan that maintains annual groundwater recharge rates, promotes the use of nonstructural practices and infiltration, and captures and treats the volume **from 90% of the average annual rainfall¹**.

OR

If the existing imperviousness is greater than 50%, implement a stormwater management plan that (a) maintains annual groundwater recharge rates, promotes the use of nonstructural practices and infiltration, and captures and treats the volume of runoff from 90% of the average annual rainfall¹ for all proposed impervious areas, and (b) results in a decrease of runoff by 25% of the annual stormwater load falling on existing imperviousness. This reduction can be accomplished through a variety of measures, including: increasing perviousness of site, implementing stormwater management practices (nonstructural and structural), capturing rainwater for reuse, or other measures.

Submittals

- Provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, declaring: (1) that existing imperviousness is less than or equal to 50%; (2) that a stormwater management plan has been implemented; (3) annual recharge rates are maintained; and (4) the required volume of runoff is captured and treated using nonstructural techniques or acceptable structural practices²

OR

- Provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, declaring that: (1) existing site imperviousness is greater than 50%; (2) a stormwater management plan has been implemented; (3) runoff from existing imperviousness is reduced by at least 25% of the annual stormwater load; (4) stormwater runoff from 100% of newly added impervious surfaces is prevented; (5) annual recharge rates are maintained; and (6) the required volume of runoff is captured and treated using nonstructural techniques or acceptable structural practices²

1. In the United States, there are three distinct climates that influence the nature and amount of rainfall occurring on an annual basis. **Humid** watersheds are defined as those that receive at least 35 inches of rainfall each year, **Semi-arid** watersheds receive between 15 and 35 inches of rainfall per year, and **Arid** watersheds receive less than 15 inches of rainfall per year. For this credit, the volume of runoff from 90% of the average annual rainfall is equivalent to the runoff from: (a) Humid Watersheds – 1 inch of rainfall; (b) Semi-arid Watersheds – 0.75 inches of rainfall; and (c) Arid Watersheds – 0.5 inches of rainfall.

2. Structural BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing field monitoring information. Structural practices are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there exists in-field performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership (TARP), Washington State Department of Ecology) for BMP monitoring.

Potential Technologies and Strategies

Use alternative surfaces (e.g., green roofs or permeable pavers) and nonstructural practices (e.g., raingardens, bioswales, disconnection of imperviousness) to reduce effective imperviousness and promote infiltration. Use environmentally sensitive design strategies (e.g., Low Impact Development, Maryland Stormwater Design Manual) to design natural and mechanical treatment systems such as constructed wetlands, biofilters, and open channels to treat stormwater runoff.

SS Credit 6.2: Stormwater Design – Channel Protection/Flood Control

1 Point

Intent

Limit disruption to stream channel stability and limit increases in flooding by managing stormwater runoff.

Requirements

In addition to meeting the requirements of SSc6.1:

If existing imperviousness is less than or equal to 50%, implement a stormwater management plan that addresses stream channel stability (e.g., prevents increases in critical erosive velocities during bankfull and near-bankfull storm events) and the frequency and magnitude of out-of-bank flooding (e.g., flow events that exceed the bankfull capacity of the channel and therefore must spill over into the floodplain)

OR

If existing imperviousness is greater than 50%, implement a stormwater management plan that results in a decrease of runoff from the site by 50% of the annual stormwater load falling on the site and addresses channel stability and the frequency and magnitude of flooding from 100% of the newly added impervious surfaces. This reduction can be accomplished through a variety of measures, including: perviousness of site, stormwater management practices (nonstructural and structural), capture of rainwater for reuse, or other measures.

Submittals

Provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, declaring that: (1) a stormwater management plan has been implemented; (2) identifies the nationally recognized channel protection strategy used or provides a narrative description and necessary calculations showing that stream channel stability is protected; and (3) demonstrates that overbank flood protection is not necessary or that the post-development ten-year 24 hour peak discharge rate does not exceed the pre-development ten-year peak discharge rate

OR

Provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, declaring that: (1) existing site imperviousness is greater than 50%; (2) a stormwater management plan has been implemented; (3) runoff from the site is reduced by at least 50% of the annual stormwater load falling on the site; and (4) runoff of stormwater from 100% of newly added impervious surfaces has been prevented.

Potential Technologies & Strategies

Design the project to maintain natural stormwater flows by promoting infiltration, using alternative surfaces (e.g., green roofs or permeable pavers) and sustainable design strategies. Harvest and reuse stormwater runoff for non-potable uses such as landscape irrigation, toilet and urinal flushing, and custodial uses. Implement a nationally recognized stream channel protection strategy such as Ontario's Distributed Runoff Control (*Final Stormwater Management Planning*

and Design Manual, Ontario Ministry of the Environment 1999) or Maryland's Channel Protection Volume Criterion (*2000 Maryland Stormwater Design Manual*, Maryland Department of the Environment 2000).

SS Credit 7.1: Heat Island Effect – Non–Roof

1 Point

Intent

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

Requirements

Provide shade (within 5 years of landscape installation) and/or use light-colored/high-albedo materials with a Solar Reflectance Index (SRI) of at least 29 and/or open grid pavement for at least 50% of the site's non-roof impervious surfaces, including parking areas, walkways, plazas, fire lanes, etc.;

OR

Place a minimum of 50% of parking spaces underground or covered by structured parking;

OR

Use an open-grid pavement system (less than 50% impervious) for a minimum of 50% of the parking lot area.

Submittals

Provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, referencing the site plan to demonstrate areas of hardscape (including paving, walking areas, plazas, fire lanes, etc.), landscaping (list species) and building footprint, and declaring that:

- At least 50% of the site's hardscape has an SRI of at least 29 and/or at least 50% of the hardscape is comprised of open grid pavement and/or at least 50% of the hardscape will be shaded within five years AND
 - The SRI has been calculated in accordance with ASTM E1989-98 for the hardscape
 - Reflectance values used to calculate SRI are based on field measurements using the ASTM E1918-97 procedure
 - Emissivity values used to calculate SRI are based on Table 1 (below) or field measurements using the ASTM E408-71 procedure

OR

- A minimum of 50% of parking spaces have been placed underground or are covered by structured parking

OR

- An open-grid pavement system (less than 50% impervious) has been used for a minimum of 50% of the parking lot area.

Potential Technologies & Strategies

Shade constructed surfaces on the site with landscape features and minimize the overall building footprint. Consider replacing constructed surfaces (i.e. roof, roads, sidewalks, etc.) with vegetated

surfaces such as garden roofs and open grid paving or specify high-albedo materials to reduce the heat absorption.

SS Credit 7.2: Heat Islands Effect – Roof

1 Point

Intent

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

Requirements

Use roofing materials having a Solar Reflectance Index (SRI) as required in Table 2 (below) for a minimum of 75% of the roof surface

OR

Install a “green” (vegetated) roof for at least 50% of the roof area.

Combinations of high albedo and vegetated roof can be used if they meet, in combination, the following criteria:

$$\text{Total Roof Area} \leq (\text{Area of SRI Roof} * 1.33) + (\text{Area of green roof} * 2)$$

Table 2

Roof Type	Slope	SRI
Low-Sloped Roof	$\leq 2:12$	78
Steep-Sloped Roof	$> 2:12$	29

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, civil engineer or responsible party, referencing the building roof plan and declaring that:
 - The SRI calculated in the letter template is equal to or greater than the value required in Table 2 for the applicable roof type
 - Reflectance values used to calculate the SRI are based on values from product ratings from the Cool Roof Rating Council’s (CRRC) *Directory of Rated Products* or the EnergyStar™ *Rated Products* list or Independent Laboratory testing in accordance with ASTM E903-96 for homogeneous, non-patterned materials having both specular and diffused optical properties OR ASTM E1084 for inhomogeneous, patterned, or corrugated materials OR field measurements using the ASTM E1918-97 procedure
 - Emissivity values used to calculate SRI are based upon product ratings from the CRRC’s *Directory of Rated Products* OR field measurements using the ASTM E408-71 procedure.
 - AND that 75% of the building’s total roof area meets the required SRI as noted in Table 2

OR

- Provide the LEED-NC Letter Template, signed by the architect, civil engineer or responsible party, referencing the building roof plan and demonstrating that vegetated roof areas comprise at least 50% of the total roof area.

OR

- Provide the LEED-NC Letter Template, signed by the architect, civil engineer, or responsible party, including the calculation showing that $\text{Total Roof Area} \leq ((\text{Area of SRI Roof} * 1.33) + (\text{Area of green roof} * 2))$

SS Credit 8: Light Pollution Reduction

1 Point

Intent

Minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments.

Requirements

Interior Lighting:

Design interior lighting so that the angle of maximum candela from each interior luminaire as located in the building shall intersect opaque building interior surfaces and not exit out through the windows OR maintain all non-emergency lighting on a programmable timer that turns lighting off during non-business hours. Provide manual override capability for after hours use.

Exterior lighting:

Only light areas where exterior lighting is clearly required for safety and comfort. Design the exterior lighting not to exceed 80% of the lighting power densities for exterior areas and 50% for building facades and landscape features as defined in ASHRAE/IESNA Standard 90.1-2004, Exterior Lighting Section, as amended and subsequent versions.

LZ1 (wilderness/national and state parks)

Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value of 0.01 horizontal and vertical footcandles at the site boundary and beyond. Document that 0% of the total designed site lumens are emitted at an angle of 90 degrees or higher.

LZ2 (Default for residential areas - rural)

Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value of 0.10 horizontal and vertical footcandles at the site boundary and must drop off to 0.01 footcandles within 10 feet beyond the site boundary. Document that no more than 2% of the total designed site lumens are emitted at an angle of 90 degrees or higher. For site boundaries that abut public rights-of-way, light trespass requirements may be met at the curb line.

LZ3 (Default for urban areas)

Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value of 0.20 horizontal and vertical footcandles at the site boundary and must drop off to 0.01 footcandles within 15 feet beyond the site. Document that no more than 5% of the total designed site lumens are emitted at an angle of 90 degrees or higher. For site boundaries that abut public rights-of-way, light trespass requirements may be met at the curb line.

LZ4 (City centers of cities with populations over 100,000)

Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value of 0.60 horizontal and vertical footcandles at the site boundary and must drop off to 0.01 footcandles within 15 feet beyond the site. Document that no more than 10% of

the total designed site lumens are emitted at an angle of 90 degrees or higher. For site boundaries that abut public rights-of-way, light trespass requirements may be met at the curb line.

Submittals

- Provide the LEED-NC Letter Template, signed by an appropriate party, declaring that the credit requirements have been met.
- Verify light trespass requirements are met by providing a site plan showing initial horizontal footcandle levels on a 5 foot grid at the site boundary and 5', 10' & 15' past the site boundary. Calculate initial horizontal footcandles at grade level.
- Verify light trespass requirements are met by providing a site plan showing initial vertical footcandles at the property line on a 5 foot horizontal and 1 foot vertical grid. Calculate initial vertical footcandles perpendicular to the property line facing the site at 0 feet to the maximum luminaire mounting height above the grade level.
- Verify light pollution requirements are met by providing catalog cut-sheets of all site and building mounted luminaires including zonal lumen distribution summary. Additionally, provide spreadsheet documentation similar to below. Note: luminaires without photometric distribution and ALL adjustable luminaires shall be assumed to have 100% of its lumens at or above 90 degrees.

Luminaire type	Number of luminaires	Initial lumens	Total Luminaire lumens	Lumens at or above 90 degrees	Total lumens at or above 90 degrees
A	10	4600	46000	100	1000
B	20	11900	238000	0	0
C	5	2000	10000	2000	10000
Total			294000		11000

Percent lamp lumens at or above 90 degrees	3.74%
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Potential Technologies & Strategies

Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Minimize site lighting where possible and model the site lighting using a computer model. Technologies to reduce light pollution include full cutoff luminaries, low-reflectance surfaces and low-angle spotlights.

Water Efficiency

WE Credit 1.1: Water Efficient Landscaping– Reduce by 50%

1 Point

Intent

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

Requirements

Use high-efficiency irrigation technology OR use water collected on site that would otherwise be released from the site, such as captured rain, or recycled wastewater, or use water treated and conveyed by a public agency specifically for nonpotable uses, or use a combination of water from these sources to reduce potable water consumption for irrigation by 50% over conventional means.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, engineer or responsible party, declaring that potable water consumption for site irrigation has been reduced by 50%. Include a brief narrative of the equipment used and/or the use of drought-tolerant or native plants.

Potential Technologies & Strategies

Perform a soil/climate analysis to determine appropriate landscape types and design the landscape with indigenous plants to reduce or eliminate irrigation requirements. Use high-efficiency irrigation systems and consider using stormwater and/or greywater for irrigation.

WE Credit 1.2: Water Efficient Landscaping – No Potable Water Use or No Irrigation

1 Point in addition to WE 1.1 (If no permanent irrigation system, two points)

Intent

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

Requirements

Use only water collected on site that would otherwise be released from the site, such as captured rain, or recycled wastewater, or use water treated and conveyed by a public agency specifically for nonpotable uses, or a combination of water from these sources to eliminate all potable water use for site irrigation (except for initial watering to establish plants), OR do not install permanent landscape irrigation systems.

Submittals

- Provide the LEED-NC Letter Template, signed by the responsible architect and/or engineer, declaring that the project site will not use potable water for irrigation. Include a narrative describing the captured rain system, the recycled site water system, and their holding capacity. List all the plant species used. Include calculations demonstrating that irrigation requirements can be met from captured rain or recycled site water.

OR

- Provide the LEED-NC Letter Template, signed by the landscape architect or responsible party, declaring that the project site does not have a permanent landscape irrigation system. Include a narrative describing how the landscape design allows for this.

Potential Technologies & Strategies

Perform a soil/climate analysis to determine appropriate landscape types and design the landscape with indigenous plants to reduce or eliminate irrigation requirements. Consider using stormwater and/or greywater for irrigation.

WE Credit 2: Innovative Wastewater Technologies

1 Point

Intent

Reduce generation of wastewater and potable water demand, while increasing the local aquifer recharge.

Requirements

Reduce the use of municipally provided potable water for building sewage conveyance by a minimum of 50%, OR treat 100% of wastewater on site to tertiary standards.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, MEP engineer or responsible party, declaring that water for building sewage conveyance will be reduced by at least 50%. Include the spreadsheet calculation and a narrative demonstrating the measures used to reduce wastewater by at least 50% from baseline conditions.

OR

- Provide the LEED-NC Letter Template, signed by the civil engineer or responsible party, declaring that 100% of wastewater will be treated to tertiary standards on site. Include a narrative describing the on-site wastewater treatment system.

Potential Technologies & Strategies

Specify high-efficiency fixtures and dry fixtures such as composting toilets and waterless urinals to reduce wastewater volumes. Consider reusing stormwater or greywater for sewage conveyance or on-site wastewater treatment systems (mechanical and/or natural).

WE Credit 3.1 Water Use Reduction– 20% Reduction

1 Point

Intent

Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

Requirements

Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements.

Submittals

- Provide the LEED-NC Letter Template, signed by the MEP engineer or responsible party, declaring that the project uses 20% less water than the baseline fixture performance requirements of the Energy Policy Act of 1992.
- Provide the spreadsheet calculation demonstrating that water-consuming fixtures specified for the stated occupancy and use of the building reduce occupancy-based potable water consumption by 20% compared to baseline conditions

Potential Technologies & Strategies

Estimate the potable and non-potable water needs for the building. Use high-efficiency fixtures, dry fixtures such as composting toilets and waterless urinals, and occupant sensors to reduce the potable water demand. Consider reuse of stormwater and greywater for non-potable applications such as toilet and urinal flushing, mechanical systems and custodial uses.

WE Credit 3.2: Water Use Reduction– 30% Reduction

1 Point in addition to WE 3.1

Intent

Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

Requirements

Employ strategies that in aggregate use 30% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements.

Submittals

- Provide the LEED-NC Letter Template, signed by the MEP engineer or responsible party, declaring that the project uses 30% less water than the baseline fixture performance requirements of the Energy Policy Act of 1992.
- Provide the spreadsheet calculation demonstrating that water-consuming fixtures specified for the stated occupancy and use of the building reduce occupancy-based potable water consumption by 30% compared to baseline conditions.

Potential Technologies & Strategies

Estimate the potable and non-potable water needs for the building. Use high-efficiency fixtures, dry fixtures such as composting toilets and waterless urinals, and occupant sensors to reduce the potable water demand. Consider reuse of stormwater and greywater for non-potable applications such as toilet and urinal flushing, mechanical systems and custodial uses.

Energy & Atmosphere

EA Prerequisite 1: Fundamental Commissioning of the Building Energy Systems Required

Intent

Verify that the building's energy related systems are installed, calibrated and perform according to the owners project requirements.

Benefits of Commissioning

Benefits of commissioning include reduced energy use, lower operating costs, reduced contractor callbacks, better building documentation, improved occupant productivity, and verification that the systems perform in accordance with the owner's project requirements.

Requirements

The following commissioning process activities shall be completed by the commissioning team, in accordance with the LEED-NC 2.2 Commissioning Reference Guide available at www.usgbc.org and in the spirit of the sample templates:

- Designate an individual as the Commissioning Authority to lead the commissioning process activities. This individual must have the minimum defined experience level and be independent, as defined in the Commissioning Reference Guide. For projects smaller than 25,000 GSF, and with less than 875,000 BTU/hr peak heating and 875,000 BTU/hr peak cooling loads, the commissioning provider may include qualified persons on the design or construction team.
- Clearly document the owner's project requirements and the basis of design for the building's energy related systems. Updates to these documents shall be made during design and construction by the design team.
- Develop and incorporate commissioning requirements into the construction documents.
- Develop and utilize a commissioning plan.
- Verify that the installation and performance of energy consuming systems meet the owner's project requirements and basis of design.
- Complete a commissioning report.

Commissioned Systems:

The energy related systems to be included in the commissioning process activities include as a minimum:

- Heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems (mechanical and passive) and associated controls
- Lighting controls, including day lighting
- Domestic hot water systems
- Renewable energy systems (PV, wind, solar etc.)

Submittals

- ☐ Provide the LEED-NC Letter Template, signed by the owner and commissioning authority, confirming that the commissioning requirements for the building's energy related systems have been successfully executed or will be provided under existing contract(s).

Potential Technologies & Strategies:

The LEED-NC 2.2 Commissioning Reference Guide available at www.usgbc.org provides detailed guidance on the rigor expected for the prerequisite in addition to providing the following samples and templates:

- Owner's project requirements
- Basis of design
- Commissioning plan
- Commissioning specification language
- Sampling strategies
- Performance verification documentation
- Commissioning report
- Who can be the commissioning authority
- Request of qualifications / Request for Proposal for soliciting a commissioning authority

EA Prerequisite 2: Minimum Energy Performance Required

Intent

Establish the minimum level of energy efficiency for the proposed building and systems.

Requirements

Design the building project to comply with both:

- (a) The mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4) of ASHRAE/IESNA Standard 90.1-2004 (without amendments); and
- (b) The prescriptive requirements (Sections 5.5, 6.5, 7.5, and 9.5) or performance requirements (Section 11) of ASHRAE/IESNA Standard 90.1-2004 (without amendments), or the local energy code, whichever is more stringent.

Submittals

- Provide a LEED-NC Letter Template, signed by a licensed professional engineer or architect, stating that the building project complies with both:
 - (a) The mandatory provisions in Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 of ASHRAE/IESNA Standard 90.1-2004 (without amendments); and
 - (b) The prescriptive requirements in Sections 5.5, 6.5, 7.5, and 9.5 or the performance requirements in Section 11 of ASHRAE/IESNA 90.1-2004 or the local energy code, whichever is more stringent. If the local energy code was applied, demonstrate that the local code is equivalent to, or more stringent than, the prescriptive or performance provisions in ASHRAE/IESNA 90.1-2004 (without amendments).

Potential Technologies & Strategies:

Design the building envelope, HVAC, lighting, and other systems to maximize energy performance. Use a computer simulation model to assess the energy performance and identify the most cost effective energy measures. Quantify energy performance compared to the baseline building.

EA Prerequisite 3: CFC Reduction in HVAC&R Equipment Required

Intent

Reduce ozone depletion.

Requirements

Zero use of CFC-based refrigerants in new base building HVAC&R systems. When reusing existing base building HVAC equipment, complete a comprehensive CFC phase-out conversion.

Submittals

- Provide a LEED-NC Letter Template, signed by a licensed professional engineer or architect, declaring that the building's HVAC&R systems do not use CFC-based refrigerants.

Potential Technologies & Strategies:

When reusing existing HVAC systems, conduct an inventory to identify equipment that uses CFC refrigerants and adopt a replacement schedule for these refrigerants. For new buildings, specify new HVAC equipment that uses no CFC refrigerants.

EA Credit 1: Optimize Energy Performance

1–10 Points

Intent

Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental impacts associated with excessive energy use.

Requirements

Reduce the proposed building performance rating compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2004 (without amendments), for the total energy consumption within and associated with the building project, as demonstrated by a whole building project simulation using the Building Performance Rating Method in Appendix G of the Standard.

% Energy Cost Savings (minimum)	Points
10.5%	1
14%	2
17.5%	3
21%	4
24.5%	5
28%	6
31.5%	7
35%	8
38.5%	9
42%	10

Appendix G of Standard 90.1-2004 requires that the energy analysis done for the Building Performance Rating Method include ALL of the energy consumption within and associated with the building project. To achieve points using this credit, the proposed design:

- Must comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4) in Standard 90.1-2004 (without amendments);
- Must include all the energy consumption within and associated with the building project; and
- Must be compared against a baseline building that both complies with Appendix G to Standard 90.1-2004 (without amendments) and that has a process energy consumption that is a minimum of 25% of the total energy consumption for the baseline building.

For the purpose of this analysis, process energy is considered to include, but is not limited to, office and general miscellaneous equipment, computers, elevators and escalators, kitchen cooking and refrigeration, laundry washing and drying, lighting exempt from the lighting power allowance (e.g. lighting integral to medical equipment) and other (e.g. waterfall pumps). Process energy does not include any lighting (such as for the interior, parking garage, surface parking, façade, or building grounds, except as noted above), nor any HVAC (such as for space heating, space

cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), nor any service water heating for domestic or space heating purposes.

If a preliminary analysis shows that process energy is less than 25% of the total energy consumption of the baseline building performance rating, then the analysis shall be revised until process energy is no less than 25%.

For EA Credit 1, process loads are expected to be identical for both the baseline building performance rating and for the proposed building performance rating. However, project teams are encouraged to apply for separate innovation credits if the energy consumption of process loads can also be reduced.

Submittals

- ❑ Complete the LEED-NC Letter Template incorporating a quantitative summary table showing the that specifically lists each of the energy saving strategies incorporated in the proposed building design and shows how they compare with the baseline building (e.g. window U-factors and SHGC, installed lighting W/ft², HVAC equipment efficiencies, etc.).
- ❑ Demonstrate via summary printout from energy simulation model the percentage by which the proposed building performance rating is less than the baseline building performance rating as defined in ASHRAE/IESNA 90.1-2004, Appendix G for the total energy consumption within and associated with the building project. All energy loads (both process and otherwise) must be included in the energy simulation model. For energy loads that are not interactive (e.g. parking garage ventilation), input each of these separately into the simulation model as a peak load accompanied by a schedule of operation so that the entire energy consumption and energy cost of the building project is shown in one printout from the simulation model.

Potential Technologies & Strategies

Design the building envelope and building systems to maximize energy performance. Use a computer simulation model to assess the energy performance and identify the most cost-effective energy efficiency measures. Quantify energy performance as compared to a baseline building.

EA Credit 2.1 Renewable Energy– 5%

1 Point

Intent

Encourage and recognize increasing levels of on-site renewable energy self-supply in order to reduce environmental impacts associated with fossil fuel energy use.

Requirements

Supply at least 5% of the building's total energy use (as expressed as a fraction of annual energy cost) through the use of on-site renewable energy systems.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, owner or responsible party, declaring that at least 5% of the building's energy is provided by on-site renewable energy. Include a narrative describing on-site renewable energy systems installed in the building and calculations demonstrating that at least 5% of total energy costs are supplied by the renewable energy system(s).

Potential Technologies & Strategies

Assess the project for non-polluting and renewable energy potential including solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies. When applying these strategies, take advantage of net metering with the local utility.

EA Credit 2.2 Renewable Energy– 10%

1 Point in addition to EA 2.1

Intent

Encourage and recognize increasing levels of self-supply through renewable technologies to reduce environmental impacts associated with fossil fuel energy use.

Requirements

Supply at least 10% of the building's total energy use (as expressed as a fraction of annual energy cost) through the use of on-site renewable energy systems.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, owner or responsible party, declaring that at least 10% of the building's energy is provided by on-site renewable energy. Include a narrative describing on-site renewable energy systems installed in the building and calculations demonstrating that at least 10% of total energy costs are supplied by the renewable energy system(s).

Potential Technologies & Strategies

Assess the project for non-polluting renewable energy potential including solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies. When applying these strategies, take advantage of net metering with the local utility.

EA Credit 2.3: Renewable Energy– 20%

1 Point in addition to EA 2.1 & 2.2

Intent

Encourage and recognize increasing levels of self-supply through renewable technologies to reduce environmental impacts associated with fossil fuel energy use.

Requirements

Supply at least 20% of the building's total energy use (as expressed as a fraction of annual energy cost) through the use of on-site renewable energy systems.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, owner or responsible party, declaring that at least 20% of the building's energy is provided by on-site renewable energy. Include a narrative describing on-site renewable energy systems installed in the building and calculations demonstrating that at least 20% of total energy costs are supplied by the renewable energy system(s).

Potential Technologies & Strategies

Assess the project for non-polluting and renewable energy potential including solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies. When applying these strategies, take advantage of net metering with the local utility.

EA Credit 3: Enhanced Commissioning

1 Point

Intent

Begin the commissioning process early during the design process and execute additional activities after systems performance verification is completed.

Requirements

In addition to the Fundamental Commissioning of the Building Energy Systems prerequisite, implement or have a contract in place to implement the following additional commissioning process activities, in accordance with the LEED-NC 2.2 Commissioning Reference Guide and in the spirit of the sample templates:

- Designate an individual as the Commissioning Authority to lead the commissioning design review activities *prior* to the end of Design Development.
- Conduct a review of the building's energy related systems contractor submittals.
- Develop a single manual that contains the information required for re-commissioning building's energy related systems.
- Verify that the requirements for training operating personnel and building occupants are completed. Have a contract in place to review building operation with O&M staff and occupants including a plan for resolution of outstanding commissioning-related issues 8 to 10 months after final acceptance.

Submittals

- Provide the LEED-NC Letter Template, signed by the owner and independent commissioning authority confirming that the required enhanced commissioning process requirements 1 and 2 have been successfully executed and that a contract for completing requirements 3 and 4 is in place.

Potential Technologies & Strategies

The LEED-NC 2.2 Commissioning Reference Guide at provides detailed guidance on the rigor expected for these process activities in addition to providing the following samples and templates:

- Commissioning design review
- Commissioning submittal review
- Systems re-commissioning manual
- Training verification plan
- Operation issue resolution plan

EA Credit 4: Refrigerant Selection

1 Point

Intent

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

Select fire suppression systems that reduce ozone depletion and support early compliance with the Montreal Protocol.

Requirements

Install base building level HVAC and refrigeration equipment that uses refrigerants that comply with the following formula:

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

Where:

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

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

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

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

GWPr: Global Warming Potential of Refrigerant $0 < \text{GWPr} < 12,000 \text{ lbCO}_2/\text{lb}$

ODPr: Ozone Depletion Potential of Refrigerant $0 < \text{ODPr} < 0.2 \text{ lbCFC11}/\text{lb}$

Lr: Refrigerant Leakage Rate (% of charge per year) $0.5\% < \text{Lr} < 3\%/\text{Year}$

Mr: End-of-life Loss (% of charge) $2\% < \text{Mr} < 10\%$

Rc: Refrigerant Charge (lbs refrigerant per Ton of cooling capacity) $0.9 < \text{Rc} < 3.3$

Life: Equipment Life (Years) $10 < \text{Life} < 35 \text{ Years}$

For projects with multiple units of base building level HVAC and refrigeration equipment, a weighted average of all base building level HVAC and refrigeration equipment shall be applied to the formula above:

$$[\sum (\text{LCGWP} + \text{LCODP} \times 10^5) \times \text{Qunit}] / \text{Qtotal} \leq 100$$

Where:

Qunit = Cooling capacity of an individual HVAC or refrigeration unit (Tons)

Qtotal = Total cooling capacity of all HVAC or refrigeration equipment (Tons)

AND fire suppression systems that do not contain ozone depleting substances – CFC's, HFC's, HCFC's or Halons..

Submittals

- Provide the LEED-NC Letter Template demonstrating that the building HVAC and refrigeration systems use refrigerants that comply with the formula: $\text{LCGWP} + \text{LCODP} \times 10^5 \leq 100$ and listing the fire suppression systems installed and declaring that all fire suppression systems are free of ozone depleting substances.

To complete the letter template, the refrigerant charge per Ton of cooling capacity and refrigerant type will be needed. The letter template will use default values of 1% leakage per year (Lr) with an end-of-life loss of charge of 3% (Mr) over an assumed 30 year life (Life). Alternative figures may exceptionally be used, provided the project can justify the assumptions

made. The LEED-NC v2.2 Reference Guide includes typical values for Lr, Mr, and Life for various common types of HVAC and refrigeration equipment, along with ODP_r and GW_r for many common refrigerants.

Potential Technologies & Strategies

Utilize base building HVAC and refrigeration systems for the refrigeration cycle that are both low or non-ozone damaging and low or non-contributing to global warming. Refer to the LEED-NC v2.2 Reference Guide for qualifying alternatives. Utilize fire suppression systems that do not contain HCFC's or Halons.

EA Credit 5: Measurement and Verification

1 Point

Intent

Provide for the ongoing accountability of building energy consumption over time.

Requirements

- Develop and implement a Measurement and Verification plan consistent with Option D: Calibrated Simulation (Savings Estimation Method 2), or Option B: ECM Isolation, as specified in the *International Performance Measurement & Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction*, April, 2003.

OR

- Develop and implement a Measurement and Verification plan consistent with Option C: Whole Building, as specified in the *International Performance Measurement & Verification Protocol (IPMVP) Volume I: Concepts and Options for Determining Energy and Water Savings*, 2001.
- The option selected shall be appropriate for the size and nature of the building.
- The M&V period shall cover a period of no less than one year of post-construction occupancy.

Submittals

- Provide a copy of the M&V Plan following IPMVP Volume III, April, 2003, or IPMVP Volume 1, 2001
- Provide the LEED-NC Letter Template, signed by the licensed engineer or other responsible party, indicating that all necessary metering equipment has been installed as per the M&V Plan and that a contract or commitment is in place for the professional services necessary to implement the M&V program.

Potential Technologies and Strategies

Model the building and/or energy systems to predict savings. Install the necessary metering and sub-metering equipment to measure energy use. Develop and implement a Measurement & Verification Plan that compares predicted savings to actual energy performance.

EA Credit 6: Green Power

1 Point

Intent

Encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis.

Requirements

Provide at least 50% of the building's electricity from renewable sources by engaging in at least a two-year renewable energy contract. Renewable sources are as defined by the Center for Resource Solutions (CRS) Green-e products certification requirements. Green power may be procured from a Green-e certified power marketer, a Green-e accredited utility program, or through Green-e certified Tradable Renewable Certificates.

Submittals

- Provide the LEED-NC Letter Template, signed by the owner or other responsible party, documenting that the supplied renewable power is equal to 50% of the project's energy consumption and the sources meet the Green-e definition of renewable energy.
- Provide a copy of the two-year electric utility purchase contract for power generated from renewable sources.

Potential Technologies & Strategies

Determine the energy needs of the building and investigate opportunities to engage in a green power contract with the local utility. Green power is derived from solar, wind, geothermal, biomass or low-impact hydro sources. Visit www.green-e.org for details about the Green-e program.

Materials and Resources

MR Prerequisite 1: Storage & Collection of Recyclables Required

Intent

Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

Requirements

Provide an easily accessible area that serves the entire building and is dedicated to the separation, collection and storage of materials for recycling including (at a minimum) paper, corrugated cardboard, glass, plastics and metals.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect or owner, declaring that the area dedicated to recycling is easily accessible and accommodates the building's recycling needs.
- Provide a plan showing the area(s) dedicated to recycled material collection and storage.

Potential Technologies & Strategies

Designate an area for recyclable collection and storage that is appropriately sized and located in a convenient area. Identify local waste handlers and buyers for glass, plastic, office paper, newspaper, cardboard and organic wastes. Instruct occupants on building recycling procedures. Consider employing cardboard balers, aluminum can crushers, recycling chutes and other waste management technologies to further enhance the recycling program.

MR Credit 1.1: Building Reuse – Maintain 75% of Existing Walls, Floors, and Roof

1 Point

Intent

Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.

Requirements

Maintain at least 75% of existing building structure (including structural floor and roof decking) and shell (exterior skin and framing, excluding window assemblies and non-structural roofing material). If the project includes an addition, the completed building (remaining existing plus new construction) may not exceed three times the area of the existing building.

Submittals

- Provide the LEED-NC Letter Template, signed by the responsible party, listing the retained elements and declaring that the credit requirements have been met.

Potential Technologies & Strategies

Consider reuse of existing, previously occupied buildings, including structure, envelope and elements. Remove elements that pose contamination risk to building occupants and upgrade components that would improve energy and water efficiency such as windows, mechanical systems and plumbing fixtures. Quantify the extent of building reuse.

MR Credit 1.2: Building Reuse – Maintain 95% of Existing Walls, Floors, and Roof

1 Point in addition to MR 1.1

Intent

Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.

Requirements

Maintain an additional 20% (95% total) of existing building structure (including structural floor and roof decking) and shell (exterior skin and framing, excluding window assemblies and non-structural roofing material). If the project includes an addition, the completed building (remaining existing plus new construction) may not exceed three times the area of the existing building

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, owner or other responsible party, demonstrating the retained elements and declaring that the credit requirements have been met.

Potential Technologies & Strategies

Consider reuse of existing buildings, including structure, envelope and elements. Remove elements that pose contamination risk to building occupants and upgrade components that would improve energy and water efficiency such as windows, mechanical systems and plumbing fixtures. Quantify the extent of building reuse.

MR Credit 1.3: Building Reuse – Maintain 50% of Interior Non-Structural Elements

1 Point in addition to MR 1.1 & 1.2

Intent

Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.

Requirements

Use existing non-shell elements (interior walls, doors, floor coverings, and ceiling systems) in at least 50% of completed building (including additions).

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, owner or other responsible party, demonstrating the retained elements and declaring that the credit requirements have been met.

Potential Technologies & Strategies

Consider reuse of existing buildings, including structure, envelope and interior non-structural elements. Remove elements that pose contamination risk to building occupants and upgrade components that would improve energy and water efficiency such as, mechanical systems and plumbing fixtures. Quantify the extent of building reuse.

MR Credit 2.1: Construction Waste Management – Divert 50% From Disposal

1 Point

Intent

Divert construction and demolition debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.

Requirements

Develop and implement a construction waste management plan, quantifying material goals for diversion. Recycle and/or salvage at least 50% of non-hazardous construction and demolition debris. Land clearing debris and excavated soil do not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, owner or other responsible party, tabulating the total non-hazardous waste material, quantities diverted and the means by which diverted, and declaring that the credit requirements have been met.

Potential Technologies & Strategies

Establish goals for diversion from disposal in landfills and incinerators and adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Designate a specific area(s) on the construction site for segregated or commingled collection of recyclable materials, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials and seek verification that diverted materials are recycled or salvaged as intended. Note that diversion may include donation of materials to charitable organizations such as Habitat for Humanity.

MR Credit 2.2: Construction Waste Management – Divert 75% From Disposal

1 Point in addition to MR 2.1

Intent

Divert construction and demolition debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.

Requirements

Develop and implement a construction waste management plan, quantifying material goals for diversion. Recycle and/or salvage an additional 25% (75% total) of non-hazardous construction and demolition debris. Land clearing debris and excavated soil do not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, owner or other responsible party, tabulating the total non-hazardous waste material, quantities diverted and the means by which diverted, and declaring that the credit requirements have been met.

Potential Technologies & Strategies

Establish goals for diversion from disposal in landfills and incinerators and adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Designate a specific area(s) on the construction site for segregated or commingled collection of recyclable materials, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials, and seek verification that the diverted materials are recycled or salvaged, as intended. Note that diversion may include donation of materials to charitable organizations such as Habitat for Humanity.

MR Credit 3.1: Resource Reuse – 5%

1 Point

Intent

Reuse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources.

Requirements

Use salvaged, refurbished or reused materials, products and furnishings for at least 5% of building materials.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, owner or other responsible party, declaring that the credit requirements have been met and listing each material or product used to meet the credit. Include details demonstrating that the project incorporates the required percentage of reused materials and products and showing their costs and the total cost of materials for the project.

Potential Technologies & Strategies

Identify opportunities to incorporate salvaged materials into building design and research potential material suppliers. Consider salvaged materials such as beams and posts, flooring, paneling, doors and frames, cabinetry and furniture, brick and decorative items.

MR Credit 3.2: Resource Reuse – 10%

1 Point in addition to MR 3.1

Intent

Reuse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources.

Requirements

Use salvaged, refurbished or reused materials, products and furnishings for at least 10% of building materials.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, owner or other responsible party, declaring that the credit requirements have been met and listing each material or product used to meet the credit. Include details demonstrating that the project incorporates the required percentage of reused materials and products and showing their costs and the total cost of all materials for the project.

Potential Technologies & Strategies

Identify opportunities to incorporate salvaged materials into building design and research potential material suppliers. Consider salvaged materials such as beams and posts, flooring, paneling, doors and frames, cabinetry and furniture, brick and decorative items.

MR Credit 4.1: Recycled Content – 10% (post-consumer + ½ pre-consumer)

1 Point

Intent

Increase demand for building products that incorporate recycled content materials, therefore reducing impacts resulting from extraction and processing of new virgin materials.

Requirements

Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% of the total value of the materials in the project.

The value of the recycled content portion of a material or furnishing shall be determined by dividing the weight of recycled content in the item by the total weight of all material in the item, then multiplying the resulting percentage by the total value of the item.

Mechanical and electrical components shall not be included in this calculation. Recycled content materials shall be defined in accordance with the International Organization of Standards document, *ISO 14021 - Environmental labels and declarations - Self-declared environmental claims (Type II environmental labeling.)*

Submittals

- Provide the LEED-NC letter Template, signed by the architect, owner or other responsible party, declaring that the credit requirements have been met and listing the recycled content products used. Include details demonstrating that the project incorporates the required percentage of recycled content materials and products and showing their cost and percentage(s) of post-consumer and/or pre-consumer content, and the total cost of all materials for the project.

Potential Technologies & Strategies

Establish a project goal for recycled content materials and identify material suppliers that can achieve this goal. During construction, ensure that the specified recycled content materials are installed and quantify the total percentage of recycled content materials installed.

MR Credit 4.2: Recycled Content – 20% (post-consumer + ½ pre-consumer)

1 Point in addition to MR 4.1

Intent

Increase demand for building products that incorporate recycled content materials, therefore reducing the impacts resulting from extraction and processing of new virgin materials.

Requirements

Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 20% of the total value of the materials in the project.

The value of the recycled content portion of a material or furnishing shall be determined by dividing the weight of recycled content in the item by the total weight of all material in the item, then multiplying the resulting percentage by the total value of the item.

Mechanical and electrical components shall not be included in this calculation. Recycled content materials shall be defined in accordance with the the International Organization of Standards document, *ISO 14021 - Environmental labels and declarations —Self-declared environmental claims (Type II environmental labeling.)*

Submittals

- ❑ Provide the LEED-NC Letter Template, signed by the architect, owner or other responsible party, declaring that the credit requirements have been met and listing the recycled content products used. Include details demonstrating that the project incorporates the required percentage of recycled content materials and products and showing their cost and percentage(s) of post-consumer and/or pre-consumer content, and the total cost of all materials for the project.

Potential Technologies & Strategies

Establish a project goal for recycled content materials and identify material suppliers that can achieve this goal. During construction, ensure that the specified recycled content materials are installed and quantify the total percentage of recycled content materials installed.

MR Credit 5.1: Regional Materials – 10% extracted, processed and manufactured regionally

1 Point

Intent

Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

Requirements

Use a minimum of 10% of building materials or products for which at least 80% of the mass is extracted, processed and manufactured within 300 miles of the project site.

OR

Specify a minimum of 10% of building materials or products for which at least 80% of the mass is extracted, processed, and manufactured within 1,000 miles of the project site, and shipped by rail or water.

OR

Specify a minimum of 10% of building materials or products that reflect a combination of the above extraction, processing, manufacturing and shipping criteria (e.g., 5% within 300 miles and 5% shipped by rail within 1,000 miles).

Submittals

- Provide the LEED-NC Letter Template, signed by the architect or responsible party, declaring that the credit requirements have been met. Include evidence of transportation service by rail or water if applicable, and calculations demonstrating that the project incorporates the required percentage of regional materials/products and showing their cost, distance from the project site to the furthest point of extraction or manufacture for the qualifying components (i.e., the components comprising at least 80% of the mass), and the total cost of all materials for the project.

Potential Technologies & Strategies

Establish a project goal for locally sourced materials, and identify materials and material suppliers that can achieve this goal. During construction, ensure that the specified local materials are installed and quantify the total percentage of local materials installed.

MR Credit 5.2: Regional Materials – 20% extracted, processed and manufactured regionally

1 Point in addition to MR 5.1

Intent

Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

Requirements

Use a minimum of 20% of building materials or products for which at least 80% of the mass is extracted, processed and manufactured within 300 miles of the project site.

OR

Specify a minimum of 20% of building materials or products for which at least 80% of the mass is extracted, processed, and manufactured within 1,000 miles of the project site, and shipped by rail or water.

OR

Specify a minimum of 20% of building materials or products that reflect a combination of the above extraction, processing, manufacturing and shipping criteria (e.g., 10% within 300 miles and 10% shipped by rail within 1,000 miles).

Submittals

- Provide the LEED-NC Letter Template, signed by the architect or responsible party, declaring that the credit requirements have been met. Include evidence of transportation service by rail or water if applicable, and calculations demonstrating that the project incorporates the required percentage of regional materials/products and showing their cost, distance from project site to to the furthest point of extraction or manufacture for the qualifying components (i.e., the components comprising at least 80% of the mass), and the total cost of all materials for the project.

Potential Technologies & Strategies

Establish a project goal for locally sourced materials and identify materials and material suppliers that can achieve this goal. During construction, ensure that the specified local materials are installed and quantify the total percentage of local materials installed.

MR Credit 6: Renewable Materials

1 Point

Intent

Reduce the use and depletion of finite raw materials by replacing them with renewable, bio-based materials.

Requirements

Use renewable, bio-based raw materials for 5% of the total value of all products used in the project. Qualifying materials must be either:

(a) Residues from the processing of renewable, bio-based materials;

OR

(b) Grown or harvested under a recognized sustainable management system. Programs that do not require third-party certification may be included. At a minimum, the management system must be subject to audit by the authority responsible for the system.

Excluded from the calculation are materials such as formwork, shoring, temporary partitions and other elements that are not a permanent part of the finished building.

Submittals

Provide the LEED-NC Letter Template, signed by the responsible party, declaring that the credit requirements have been met and including calculations demonstrating that the project incorporates the required percentage of qualifying products.

Potential Technologies & Strategies

Establish a project goal for renewable, bio-based materials and identify products and suppliers that can support achievement of this goal. Consider solid wood, engineered wood, bamboo, wool, cotton, cork, agricultural fibers, and others.

Examples of management systems meeting the credit requirements are listed below. For a more complete list, see [USGBC Web page]:

- Canadian Standards Association
- Sustainable Forestry Initiative
- Sustainable Agricultural Program

Detail, specify, facilitate the purchase of, and retain records of purchases of qualifying products.

MR Credit 7: Renewable Materials – Certified Environmentally Responsible Management

1 Point

Intent

Reduce the use and depletion of finite raw materials by replacing them with renewable, bio-based materials; and encourage certified environmentally responsible management of such resources.

Requirements

Use renewable, bio-based raw materials that are certified in accordance with one or more USGBC-approved premier certification programs for environmental management, for 50% of the total value of all bio-based materials and products used in the project.

These certification programs represent the highest level of rigor in environmental management, as evidenced by their endorsement by credible environmental non-governmental organizations and other non-industry entities.

Residues may or may not, at the discretion of the project team, be counted toward the total value of renewable, bio-based materials in the project.

Submittals

- Provide the LEED-NC Letter Template, signed by the responsible party, declaring that the credit requirements have been met and including calculations demonstrating that the project incorporates the required percentage of qualifying materials.
- For each product used to meet these requirements, provide the applicable vendor's or manufacturer's certification documentation (e.g., FSC chain-of-custody certificate).

Potential Technologies & Strategies

Establish a project goal for environmentally certified renewable, bio-based materials and identify products and suppliers that can support the achievement of this goal. Consider solid wood, engineered wood, bamboo, wool, cotton, cork, agricultural fibers, and others.

Examples of certification systems meeting the credit requirements are listed below. A complete list of qualifying programs is available at [USGBC Web page].

- Association for Bamboo in Construction (remains to be confirmed by TAG)
- Forest Stewardship Council
- Organic Trade Association (remains to be confirmed by TAG)

Detail, specify, facilitate the purchase of, and retain records of purchases of qualifying products.

Indoor Environmental Quality

EQ Prerequisite 1: Minimum IAQ Performance Required

Intent

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

Requirements

Meet the minimum requirements of voluntary consensus standard ASHRAE 62.1-2004, Ventilation for Acceptable Indoor Air Quality. Mechanical ventilation systems shall be designed using the Ventilation Rate Procedure.

Naturally ventilated buildings must comply with ASHRAE 62.1-2004, paragraph 5.1.

Submittals

- Provide the LEED-NC Letter Template, signed by the responsible design professional, declaring that the project is fully compliant with Sections 4, 5, 6, and 7 of ASHRAE 62.1-2004.
- Provide a summary of calculations used to determine outdoor air ventilation rates, documenting all assumptions including occupancy type, occupant density, zone air distribution effectiveness, and ventilation system efficiency.

Potential Technologies & Strategies

Design and construct the building to meet the requirements of Sections 4, 5, 6, and 7 of the referenced standard.

EQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control Required

Intent

Prevent or minimize exposure of building occupants, indoor surfaces, and systems to Environmental Tobacco Smoke (ETS).

Requirements

Option 1. Prohibit smoking in the building.

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

OR

Option 2. Establish negative pressure in the rooms with smoking.

- Prohibit smoking in the building except in designated smoking areas
- Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.
- Providing one or more designated smoking rooms designed to effectively contain, capture and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors with no re-circulation of ETS-containing air to the non-smoking area of the building, and enclosed with impermeable deck-to-deck partitions and operated at a negative pressure compared with the surrounding spaces of at least an average of 5 Pa (0.02 inches of water gauge) and with a minimum of 1 Pa (0.004 inches of water) when the door(s) to the smoking room are closed.
- Performance of the smoking room differential air pressures shall be verified by conducting 15 minutes of measurement, with a minimum of one measurement every 10 seconds, of the differential pressure in the smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. The testing will be conducted with each space configured for worst case conditions of transport of air from the smoking rooms to adjacent spaces.

OR

Option 3. Reduce air leakage between rooms with smoking and non-smoking areas in residential buildings. Note that Option 3 is for residential buildings only.

- Prohibit smoking in all common areas of the building
- Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows opening to common areas.
- Minimize uncontrolled pathways for ETS transfer between individual residential units by sealing penetrations in walls, ceilings, and floors in the residential units, and by sealing vertical chases adjacent to the units. In addition, all doors in the residential units leading to common hallways shall be weather-stripped to minimize air leakage into the hallway.

Acceptable sealing of residential units shall be demonstrated by a blower door test conducted in accordance with ANSI/ASTM-779-99, Standard Test Method for Determining Air Leakage Rate By Fan Pressurization, AND use the progressive sampling methodology defined in Chapter 7 (Home Energy Rating Systems (HERS) Required Verification And Diagnostic Testing) of the California Low Rise Residential Alternative Calculation Method Approval Manual (http://www.energy.ca.gov/title24/residential_manual/res_manual_chapter4.pdf). Residential units must demonstrate less than 1.25 square inches leakage area per 100 square feet of enclosure area (i.e. sum of all wall, ceiling, and floor areas).

Submittals

- Provide the LEED-NC Letter Template, signed by the building owner or responsible party, declaring that the building will be operated under a policy prohibiting smoking, and the exterior designated smoking areas are at least 25 feet away from entries and operable windows.

OR

- Provide the LEED-NC Letter Template, signed by the tenant or responsible party, declaring and demonstrating that smoking is prohibited in that portion of the tenant space not designated as a smoking space and all other areas of the building serviced by the same HVAC system, plus common areas used by tenant occupants. If the tenant's occupants are permitted to smoke, declare and demonstrate that designated smoking rooms met the design criteria described in the credit requirements and performance has been verified using the method described in the credit requirements.

OR

- Provide the LEED-NC Letter Template, signed by the tenant or responsible party, declaring and demonstrating that the credit requirements for ETS transfer between individual residential units have been satisfied.

Potential Technologies & Strategies

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

EQ Credit 1: Outdoor Air Delivery Monitoring

1 Point

Intent

Provide capacity for ventilation system monitoring to help sustain long-term occupant comfort and well-being.

Requirements

Install permanent monitoring and alarm systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements in a form that affords operational adjustments:

- For mechanical ventilation systems that predominantly serve densely occupied spaces (those with a design occupant density greater than or equal to 25 people per 1000 ft²), install a CO₂ sensor within each densely occupied space.
- For all other mechanical ventilation systems, provide an outdoor airflow measurement device capable of measuring the minimum outdoor airflow rate at all expected system operating conditions within 15% of the design minimum outdoor air rate.
- For natural ventilation systems, install a CO₂ sensor within each naturally ventilated space.

Submittals

- Provide the LEED-NC Letter Template, signed by the responsible design professional, declaring and summarizing the installation, operational design and controls/zones for the carbon dioxide or outdoor airflow monitoring system.

Potential Technologies & Strategies

To ensure that sensors can reliably indicate that ventilation systems are operating as designed:

- CO₂ sensors shall be located within the breathing zone of the room as defined in Standard 62.1.
- CO₂ sensors shall be certified by the manufacturer to have an accuracy of no less than 75 ppm, factory calibrated or calibrated at start-up, and certified by the manufacturer to require calibration no more frequently than once every 5 years.
- Required CO₂ sensors and outdoor airflow monitors shall be configured to generate an alarm if the indicated outdoor airflow rate drops more than 15% below the minimum outdoor air rate required by Standard 62.1 (see EQ Prerequisite 1) in one of the following ways:
 - A building automation system alarm visible to the system operator/engineer
 - An alarm that is clearly visible to or audible by occupants.
- CO₂ sensors may also be used for demand controlled ventilation provided the control strategy complies with Standard 62.1 (see EQ Prerequisite 1), including maintaining the area-based component of the design ventilation rate.

- Space CO₂ alarms and demand controlled ventilation setpoints shall be based on the differential corresponding to the ventilation rates prescribed in Standard 62.1 plus the outdoor air CO₂ concentration, which shall be determined by one of the following:
 - Outdoor CO₂ concentration shall be assumed to be 400 ppm without any direct measurement; or
 - Outdoor CO₂ concentration shall be dynamically measured using a CO₂ sensor located near the position of the outdoor air intake.

EQ Credit 2: Increased Ventilation

1 Point

Intent

Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity.

Requirements

For Mechanically Ventilated Spaces:

- Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2004 as determined by EQ Prerequisite 1.

For Naturally Ventilated Spaces:

- Design natural ventilation systems for occupied spaces to meet the recommendations set forth in the CIBSE (Chartered Institution of Building Services Engineers) “Good Practice Guide 237” [1998]. Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 1.18 of the CIBSE “Applications Manual 10: 1997, “Natural ventilation in non-domestic buildings.”
- And either of the following;
 - Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE Applications Manual 10: 1997, “Natural ventilation in non-domestic buildings.”
 - Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate at least 90% of occupied spaces.

Submittals

For mechanical ventilation systems, provide calculations demonstrating that design breathing zone ventilation rates exceed the minimum rates required by Standard 62.1 by at least 30%.

For natural ventilation systems:

- Provide documentation that natural ventilation is an effective strategy for the project and follows the design recommendations established by CIBSE.

And either of the following;

- Provide diagrams and calculations based on CIBSE Applications Manual 10.
- Provide diagrams and calculations based on results provided by a multi-zone analytical model.

Potential Technologies & Strategies

For Mechanically Ventilated Spaces: Design ventilation systems to provide breathing zone ventilation rates at least 30% larger than the minimum rates prescribed by the referenced standard.

For Naturally Ventilated Spaces: Follow the eight design steps described in CIBSE “Good Practice Guide 237” – 1) Develop design requirements, 2) Plan airflow paths, 3) Identify building uses and features that might require special attention, 4) Determine ventilation requirements, 5) Estimate external driving pressures, 6) Select types of ventilation devices, 7) Size ventilation devices, 8) Analyze the design. Use public domain software such as NIST’s CONTAM, Multizone Modeling Software, along with LoopDA, Natural Ventilation Sizing Tool, to analytically predict room-by-room airflows.

EQ Credit 3.1: Construction IAQ Management Plan – During Construction

1 Point

Intent

Prevent indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants.

Requirements

Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows:

- During construction meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3.
- Protect stored on-site or installed absorptive materials from moisture damage.
- If air handlers must be used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999.
- Replace all filtration media immediately prior to occupancy.

Submittals

- Provide the LEED-NC Letter Template, signed by the general contractor or responsible party, declaring that a Construction IAQ Management Plan has been developed and implemented, and listing each air filter used during construction and at the end of construction. Include the MERV value, manufacturer name and model number.

AND EITHER

- Provide 18 photographs—six photographs taken on three different occasions during construction—along with identification of the SMACNA approach featured by each photograph, in order to show consistent adherence to the credit requirements

OR

- Declare the five Design Approaches of SMACNA IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3, which were used during building construction. Include a brief description of some of the important design approaches employed.

Potential Technologies & Strategies

Adopt an IAQ management plan to protect the HVAC system during construction, control pollutant sources and interrupt contamination pathways. Sequence the installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile and gypsum wall board. Coordinate with Indoor Environmental Quality Credits 3.2 and 5 and install only a single set of final filtration media.

EQ Credit 3.2: Construction IAQ Management Plan – Before Occupancy

1 Point

Intent

Reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants.

Requirements

Develop and implement an Indoor Air Quality (IAQ) Management Plan for the pre-occupancy phase as follows:

- After construction ends and with all interior finishes installed, as described in the Reference Guide, install new filtration media and flush-out the building by supplying a total air volume of 14,000 ft³ of outdoor air per ft² of floor area while maintaining an internal temperature of at least 60 oF and, where mechanical cooling is operated, relative humidity no higher than 60%.
- The space may only be occupied following delivery of a minimum of 3,500 ft³ of outdoor air per ft² of floor area to the space, and provided the space is ventilated at minimum rate of 0.30 cfm/ft² of outside air or the design minimum outside air rate, whichever is greater, a minimum of three hours prior to occupancy and during occupancy, until the total of 14,000 ft³/ft² of outside air has been delivered to the space.

OR

- Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the United States Environmental Protection Agency “Compendium of Methods for the Determination of Air Pollutants in Indoor Air” and as additionally detailed in the Reference Guide.
- Demonstrate that the contaminants concentration levels listed below are not exceeded:

CONTAMINATE	MAXIMUM CONCENTRATION
Formaldehyde	50 parts per billion
Particulates (PM10)	50 micrograms per cubic meter
Total Volatile Organic Compounds (TVOC)	500 micrograms per cubic meter
* 4-Phenylcyclohexene (4-PCH)	6.5 micrograms per cubic meter
Carbon Monoxide (CO)	9 part per million and no greater than 2 parts per million above outdoor levels

* This test is only required only if carpets and fabrics with Styrene Butadiene (SB) latex backing material are installed as part of the base building systems.

- For each sampling point where the maximum concentration limits are exceeded conduct additional flushout with outside air and retest the specific parameter(s) that were exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been

met. When retesting non-complying building areas, take samples from the same locations as in the first test.

- The air sample testing shall be conducted as follows:
 - All measurements shall be conducted prior to occupancy, but during normal occupied hours, and with the building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
 - The building shall have all interior finishes installed, including but not limited to millwork, doors, paint, carpet, and acoustic tiles. Non-fixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
 - The number of sampling locations will vary depending upon the size of the building and number of ventilation systems. For each portion of the building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 ft², or for each contiguous floor area, whichever is larger, and include areas with the least ventilation and greatest presumed source strength.
 - Air samples are shall be collected between 4 feet and 7 feet from the floor to represent the breathing zone of occupants and over a minimum 4 hour period.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect, general contractor or responsible party, describing the building flush-out procedures and dates. Provide calculations to demonstrate that the required total air volumes and minimum ventilation volumes and rates have been delivered.

OR

- Provide the LEED-NC Letter Template, signed by the environmental consultant or responsible party, declaring that the air quality testing procedure has been conducted and that all areas tested are do not exceed the maximum allowable concentration limits.
- Provide a copy of the IAQ testing results that includes documentation of the results and the identifying the EPA testing method used. If alternative testing protocols are used, provide documentation and rationale justifying that the measured results meet the intent of the EPA testing methods.

Potential Technologies & Strategies

Prior to occupancy, perform a two week building flush-out or test the contaminant levels in the building. Coordinate with Indoor Environmental Quality Credits 3.1 and 5 and install only a single set of final filtration media. For IAQ testing consider using a recognized measurement protocol similar to the EPA "Compendium of Methods for the Determination of air Pollutants in Indoor Air." If alternative testing protocols are used, provide justification that the measured test results meet the intent of the EPA testing methods.

Copies of the IAQ testing results should describe the contaminant sampling and analytical methods, the locations and duration of contaminant samples, the field sampling log sheets and laboratory analytical data and the methods and results utilized to determine that the ventilation system was started at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode through the duration of the air testing.

EQ Credit 4.1: Low-Emitting Materials – Adhesives & Sealants

1 Point

Intent

Reduce the quantity of indoor air contaminants that are odorous, potentially irritating and/or harmful to the comfort and well-being of installers and occupants.

Requirements

All materials listed below that are used inside the exterior weatherproofing system must not exceed the following requirements:

- Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management District (SCAQMD) Rule #1168 requirements in effect on January 1, 2003 and rule amendment date of October 3, 2003.
- Aerosol Adhesives: Green Seal Standard GC-36 requirements in effect on October 19, 2000.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect or responsible party, listing the adhesives, sealants, sealant primers and aerosol adhesives used in the building and declaring that they meet the noted requirements. For each product in the listing, state the VOC level, the applicable standard, the classification of material and the VOC limit.

Potential Technologies & Strategies

Specify Low-VOC materials in construction documents. Ensure that VOC limits are clearly stated in each section of the specifications where adhesives and sealants are addressed. Provide product cut sheets, MSD sheets, signed attestations or other official literature from the manufacturer clearly identifying the emissions limits.

EQ Credit 4.2: Low-Emitting Materials – Paints and Coatings

1 Point

Intent

Reduce the quantity of indoor air contaminants that are odorous, potentially irritating and/or harmful to the comfort and well-being of installers and occupants.

Requirements

Paints and coating used on the interior of the building and applied on-site must not exceed the VOC limits and must not include any of the chemical components limited or restricted by the following standards:

- Topcoat Paints: Green Seal Standard GS-11, Paints, First Edition, May 20, 1993.
- Anti-Corrosive and Anti-Rust Paints: Green Seal Standard GS-03, Anti-Corrosive Paints, Second Edition, January 7, 1997. For applications on ferrous metal substrates.
- All other Architectural Coatings, Primers and Undercoats: South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect or responsible party, listing all the interior paints and coatings used in the building that are addressed by the referenced standards. State that they comply with the current VOC and chemical component limits and/or chemical component restrictions of each standard. For each product in the listing, state the VOC level, the applicable standard, the classification of material and the VOC limit.

Potential Technologies & Strategies

Specify Low-VOC paints and coatings in construction documents. Ensure that VOC limits are clearly stated in each section of the specifications where paints and coatings are addressed. Provide product cut sheets, MSD sheets, signed attestations or other official literature from the manufacturer clearly stating that VOC limits and restricted chemicals identified in the referenced standards are not present.

EQ Credit 4.3

1 Point

Low-Emitting Materials – Carpet Systems

Intent

Reduce the quantity of indoor air contaminants that are odorous, potentially irritating and/or harmful to the comfort and well-being of installers and occupants.

Requirements

Carpet systems must not exceed the target emissions factors of the Carpet and Rug Institute's:

- Carpet: Green Label Plus Program and Testing Procedures.
- Carpet Cushion: Green Label Program and Testing Procedure
- Carpet Adhesive: Green Label Program and Testing Procedure.

OR

Carpet systems must not exceed the maximum target emission factors and testing requirements identified below in a 24-hour chamber test. For carpets only, 14-day chamber testing may be used in lieu of the 24-hour testing at the discretion of the product manufacturer. Test results must be current within 12 months of product installation in the building.

CARPET 24-HOUR/14-DAY EMISSIONS TEST CRITERIA

(All values shown below apply to both test durations except as noted)

Target Contaminant	Maximum Emission Factor (micrograms/m ² per hour)	Predicted Office Building Target Air Concentration (for reference only) (micrograms/m ³)
TVOC	500	270
Acetaldehyde	8.3	4.5
Benzene	55	30
Caprolactam	130 (24-hour) / 190 (14-day)	70 (24-hour) / 100 (14-day)
2-Ethylhexanoic acid	46	25
Formaldehyde	31	16
1-methyl-2-pyrrolidinone	300	160
Naphthalene	8.3	4.5
Nonanal	24	13
Octanal	13	7.2
4-Phenylcyclohexene	4.6	2.5
Toluene	280	150
Styrene	410	220
Vinyl acetate	190	100

CUSHION 24-HOUR EMISSIONS TEST CRITERIA

Target Contaminant	Maximum Emission Factor (milligrams/m ² per hour)
TVOC	1.00
Butylated hydroxytoluene (BHT)	0.30
Formaldehyde	0.05
4-phenylcyclohexene (4-PC)	0.05

* TABLE NOTE: VOC content does not require 24-hour testing.

TESTING PROCEDURES: Each manufactured product must meet the testing requirements identified below. Testing data for individual materials used to fabricate a product can not be used to determine compliance with the established emissions criteria:

- **TESTING STANDARDS:** Environmental chamber test must be conducted following ASTM Standard D5116-97 "Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products". For adhesive only, determine VOC content following the method specified in EQ Credit 4.1.
- **PRODUCT SAMPLE COLLECTION:** Test specimens shall be selected or cut at random directly from normal material production runs, for roll goods, carpet tile and cushion. Test specimens for adhesives shall be collected from unopened manufacturer's containers. Specimens shall be packaged at the factory and shipped directly to testing laboratory by the manufacturer within 24-hours of production. Packaging shall preserve the chemical integrity of the specimen. Wrap the specimen in a manner that will eliminate direct contact with air or absorbent packaging materials other than an inert air barrier such as aluminum foil. A chain-of-custody form must accompany each test specimen.

Submittals

- Provide the LEED Letter Template, signed by the architect or responsible party, listing all the carpets, carpet cushions and carpet adhesives installed in the building and stating that they do not exceed the referenced emissions factors and VOC content, and have been tested according to the requirements. Include the Green Label Plus and Green Label CIR certification numbers in the list.
- Provide a copy of the test report from the testing facility, signed and dated by authorized laboratory personnel for each type of carpet, carpet cushion and carpet adhesive installed in the building. In the test report clearly indicate the emissions test results and compare them to the requirements, and state that the test requirements have been met.

Potential Technologies & Strategies

Specify requirements for maximum contaminate emissions clearly in the construction specifications where carpet, carpet cushion and carpet adhesives are addressed.

The "Green Label Plus" program for carpets and its associated VOC emission criteria in micrograms per square meter per hour developed by the Carpet & Rug Institute (CRI) in coordination with California's Sustainable Building Task Force and the California Department of Health Services (DHS) are described in Section 9, "Acceptable Emissions Testing for Carpet," DHS document CA/DHS/EHLB/R-174, dated 07/15/04. This document is available at http://www.dhs.ca.gov/ps/deodc/ehlb/iaq/VOCS/Section_01350_07_15_2004_FINAL.pdf.

Chronic reference exposure levels (CRELs) are concentrations at or below which serious noncancer systemic health effects are unlikely to occur among a diverse human population (including sensitive individuals) continuously exposed over ten years or more. For further information about CRELS check with the California Environmental Protection Agency (Cal/EPA) at www.calepa.ca.gov/air/chronic_rels/index.html. **The one exception to using CREL is for formaldehyde which is set to higher emissions level to address issues related to the ability of meeting the emissions criteria based on current industry practices.**

Use accepted testing method criteria such as “The Test Method For Determining Total Volatile Organic Compound Emission Factors From Carpet and Associated Materials Under Defined Test Conditions Using Small Environmental Chambers” from the EPA Carpet Policy Dialogue Compendium Report, September 1991, EPA/560/2-91-002. This document is available from www.ntis.gov.

EQ Credit 4.4: Low-Emitting Materials – Composite Wood and Laminate Adhesives

1 Point

Intent

Reduce the quantity of indoor air contaminants that are odorous, potentially irritating and/or harmful to the comfort and well-being of installers and occupants.

Requirements

Composite wood and agrifiber products, including core materials, must contain no added urea-formaldehyde resins. Adhesives used in field- and shop-fabricated assemblies containing these products must contain no urea-formaldehyde.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect or responsible party, listing all the composite wood products used in the building and stating that they contain no added urea-formaldehyde resins, and listing all the laminating adhesives used in the building and stating that they contain no urea-formaldehyde.
- Provide documentation for all core and adhesive products used on the project indicating that products used contained no added urea-formaldehyde

Potential Technologies & Strategies

Specify wood and agrifiber products that contain no added urea-formaldehyde resins. Specify laminating adhesives for field and shop applied assemblies, including adhesives and veneers that contain no urea-formaldehyde. Review product cut sheets, MSD sheets, signed attestations or other official literature from the manufacturer clearly identifying the emissions limits.

EQ Credit 5: Indoor Chemical & Pollutant Source Control

1 Point

Intent

Minimize exposure of building occupants to potentially hazardous particulates, biological contaminants and chemical pollutants that adversely impact air and water quality.

Requirements

Design to minimize and control pollutant or biological contaminant entry into buildings and later cross-contamination of regularly occupied areas:

- Employ permanent entryway systems (grills, grates, etc.) to capture dirt, particulates, etc. from entering the building at all high volume entryways.
- Where hazardous gases or chemicals may be present or used (including garages, housekeeping/laundry areas, and copying/printing rooms), provide segregated areas with deck to deck partitions with separate outside exhaust at a rate of at least 0.50 cubic feet per minute per square foot, no air re-circulation, and operated at a negative pressure compared with the surrounding spaces of at least an average of 5 Pa (0.02 inches of water gauge) and with a minimum of 1 Pa (0.004 inches of water) when the doors to the rooms are closed.
- Provide containment drains plumbed for appropriate disposal of hazardous liquid wastes in places where water and chemical concentrate mixing occurs for maintenance, or laboratory purposes.
- Provide regularly occupied areas of the building with new air filtration media prior to occupancy that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect or responsible party, declaring that:
 - Permanent entryway systems (grilles, grates, etc.) to capture dirt, particulates, etc. are provided at all high volume entryways.
 - Chemical use areas and copy rooms have been physically separated with deck-to-deck partitions; independent exhaust ventilation has been installed at the required exhaust rate and negative pressure differential.
 - Drains in facility cleaning and maintenance areas are plumbed for environmentally appropriate disposal of hazardous liquid wastes.
 - Filters used meet the MERV requirements with new media installed prior to occupancy. Provide a listing of each filter installed including the MERV value, manufacturer name and model number.

Potential Technologies & Strategies

Design facility cleaning and maintenance areas with isolated exhaust and plumbing drainage systems for contaminants. Maintain physical isolation from the rest of the regularly occupied areas of the building. Install permanent architectural entryway systems such as grills or grates to

prevent occupant-borne contaminants from entering the building. Install high-level filtration systems in air handling units processing both return air and outside supply air. Ensure that air handling units can accommodate required filter sizes.

EQ Credit 6.1: Controllability of Systems – Lighting

1 Point

Intent

Provide a high level of temperature and ventilation, or lighting system control by individual occupants or specific groups in multi-occupant spaces (i.e. classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants.

Requirements

Provide individual lighting controls for 90% of the building occupants, enabling adjustments to suit individual task needs and preferences. And, provide lighting system controllability for all shared multi-occupant spaces enabling adjustment to meet group needs and preferences.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect or responsible party, demonstrating and declaring that the required lighting controls are provided.

Potential Technologies & Strategies

Design the building with occupant controls for lighting. Strategies to consider include lighting controls and task lighting. Integrate lighting systems controllability into the overall lighting design, providing ambient and task lighting while managing the overall energy use of the building.

EQ Credit 6.2: Controllability of Systems – Temperature and Ventilation

1 Point

Intent

Provide a high level of temperature and ventilation, or lighting system control by individual occupants or specific groups in multi-occupant spaces (i.e. classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants.

Requirements

Provide individual temperature and ventilation controls for 50% of the occupants. Operable windows can be used in lieu of individual controls for occupants of areas that are 20 feet inside of and 10 feet to either side of the operable part of the window. The areas of operable window must meet the requirements of ASHRAE 62-2001 paragraph 5.1 Natural Ventilation. And, multi-occupant spaces where transient occupant groups share the space must provide temperature and ventilation controls to meet group needs and preferences.

Submittals

- Provide the LEED-NC Letter Template, signed by the architect or responsible party, demonstrating and declaring that the required ventilation and temperature controls are provided

Potential Technologies & Strategies

Design the building with occupant controls for airflow, temperature and ventilation. Strategies to consider include underfloor HVAC systems with individual diffusers, displacement ventilation systems with control devices, ventilation walls and mullions, and operable windows. Integrate temperature and ventilation systems controllability into the environmental systems design providing for individual space environments while managing the overall energy use of the building.

EQ Credit 7.1: Thermal Comfort – Compliance

1 Point

Intent

Provide a thermally comfortable environment that supports the productivity and well-being of building occupants.

Requirements

Comply with ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy.

Submittals

- Provide the LEED-NC Letter Template, signed by the engineer or responsible party, declaring that the project design complies with ASHRAE Standard 55-2004 and that design compliance documentation and performance validation per Section 6 of the standard has been successfully completed or will be provided under existing contracts.

Potential Technologies & Strategies

Establish comfort criteria per the standard and design the building envelope and HVAC system to maintain these comfort ranges.

EQ Credit 7.2: Thermal Comfort – Monitoring

1 Point

Intent

Provide a thermally comfortable environment that supports the productivity and well-being of building occupants.

Requirements

Provide a permanent monitoring system and process for corrective action to ensure building performance to the desired comfort criteria as determined by EQ Credit 7.1, Thermal Comfort - Compliance.

Submittals

- Provide the LEED-NC Letter Template, signed by the engineer or responsible party, that identifies the comfort criteria, strategy for ensuring performance to the comfort criteria, description of the permanent monitoring system implemented, and process for corrective action.

Potential Technologies & Strategies

ASHRAE Standard 55-2004 Paragraph 7 Evaluation of the Thermal Environment provides guidance on measurement of building performance parameters and two methods for validating performance: (a) Survey Occupants and (b) Analyze Environment Variables. The permanent monitoring system required here may apply either approach, survey or technical system, where the process or system is integrated into the standard operating processes of the building.

EQ Credit 8.1: Daylight and Views – Daylight 75% of Spaces

1 Point

Intent

Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

Requirements

Achieve a minimum Daylight Factor of 2% (excluding all direct sunlight penetrations) or achieve at least 25 footcandles using a computer simulation model in 75% of all regularly occupied areas. Provide daylight redirection and/or glare control devices to ensure daylight effectiveness. Exceptions for areas where tasks would be hindered by the use of daylight will be considered on their merits.

Submittals

- Provide the LEED-NC Letter Template signed by the responsible party. Provide area calculations that define the daylight zones and provide a summary of daylight factor prediction calculations through manual methods or a summary of computer simulations illustrating that the footcandle levels have been achieved.

Potential Technologies & Strategies

Design the building to maximize interior daylighting. Strategies to consider include building orientation, shallow floor plates, increased building perimeter, exterior and interior permanent shading devices, high performance glazing and photo-integrated light sensors. Predict daylight factors via manual calculations or model daylighting strategies with a physical or computer model to assess footcandle levels and daylight factors achieved. Modeling must demonstrate 25 horizontal footcandles under clear sky conditions, at noon, on the equinox, at 30 inches above the floor. Any portion of a room achieving the requirements can qualify for this credit.

EQ Credit 8.2: Daylight and Views – Views for 90% of Spaces

1 Point

Intent

Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

Requirements

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

- Areas directly connected to perimeter windows must have a glazing-to-floor area ratio of at least 0.07. Parts of the floor area with horizontal view angles of less than 10 degrees at 50 inches above the floor can not be included in this calculation.
- Areas not directly connected to perimeter windows must have a horizontal view angle of less than 10 degrees at 50 inches above the floor involving 50% or more of the floor area. If a room meets these requirements then the entire room area is considered to meet the view requirement. Exceptions will be considered on their merits.

Submittals

- Provide the LEED-NC Letter Template and calculations describing, demonstrating and declaring that the building occupants in regularly occupied areas will have direct lines of site to perimeter glazing and noting the actual glazing-to-floor area ratios for perimeter windows. Provide drawings highlighting the direct line of sight zones and the critical horizontal view angles.

Potential Technologies & Strategies

Design the space to maximize daylighting and view opportunities. Strategies to consider include lower partition heights, interior shading devices, interior glazing, and photo integrated light sensors.

Innovation & Design Process

ID Credit 1

1–4 Points

Intent

To provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by the LEED-NC Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED-NC Green Building Rating System.

Requirements

Credit 1.1 (1 point) In writing, identify the intent of the proposed innovation credit, the proposed requirement for compliance, the proposed submittals to demonstrate compliance, and the design approach (strategies) that might be used to meet the requirements.

Credit 1.2 (1 point) Same as Credit 1.1

Credit 1.3 (1 point) Same as Credit 1.1

Credit 1.4 (1 point) Same as Credit 1.1

Submittals

- Provide the proposal(s) within the LEED-NC Letter Template (including intent, requirement, submittals and possible strategies) and relevant evidence of performance achieved.

Potential Technologies & Strategies

Substantially exceed a LEED-NC performance credit such as energy performance or water efficiency. Apply strategies or measures that are not covered by LEED-NC such as acoustic performance, education of occupants, community development or lifecycle analysis of material choices.

LEED Accredited Professional

ID Credit 2

1 Point

Intent

To support and encourage the design integration required by a LEED-NC Green Building project and to streamline the application and certification process.

Requirement

At least one principal participant of the project team that has successfully completed the LEED Accredited Professional exam

Submittals

- Provide the LEED-NC Letter Template stating the LEED Accredited Professional's name, title, company and contact information.

Potential Technologies & Strategies

Attending a LEED Accredited Professional Training Workshop is recommended but not required. Study the LEED-NC Reference Guide. Successfully pass the LEED accreditation exam.