LEED 2009 FOR HEALTHCARE

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USGBC Member Approved May 2011

PREFACE FROM USGBC

The built environment has a profound impact on our natural environment, economy, health, and productivity. Breakthroughs in building science, technology, and operations are now available to designers, builders, operators, and owners who want to build green and maximize both economic and environmental performance.

Through the LEED® green building certification program, the U.S. Green Building Council (USGBC) is transforming the built environment. The green building movement offers an unprecedented opportunity to respond to the most important challenges of our time, including global climate change, dependence on non sustainable and expensive sources of energy, and threats to human health. The work of innovative building professionals is a fundamental driving force in the green building moment. Such leadership is a critical component to achieving USGBC's mission of a sustainable built environment for all within a generation.

USGBC MEMBERSHIP

USGBC's greatest strength is the diversity of our membership. USGBC is a balanced, consensus based nonprofit with more than 16,000 member companies and organizations representing the entire building industry. Since its inception in 1993, USGBC has played a vital role in providing a leadership forum and a unique, integrating force for the building industry. USGBC's programs have three distinguishing characteristics:

Committee-based

The heart of this effective coalition is our committee structure, in which volunteer members design strategies that are implemented by staff and expert consultants. Our committees provide a forum for members to resolve differences, build alliances, and forge cooperative solutions for influencing change in all sectors of the building industry.

Member-driven

Membership is open and balanced and provides a comprehensive platform for carrying out important programs and activities. We target the issues identified by our members as the highest priority. We conduct an annual review of achievements that allows us to set policy, revise strategies, and devise work plans based on members' needs.

Consensus-focused

We work together to promote green buildings, and in doing so, we help foster greater economic vitality and environmental health at lower costs. We work to bridge ideological gaps between industry segments and develop balanced policies that benefit the entire industry.

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LEED 2009 FOR HEALTHCARE PROJECT CHECKLIST

Sustainable Sites		18 Possible Points
☑ Prerequisite 1	Construction Activity Pollution Prevention	Required
☑ Prerequisite 2	Environmental Site Assessment	Required
☐ Credit 1	Site Selection	1
☐ Credit 2	Development Density and Community Connectivity	1
☐ Credit 3	Brownfield Redevelopment	1
☐ Credit 4.1	Alternative Transportation—Public Transportation Access	3
☐ Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
☐ Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	1
☐ Credit 4.4	Alternative Transportation—Parking Capacity	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—Quantity Control	1
☐ Credit 6.2	Stormwater Design—Quality Control	1
☐ Credit 7.1	Heat Island Effect—Nonroof	1
☐ Credit 7.2	Heat Island Effect—Roof	1
☐ Credit 8	Light Pollution Reduction	1
☐ Credit 9.1	Connection to the Natural World—Places of Respite	1
☐ Credit 9.2	Connection to the Natural World—Direct Exterior Access for Patients	1

Water Efficiency		9 Possible Points
☑ Prerequisite 1	Water Use Reduction	Required
☑ Prerequisite 2	Minimize Potable Water Use for Medical Equipment Cooling	Required
☐ Credit 1	Water Efficient Landscaping—No Potable Water Use or No Irrigation	2
☐ Credit 2	Water Use Reduction—Measurement and Verification	1-2
☐ Credit 3	Water Use Reduction	1-3
☐ Credit 4.1	Water Use Reduction—Building Equipment	1
☐ Credit 4.2	Water Use Reduction—Cooling Towers	1
☐ Credit 4.3	Water Use Reduction—Food Waste Systems	1

Energy and Atmosphere		39 Possible Points
☑ Prerequisite 1	Fundamental Commissioning of Building Energy Systems	Required
☑ Prerequisite 2	Minimum Energy Performance	Required
☑ Prerequisite 3	Fundamental Refrigerant Management	Required
☐ Credit 1	Optimize Energy Performance	1–24
☐ Credit 2	On-site Renewable Energy	1–8
☐ Credit 3	Enhanced Commissioning	1-2
☐ Credit 4	Enhanced Refrigerant Management	1
☐ Credit 5	Measurement and Verification	2
☐ Credit 6	Green Power	1
☐ Credit 7	Community Contaminant Prevention—Airborne Releases	1

Materials and Resources — 16 Possible Points

☑	Prerequisite 1	Storage and Collection of Recyclables	Required
☑	Prerequisite 2	PBT Source Reduction—Mercury	Required
☐	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors and Roof	1-3
☐	Credit 1.2	Building Reuse—Maintain Existing Interior Nonstructural Elements	1
☐	Credit 2	Construction Waste Management	1-2
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☐	Credit 4.1	PBT Source Reduction—Mercury in Lamps	1
☐	Credit 4.2	PBT Source Reduction—Lead, Cadmium and Copper	2
☐	Credit 5	Furniture and Medical Furnishings	1-2
☐	Credit 6	Resource Use—Design for Flexibility	1

Indoor Environmental Quality — 18 Possible Points

☑	Prerequisite 1	Minimum Indoor Air Quality Performance	Required
☑	Prerequisite 2	Environmental Tobacco Smoke (ETS) Control	Required
☑	Prerequisite 3	Hazardous Material Removal or Encapsulation (Renovations Only)	Required
☐	Credit 1	Outdoor Air Delivery Monitoring	1
☐	Credit 2	Acoustic Environment	1-2
☐	Credit 3.1	Construction Indoor Air Quality Management Plan—During Construction	1
☐	Credit 3.2	Construction Indoor Air Quality Management Plan—Before Occupancy	1
☐	Credit 4	Low-Emitting Materials	1-4
☐	Credit 5	Indoor Chemical and Pollutant Source Control	1
☐	Credit 6.1	Controllability of Systems—Lighting	1
☐	Credit 6.2	Controllability of Systems—Thermal Comfort	1
☐	Credit 7	Thermal Comfort—Design and Verification	1
☐	Credit 8.1	Daylight and Views—Daylight	2
☐	Credit 8.2	Daylight and Views—Views	1-3

Innovation in Design — 6 Possible Points

☑	Prerequisite 1	Integrated Project Planning and Design	Required
☐	Credit 1	Innovation in Design	1-4
☐	Credit 2	LEED Accredited Professional	1
☐	Credit 3	Integrated Project Planning and Design	1

Regional Priority — 4 Possible Points

☐	Credit 1	Regional Priority	1-4

LEED 2009 for Healthcare

100 base points; 6 possible Innovation in Design and 4 Regional Priority points

Certified	40–49 points
Silver	50–59 points
Gold	60–79 points
Platinum	80 points and above

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INTRODUCTION

I. LEED® GREEN BUILDING RATING SYSTEM

Background on LEED®

Following the formation of the U.S. Green Building Council (USGBC) in 1993, the organization's members quickly realized that the sustainable building industry needed a system to define and measure "green buildings." USGBC began to research existing green building metrics and rating systems. Less than a year after formation, the members acted on the initial findings by establishing a committee to focus solely on this topic. The composition of the committee was diverse; it included architects, real estate agents, a building owner, a lawyer, an environmentalist, and industry representatives. This cross section of people and professions added a richness and depth both to the process and to the ultimate product.

The first LEED Pilot Project Program, also referred to as LEED Version 1.0, was launched at the USGBC Membership Summit in August 1998. After extensive modifications, LEED Green Building Rating System Version 2.0 was released in March 2000, with LEED Version 2.1 following in 2002 and LEED Version 2.2 following in 2005.

As LEED has evolved and matured, the program has undertaken new initiatives. In addition to a rating system specifically devoted to building operational and maintenance issues (LEED for Existing Buildings: Operations & Maintenance), LEED addresses the different project development and delivery processes that exist in the U.S. building design and construction market, through rating systems for specific building typologies, sectors, and project scopes: LEED for Core & Shell, LEED for New Construction, LEED for Schools, LEED for Neighborhood Development, LEED for Retail, LEED for Healthcare, LEED for Homes, and LEED for Commercial Interiors.

Project teams interact with the Green Building Certification Institute (GBCI) for project registration and certification. GBCI was established in 2008 as a separately incorporated entity with the support of the U.S. Green Building Council. GBCI administers credentialing and certification programs related to green building practice. These programs support the application of proven strategies for increasing and measuring the performance of buildings and communities as defined by industry systems such as LEED.

The green building field is growing and changing daily. New technologies and products are being introduced into the marketplace, and innovative designs and practices are proving their effectiveness. The LEED rating systems and reference guides will evolve as well. Project teams must comply with the version of the rating system that is current at the time of their registration.

USGBC will highlight new developments on its website on a continual basis at www.usgbc.org.

LEED for Healthcare and the Green Guide for Health Care

The LEED for Healthcare rating system represents a culmination of seven years of close collaboration between the Green Guide for Health Care (GGHC) and USGBC. GGHC, a joint project of Health Care Without Harm and Center for Maximum Potential Building Systems, has helped to streamline the LEED for Healthcare development schedule by aligning with the LEED for New Construction rating system's organizational structure. The GGHC is the first voluntary, self-certifying toolkit of green building best practices customized for the healthcare sector. The GGHC conducted a robust pilot program that included more than 100 health care facilities that informed the development of the LEED for Healthcare rating system.

Features of LEED®

The LEED Green Building Rating Systems are voluntary, consensus-based, and market-driven. Based on existing and proven technology, they evaluate environmental performance from a whole building perspective over a building's life cycle, providing a definitive standard for what constitutes a green building in design, construction, and operation.

The LEED rating systems are designed for rating new and existing commercial, institutional, and residential buildings. They are based on accepted energy and environmental principles and strike a balance between known, established practices and emerging concepts. Each rating system is organized into 5 environmental categories: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. An additional category, Innovation in Design, addresses sustainable building expertise as well as design measures not covered under the 5 environmental categories. Regional bonus points are another feature of LEED and acknowledge the importance of local conditions in determining best environmental design and construction practices.

The LEED Credit Weightings

In LEED 2009, the allocation of points between credits is based on the potential environmental impacts and human benefits of each credit with respect to a set of impact categories. The impacts are defined as the environmental or human effect of the design, construction, operation, and maintenance of the building, such as greenhouse gas emissions, fossil fuel use, toxins and carcinogens, air and water pollutants, indoor environmental conditions. A combination of approaches, including energy modeling, life-cycle assessment, and transportation analysis, is used to quantify each type of impact. The resulting allocation of points among credits is called credit weighting.

LEED 2009 uses the U.S. Environmental Protection Agency's TRACI[1] environmental impact categories as the basis for weighting each credit. TRACI was developed to assist with impact evaluation for life-cycle assessment, industrial ecology, process design, and pollution prevention.

LEED 2009 also takes into consideration the weightings developed by the National Institute of Standards and Technology (NIST); these compare impact categories with one another and assign a relative weight to each. Together, the 2 approaches provide a solid foundation for determining the point value of each credit in LEED 2009.

The LEED 2009 credit weightings process is based on the following parameters, which maintain consistency and usability across rating systems:

- All LEED credits are worth a minimum of 1 point.
- All LEED credits are positive, whole numbers; there are no fractions or negative values.
- All LEED credits receive a single, static weight in each rating system; there are no individualized scorecards based on project location.
- All LEED rating systems have 100 base points; Innovation in Design (or Operations) and Regional Priority credits provide opportunities for up to 10 bonus points.

Given the above criteria, the LEED 2009 credit weightings process involves 3 steps:

1. A reference building is used to estimate the environmental impacts in 13 categories associated with a typical building pursuing LEED certification.
2. The relative importance of building impacts in each category are set to reflect values based on the NIST weightings.[2]
3. Data that quantify building impacts on environmental and human health are used to assign points to individual credits.

Each credit is allocated points based on the relative importance of the building-related impacts that it addresses. The result is a weighted average that combines building impacts and the relative value of the impact categories. Credits that most directly address the most important impacts are given the greatest weight, subject to the system design parameters described above. Credit weights also reflect a decision by LEED to recognize the market implications of point allocation. The result is a significant change in allocation of points compared with previous LEED rating systems. Overall, the changes increase the relative emphasis on the reduction of energy consumption and greenhouse gas emissions associated with building systems, transportation, the embodied energy of water, the embodied energy of materials, and where applicable, solid waste.

The details of the weightings process vary slightly among individual rating systems. For example, LEED for Existing Buildings: Operations & Maintenance includes credits related to solid waste management but LEED for New Construction does not. This results in a difference in the portion of the environmental footprint addressed by each rating system and the relative allocation of points. The weightings process for each rating system is fully documented in a weightings workbook.

The credit weightings process will be reevaluated over time to incorporate changes in values ascribed to different building impacts and building types, based on both market reality and evolving scientific knowledge related to buildings. A complete explanation of the LEED credit weightings system is available on the USGBC website, at www.usgbc.org.

Regional Priority Credits

To provide incentive to address geographically specific environmental issues, USGBC regional councils and chapters have identified 6 credits per rating system that are of particular importance to specific areas. If the identified credits were not applicable to LEED 2009 for Healthcare, the Regional Priority Working Group identified alternative regional priority credits. Each regional priority credit is worth an additional 1 point, and a total of 4 regional priority points may be earned. Upon project registration, LEED-Online automatically determines a project's regional priority credits based on its zip code. If the project achieves more than 4 regional priority credits, the team can choose the credits for which these points will apply. The USGBC website also contains a searchable database of regional priority credits.

II. OVERVIEW AND PROCESS

The LEED 2009 for Healthcare Green Building Rating System is a set of performance standards for certifying health care facilities. The intent is to promote healthful, durable, affordable, and environmentally sound practices in building design and construction.

Prerequisites and credits in the LEED 2009 for Healthcare addresses 7 topics:

- Sustainable Sites (SS)
- Water Efficiency (WE)
- Energy and Atmosphere (EA)
- Materials and Resources (MR)
- Indoor Environmental Quality (IEQ)
- Innovation in Design (ID)
- Regional Priority (RP)

LEED 2009 for Healthcare certifications are awarded according to the following scale:

Certified	40–49 points
Silver	50–59 points
Gold	60–79 points
Platinum	80 points and above

GBCI will recognize buildings that achieve one of these rating levels with a formal letter of certification.

When to Use LEED 2009 for Healthcare

LEED for Healthcare was written primarily for inpatient and outpatient care facilities and licensed long term care facilities. The rating system may also be used for medical offices, assisted living facilities and medical education and research centers. LEED for Healthcare addresses design and construction activities for both new buildings and major renovations of existing buildings. A major renovation involves major HVAC renovation, significant envelope modifications, and major interior rehabilitation. For a major renovation of an existing building, LEED for Healthcare is the appropriate rating system. If the project scope does not involve significant design and construction activities and focuses more on operations and maintenance activities, LEED for Existing Buildings: Operations & Maintenance is more appropriate because it addresses operational and maintenance issues of working buildings.

Registration

Project teams interested in earning LEED certification for their buildings must first register the project with GBCI. Projects can be registered on the GBCI website (www.gbci.org). The website also has information on registration costs for USGBC national members as well as nonmembers. Registration is an important step that establishes contact with GBCI and provides access to software tools, errata, critical communications, and other essential information.

Certification

To earn LEED certification, the applicant project must satisfy all the prerequisites and qualify for a minimum number of points to attain the established project ratings as listed below. Having satisfied the basic prerequisites of the program, applicant projects are then rated according to their degree of compliance within the rating system.

LEED 2009 for Healthcare provides the option of splitting a certification application into two phases: design and construction. Documentation for design phase credits, identified in LEED-Online, can be submitted for review at the end of the design phase; the submittals for these credits can be fully evaluated based on documentation available during this phase of the project. For example, if a project site meets the requirements of LEED for Healthcare SS Credit 3, Brownfield Redevelopment, the likelihood of credit achievement can be assessed before construction is complete. The LEED credit itself, however, is not awarded at the design review stage.

For more information on the LEED certification process including LEED-Online, Credit Interpretation Requests and Rulings, Appeals, and Fees please see the LEED Reference Guide for Green Building Design and Construction, 2009 Edition Healthcare Supplement and visit www.usgbc.org or www.gbci.org.

III. MINIMUM PROGRAM REQUIREMENTS

The LEED 2009 Minimum Program Requirements (MPRs) is a USGBC policy that lists the minimum characteristics that a project must possess in order to be eligible for certification under LEED 2009. These requirements define the categories of buildings that the LEED rating systems were designed to evaluate, and taken together serve three goals: to give clear guidance to customers, to protect the integrity of the LEED program, and to reduce challenges that occur during the LEED certification process. It is expected that MPRs will evolve over time

along with LEED rating system improvements. The requirements will apply only to those projects registering under LEED 2009 and are an important part of the registration process. The MPRs can be reviewed in the LEED Resources section of www.usgbc.org.

IV. EXEMPLARY PERFORMANCE STRATEGIES

Exemplary performance strategies result in performance that greatly exceeds the performance level or expands the scope required by an existing LEED 2009 for Healthcare credit. To earn exemplary performance credits, teams must meet the performance level defined by the next step in the threshold progression. For credits with more than 1 compliance path, an Innovation in Design point can be earned by satisfying more than 1 compliance path if their benefits are additive.

The credits for which exemplary performance points are available through expanded performance or scope are noted in the LEED Reference Guide for Green Design & Construction, 2009 Edition Healthcare Supplement and in LEED-Online.

ENDNOTES

[1] Tools for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI). U.S. Environmental Protection Agency, Office of Research and Development. http://www.epa.gov/nrmrl/std/sab/traci/.

[2] Relative impact category weights based on an exercise undertaken by NIST (National Institute of Standards and Technology) for the BEES program. http://www.bfrl.nist.gov/oae/software/bees/.

SS Prerequisite 1: Construction Activity Pollution Prevention

Required

Intent

Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.

Requirements

Create and implement an erosion and sedimentation control (ESC) plan for all construction activities associated with the project. The ESC plan must conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit OR local standards and codes, whichever is more stringent. The plan must describe the measures implemented to accomplish 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 sewers or receiving streams.
- Prevent pollution of the air with dust and particulate matter.

The EPA's construction general permit (CGP) outlines the provisions necessary to comply with Phases I and II of the National Pollutant Discharge Elimination System (NPDES) Program. While the CGP permit only applies to construction sites greater than one acre, the requirements are applied to all projects for the purposes of this prerequisite. Information on the EPA construction general permit is available at http://cfpub.epa.gov/npdes/stormwater/cgp.cfm.

SS Prerequisite 2: Environmental Site Assessment

Required

Intent

Ensure that the site is assessed for environmental contamination and, if contaminated, that the environmental contamination has been remediated to protect occupant health.

Requirements

Conduct a Phase I Environmental Site Assessment (as described in ASTM E1527-05) to determine if environmental contamination exists at the site. If contamination is suspected, conduct a Phase II Environmental Site Assessment [as described in ASTM E1903-97 (2002)].

AND

Sites that are contaminated due to the past existence of a landfill on the site are prohibited. If the site is otherwise contaminated, then it must be remediated to meet local, state or federal EPA region residential (unrestricted) standards, whichever is the most stringent. Documentation from the authority must be provided, such as EPA's Ready for Reuse document, to prove "safe" levels of contamination have been achieved. As the remediation process leads to significant environmental benefit, one point (in SS Credit 3: Brownfield Redevelopment) will be given for successful documented remediation of the site.

SS Credit 1: Site Selection

1 Point

Intent

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

Requirements

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

- Prime farmland as defined by the U.S. 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).
- Previously undeveloped land whose elevation is lower than five feet above the elevation of the 100-year flood as defined by the Federal Emergency Management Agency (FEMA).
- Land specifically identified as habitat for any species on federal or state threatened or endangered lists.
- Land within 100 feet of any wetlands as defined by the U.S. 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 within setback distances from wetlands prescribed in state or local regulations, as defined by local or state rule or law, whichever is more stringent.
- Previously undeveloped land that is within 50 feet of a water body, defined as seas, lakes, rivers, streams and tributaries that support or could support fish, recreation or industrial use, consistent with the terminology of the Clean Water Act.
- Land that 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).

SS Credit 2: Development Density and Community Connectivity

1 Point

Intent

Channel development to urban areas with existing infrastructure, protect greenfields, and preserve habitat and natural resources. In rural areas, increase development density on sites with existing or previously developed health care facilities rather than on undeveloped rural land.

Requirements

OPTION 1. Development Density

Construct or renovate a building on a previously developed site AND in a community with a minimum density of 60,000 square feet per acre net. The density calculation is based on a typical, two-story downtown development and must include the area of the project being built.

OR

OPTION 2. Community Connectivity

Construct or renovate a building on a site that meets the following criteria:

- Located on a previously developed site,
- Located within 1/2-mile of a residential area or neighborhood with an average density of 10 units per acre net,
- Located within 1/2-mile of at least 10 basic services, and
- Pedestrian access available between the building and the services.

For mixed-use projects, no more than three services within the project boundary may be counted towards the ten basic services, provided it is open to the public. No more than two of the ten services required may be anticipated (i.e., at least eight must be existing and operational). In addition, the anticipated services must demonstrate that they will be operational in the locations indicated within 1 year of occupation of the applicant project.

Examples of basic services include the following:

- Bank
- Place of Worship
- Convenience Grocery
- Day Care Center
- Cleaners
- Fire Station
- Beauty Salon
- Hardware
- Laundry
- Library
- Medical or Dental Office
- Senior Care Facility
- Park
- Pharmacy
- Post Office
- Restaurant
- School
- Supermarket
- Theater
- Community Center
- Fitness Center
- Museum
- Hotel
- Medical Device Supplier
- Home Healthcare Service Provider
- Healthcare Support Agencies
- Family Support Facility
- Rehabilitation Facility

Proximity is determined by drawing a 1/2-mile radius around a main building entrance on a site map and counting the services within that radius.

OR

OPTION 3. EXISTING RURAL SITES[1]

For previously developed existing rural healthcare campus sites, achieve a minimum development density of 30,000 square feet per acre.

1 For the purposes of this credit, "rural land" is defined in accordance with U.S. Census Bureau definitions: settlements comprising less than 2,500 persons, areas outside of incorporated census designated places and the rural portions of extended cities. For additional information, visit http://www.census.gov/population/censusdata/urdef.txt.

SS Credit 3: Brownfield Redevelopment

1 Point

Intent

Rehabilitate damaged sites where development is complicated by environmental contamination and to reduce pressure on undeveloped land.

Requirements

Projects can only obtain this point via SS Prerequisite 2: Environmental Site Assessment, by remediating site contamination.

SS Credit 4.1: Alternative Transportation—Public Transportation Access

3 Points

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

OPTION 1. Rail Station Proximity

Locate the project within 1/2-mile walking distance (measured from a main building entrance) of an existing or planned and funded commuter rail, light rail or subway station.

For stations located greater than 1/8-mile from building entrance, provide an on-demand shuttle service with a documented service plan.

OR

OPTION 2. Bus Stop Proximity

Locate the project within 1/8-mile walking distance (measured from a main building entrance) of one or more stops for two or more public, campus, or private bus lines usable by building occupants.

SS Credit 4.2: Alternative Transportation—Bicycle Storage and Changing Rooms

1 Point

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

CASE 1. Commercial or Institutional Projects

Provide secure bicycle racks and/or storage within 200 yards of a building entrance for 5% or more of all Full Time Equivalent (FTE) staff(measured at peak periods)

Provide showers and changing facilities in the building, or within 200 yards of a primary staff building entrance, for 0.5% of FTE staff (measured at peak periods).

CASE 2. Residential Projects

For residential buildings, provide covered storage facilities for securing bicycles for 15% or more of building occupants, in lieu of changing/shower 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

OPTION 1

Provide preferred parking[1] for low-emitting and fuel-efficient vehicles[2] for 5% of the total vehicle parking capacity of the site. Providing a discounted parking rate is an acceptable substitute for preferred parking for low-emitting/fuel-efficient vehicles. To establish a meaningful incentive in all potential markets, the parking rate must be discounted at least 20%. The discounted rate must be available to all customers (i.e., not limited to the number of customers equal to 5% of the vehicle parking capacity), publicly posted at the entrance of the parking area and available for a minimum of two years.

OR

OPTION 2

Install alternative-fuel fueling stations for 3% of the total vehicle parking capacity of the site. Liquid or gaseous fueling facilities must be separately ventilated or located outdoors.

OR

OPTION 3

Provide low-emitting and fuel-efficient vehicles for 3% of Full Time Equivalent (FTE) staff measured at peak periods.

Provide preferred parking for these vehicles.

OR

OPTION 4

Provide staff access to a low-emitting or fuel-efficient vehicle-sharing program. The following requirements must be met:

- One low-emitting or fuel-efficient vehicle must be provided per 3% of FTE staff measured at peak periods, assuming that one shared vehicle can carry eight persons (i.e., 1 vehicle per 267 FTE occupants). For buildings with fewer than 267 FTE staff, at least one low emitting or fuel-efficient vehicle must be provided.
- A vehicle-sharing contract must be provided that has an agreement of at least two years.

1 "Preferred parking" refers to the parking spots that are closest to the main entrance of the project (exclusive of accessible spaces) or parking passes provided at a discounted price.

2 For the purposes of this credit, "low-emitting/fuel-efficient vehicles" are defined as vehicles that are either classified as Zero Emission Vehicles (ZEV) by the California Air Resources Board or have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.

- The estimated number of customers served per vehicle must be supported by documentation.
- A narrative explaining the vehicle-sharing program and its administration must be submitted.
- Parking for low-emitting and fuel-efficient vehicles must be located in the nearest available spaces in the nearest available parking area. Provide a site plan or area map clearly highlighting the walking path from the parking area to the project site and noting the distance.

SS Credit 4.4: Alternative Transportation—Parking Capacity

1 Point

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

CASE 1. Non-Residential Healthcare Projects

OPTION 1

Size parking capacity to meet, but not exceed, minimum local zoning requirements OR health department regulatory authority, whichever is the overriding requirement.

Provide preferred parking[1] for carpools or vanpools for 5% of the total parking spaces.

OR

OPTION 2

For projects that provide parking for less than 5% of full-time equivalent (FTE) staff:

Provide preferred parking for carpools or vanpools, marked as such, for 5% of total parking spaces. Providing a discounted parking rate is an acceptable substitute for preferred parking for carpool or vanpool vehicles. To establish a meaningful incentive in all potential markets, the parking rate must be discounted at least 20%. The discounted rate must be available to all customers (i.e., not limited to the number of customers equal to 5% of the vehicle parking capacity), publicly posted at the entrance of the parking area, and available for a minimum of two years.

OR

OPTION 3

Provide no new parking.

CASE 2. Residential Healthcare Licensed Long Term Care Projects

OPTION 1

Size parking capacity to meet, but not exceed, minimum local zoning requirements or health department regulatory authority, whichever is the overriding requirement.

Provide infrastructure and support programs to facilitate shared vehicle use, such as carpool drop-off areas, designated parking for vanpools, car-share services, ride boards and shuttle services to mass transit.

Provide preferred parking for carpools or vanpools for 5% of the total parking spaces provided for staff OR, for projects that provide parking for less than 5% FTE staff measured at peak periods, provide preferred parking for carpools or vanpools, marked as such, for 5% of total provided parking spaces. Providing a discounted parking rate is an acceptable substitute for preferred parking for carpool or vanpool vehicles. To establish

1 For the purposes of this credit "preferred parking" refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped persons) or parking passes provided at a discounted price.

a meaningful incentive in all potential markets, the parking rate must be discounted at least 20%. The discounted rate must be available to all customers (i.e. not limited to the number of customers equal to 5% of the vehicle parking capacity), publicly posted at the entrance of the parking area and available for a minimum of two years.

OR

OPTION 2

Provide no new parking.

CASE 3. Mixed Use Healthcare Projects (i.e. including residential, retail, and/or medical office components)

OPTION 1

Mixed-use buildings with less than 10% non-residential area must be considered residential and adhere to the residential requirements in Case 2. For mixed-use buildings with more than 10% non-residential area, the non-residential space must adhere to the requirements in Case 1 and the residential component must adhere to residential requirements in Case 2. Note: This option applies only to mixed-use healthcare projects that include residential, retail and/or medical office components.

OR

OPTION 2

Provide no new parking.

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

CASE 1. Greenfield Sites[1]

Limit all site disturbance to the following parameters:

- 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;
- 25 feet beyond constructed areas with permeable surfaces, such as pervious paving areas, stormwater detention facilities and playing fields that require additional staging areas to limit compaction in the constructed area.

CASE 2. Previously Developed[2] Areas or Graded Sites

Restore or protect a minimum of 50% of the site area, excluding the building footprint, or 20% of the total site area, including building footprint, whichever is greater, with native or adapted vegetation[3].

Projects earning SS Credit 2: Development Density and Community Connectivity may include vegetated roof surface in this calculation if the plants are native or adapted, provide habitat, and promote biodiversity. Projects earning SS Credit 9.1: Connection to the Natural World—Outdoor Places of Respite may apply the planted areas to this calculation, if the plants are native or adapted, provide habitat and promote biodiversity.

1 Greenfield sites are those that are not previously developed or graded and remain in a natural state.
2 Previously developed areas are those that previously contained buildings, roadways, parking lots or were graded or altered by direct human activities.
3 Native or adapted plants are plants indigenous to a locality or cultivars of native plants that are adapted to the local climate and are not considered invasive species or noxious weeds.

SS Credit 5.2: Site Development—Maximize Open Space

1 Point

Intent

Promote biodiversity by providing a high ratio of open space to development footprint.

Requirements

CASE 1

Reduce the development footprint[1] and/or provide vegetated open space within the project boundary such that the amount of open space exceeds local zoning requirements by 25%.

OR

CASE 2

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

OR

CASE 3

Where a zoning ordinance exists, but there is no requirement for open space (zero), provide vegetated open space equal to 20% of the project site area.

ALL CASES

For projects located in urban areas that earn SS Credit 2 : Development Density and Community Connectivity, vegetated roof areas can contribute to credit compliance.

For projects located in urban areas that earn SS Credit 2: Development Density and Community Connectivity, pedestrian-oriented hardscape areas can contribute to credit compliance. For such projects, a minimum of 25% of the open space counted must be vegetated.

Wetlands or naturally designed ponds may count as open space if the side slope gradients average 1:4 (vertical: horizontal) or less and are vegetated.

1 Development footprint is defined as the total area of the building footprint, hardscape, access roads and parking.

SS Credit 6.1: Stormwater Design—Quantity Control

1 Point

Intent

Limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants.

Requirements

CASE 1. Sites with Existing Imperviousness 50% or Less

OPTION 1

Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the predevelopment peak discharge rate and quantity for the 1- and 2-year 24-hour design storms.

OR

OPTION 2

Implement a stormwater management plan that protects receiving stream channels from excessive erosion. The stormwater management plan must include stream channel protection and quantity control strategies.

CASE 2. Sites with Existing Imperviousness Greater Than 50%

Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the 2-year 24-hour design storm.

SS Credit 6.2: Stormwater Design—Quality Control

1 Point

Intent

Limit disruption and pollution of natural water flows by managing stormwater runoff.

Requirements

Implement a stormwater management plan that reduces impervious cover, promotes infiltration and captures and treats the stormwater runoff from 90% of the average annual rainfall[1] using acceptable best management practices (BMPs).

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 monitoring reports. BMPs are considered to meet these criteria if:

- They are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards.

OR

- There exists infield 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.

1 There are 3 distinct climates in the United States that influence the nature and amount of annual rainfall. Humid watersheds are defined as those that receive at least 40 inches of rainfall each year. Semiarid watersheds receive between 20 and 40 inches of rainfall per year, and arid watersheds receive less than 20 inches of rainfall per year. For this credit, 90% of the average annual rainfall is equivalent to treating the runoff from the following (based on climate):
- Humid Watersheds — 1 inch of rainfall
- Semiarid Watersheds — 0.75 inches of rainfall
- Arid Watersheds — 0.5 inches of rainfall

SS Credit 7.1: Heat Island Effect—Nonroof

1 Point

Intent

Reduce heat islands[1] to minimize impacts on microclimates and human and wildlife habitats.

Requirements

OPTION 1

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

- Provide shade from the existing tree canopy or within 5 years of landscape installation. Landscaping (trees) must be in place at the time of occupancy.
- Provide shade from structures covered by solar panels that produce energy used to offset some nonrenewable resource use.
- Provide shade from architectural devices or structures that have a solar reflectance index[2] (SRI) of at least 29.
- Use hardscape materials with an SRI of at least 29.
- Use an open-grid pavement system (at least 50% pervious).

OR

OPTION 2

Place a minimum of 50% of parking spaces under cover[3]. Any roof used to shade or cover parking must have an SRI of at least 29, be a vegetated green roof or be covered by solar panels that produce energy used to offset some nonrenewable resource use.

1 Heat islands are defined as thermal gradient differences between developed and undeveloped areas.
2 The solar reflectance index (SRI) is a measure of the constructed surface's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black surface (reflectance 0.05, emittance 0.90) is 0 and a standard white surface (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371.
3 For the purposes of this credit, under cover parking is defined as parking underground, under deck, under roof, or under a building.

SS Credit 7.2: Heat Island Effect—Roof

1 Point

Intent

Reduce heat islands[1] to minimize impacts on microclimates and human and wildlife habitats.

Requirements

OPTION 1

Use roofing materials with a solar reflectance index[2] (SRI) equal to or greater than the values in the table below for a minimum of 75% of the roof surface.

Roofing materials having a lower SRI value than those listed below may be used if the weighted rooftop SRI average meets the following criteria:

$$\frac{\text{Area Roof Meeting Minimum SRI}}{\text{Total Roof Area}} \times \frac{\text{SRI of Installed Roof}}{\text{Required SRI}} \geq 75\%$$

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

OR

OPTION 2

Install a vegetated roof that covers at least 50% of the roof area.

OR

OPTION 3

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

$$\frac{\text{Area Roof Meeting Minimum SRI}}{0.75} + \frac{\text{Area of Vegetated Roof}}{0.5} \geq \text{Total Roof Area}$$

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

1 Heat islands are defined as thermal gradient differences between developed and undeveloped areas.

2 The solar reflectance index (SRI) is a measure of the constructed surface's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black surface (reflectance 0.05, emittance 0.90) is 0 and a standard white surface (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918 or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371.

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 from lighting on nocturnal environments.

Requirements

Project teams must comply with one of the two options for interior lighting AND the requirement for exterior lighting.

For Interior Lighting

OPTION 1

Reduce the input power (by automatic device) of all nonemergency interior luminaires with a direct line of sight to any openings in the envelope (translucent or transparent) by at least 50% between 11 p.m. and 5 a.m. An after-hours override may be provided by a manual or occupant-sensing device provided the override lasts no more than 30 minutes.

OR

OPTION 2

All openings in the envelope (translucent or transparent) with a direct line of sight to any nonemergency luminaires must have shielding (controlled/closed by automatic device for a resultant transmittance of less than 10% between 11 p.m. and 5 a.m.).

For Exterior Lighting

Light areas only as required for safety and comfort. Exterior lighting power densities shall not exceed those specified in ANSI/ASHRAE/IESNA Standard 90.1-2007 with Addenda 1 for the documented lighting zone. Justification shall be provided for the selected lighting zone. Lighting controls for all exterior lighting shall comply with section 9.4.1.3 of ANSI/ASHRAE/IESNA Standard 90.1- 2007, without amendments.

Note: The following areas may be excluded from credit requirements: emergency departments, including helipads, a designated parking area for night staff, a designated parking area for night visitors, pedestrian walkways, service/loading areas and associated circulation routes. Helipad areas shall be illuminated in accordance with applicable transportation requirements.

Classify the project under 1 of the following zones, as defined in IESNA RP-33, and follow all the requirements for that zone:

LZ1: Dark (**developed areas within national parks, state parks, forest land and rural areas**)
Design exterior lighting so that all site and building-mounted luminaires produce a maximum initial illuminance value no greater than 0.01 horizontal and vertical footcandles at the site boundary and beyond. Document that 0% of the total initial designed fixture lumens (sum total of all fixtures on site) are emitted at an angle of 90 degrees or higher from nadir (straight down).

LZ2: Low (primarily residential zones, neighborhood business districts, light industrial areas with limited nighttime use and residential mixed-use areas)
Design exterior lighting so that all site and building-mounted luminaires produce a maximum initial illuminance value no greater than 0.10 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 10 feet beyond the site boundary. Document that no more than 2% of the total initial designed fixture lumens (sum total of all fixtures on site) are emitted at an angle of 90 degrees or higher from nadir (straight down).

LZ3: Medium (all other areas not included in LZ1, LZ2 or LZ4, such as commercial/ industrial and high-density residential)
Design exterior lighting so that all site and building-mounted luminaires produce a maximum initial illuminance value no greater than 0.20 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 5% of the total initial designed fixture lumens (sum total of all fixtures on site) are emitted at an angle of 90 degrees or higher from nadir (straight down).

LZ4: High[1] (high-activity commercial districts in major metropolitan areas)
Design exterior lighting so that all site and building-mounted luminaires produce a maximum initial illuminance value no greater than 0.60 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 10% of the total initial designed fixture lumens (sum total of all fixtures on site) are emitted at an angle of 90 degrees or higher from nadir (straight down).

LZ2, LZ3 and LZ4 - For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

For All Zones
Illuminance generated from a single luminaire placed at the intersection of a private vehicular driveway and public roadway accessing the site is allowed to use the centerline of the public roadway as the site boundary for a length of 2 times the driveway width centered at the centerline of the driveway.

1 To be LZ4, the area must be so designated by an organization with local jurisdiction, such as the local zoning authority..

SS Credit 9.1: Connection to the Natural World—Places of Respite

1 Point

Intent

Provide outdoor places of respite on the healthcare campus to connect patients, staff and visitors to the health benefits of the natural environment.

Requirements

Provide patient and visitor accessible outdoor places of respite equal to 5% of the net usable program area[1] of the building or project.

Provide additional dedicated outdoor place(s) of respite for staff equal to 2% of the net usable program area of the building or project.

Qualifying areas must meet the following requirements:

- Accessible from within the building or located within 200 feet of a building entrance or access point.
- Located where no medical intervention or direct medical care is delivered.
- Open to fresh air, the sky and the natural elements, including seasonal weather.
- Provide options for shade or indirect sun at a minimum of one seating space per 200 square feet of garden area with one wheelchair space per five seating spaces. Examples of qualifying shade structures include trellises and tree-shaded wheelchair accessible seating areas.
- Non-smoking areas in compliance with IEQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control.

In addition, qualifying areas must comply with the following:

- Interior atria, greenhouses, solaria or conditioned spaces may be used to meet up to 30% of the required area, if 90% of each qualifying space's square footage achieves a direct line of sight to unobstructed views of nature. If views of nature are exterior to the space, calculate lines of sight between 30 inches and 90 inches above the finish floor.
- Horticulture therapy and other specific clinical or special-use gardens (i.e. a cancer healing garden) unavailable to all building occupants may be used to meet up to 50% of the required area.
- Universal-access natural trails with places to pause that are available to visitors, staff and/or patients may be used to meet up to 30% of the required area, provided trail access is available within 200 feet of a building entrance.
- Provide options for shade or indirect sun at a minimum of one seating space/ 200 square feet of garden area with one wheelchair space per five seating spaces. Examples of qualifying shade structures include trellises and tree-shaded wheelchair accessible seating areas.
- Exterior places of respite shall comply with the 2010 FGI Guidelines for Design and Construction of Health Care Facilities (Section 1.2-6: Design Considerations and Requirements). Existing exterior places of respite on the hospital campus may be used to comply with this credit, provided that the location of the existing spaces meets the credit requirements.

1 For the purposes of this credit, "net usable program area" shall be defined as the sum of all interior areas in the project available to house the project's program. Areas housing building equipment, vertical circulation and structure shall be excluded.

SS Credit 9.2: Connection to the Natural World—Direct Exterior Access for Patients

1 Point

Intent

Provide patients and staff with the health benefits associated with direct access to the natural environment.

Requirements

To provide direct access to an exterior courtyard, terrace, garden or balcony with a minimum area of five square feet per patient for 75% of all inpatients AND 75% of qualifying outpatients with clinical Length of Stay (LOS) greater than four hours.

- Qualifying outpatients may include outpatient renal dialysis, infusion therapies, ambulatory surgery intake and stage 2 recovery. Patients with length of stay greater than four hours, whose treatment makes them unable to move, such as emergency, stage 1 surgical recovery, and critical care may be excluded. Places of respite outside the building envelope that meet the requirements of SS Credit 9.1: Connection to the Natural World—Places of Respite that are immediately adjacent to clinical areas or with direct access from inpatient units may be included in the calculation.
- Qualifying spaces must be designated as non-smoking and meet the requirements of IEQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control.
- Qualifying spaces must meet the requirement for outdoor air quality enumerated in IEQ Credit 5: Indoor Chemical and Pollutant Source Control and be located more than 100 feet from building exhaust air locations, loading docks, building entrances and roadways subject to idling vehicles.

WATER EFFICIENCY

WE Prerequisite 1: Water Use Reduction

Required

Intent

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

Requirements

Building Water Use

Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation). The baseline shall meet the requirements of the Energy Policy Act (EPAct) of 1992 and subsequent rulings by the Department of Energy, requirements of the EPAct of 2005, and the plumbing code requirements as stated in the 2006 editions of the Uniform Plumbing Code or International Plumbing Code pertaining to fixture performance.[1]

Calculations are based on estimated occupant usage and must include only the following fixtures and fixture fittings (as applicable to the project scope): water closets, urinals, lavatory faucets, and pre-rinse spray valves. Fixtures used for clinical use, such as surgical scrub sinks and exam room sinks are exempt from this calculation.

Table 1: National Efficiency Baselines for Commercial and Residential Water-Using Fixtures, Fittings and Appliances (adapted from information developed and summarized by the U.S. Environmental Protection Agency Office of Water).

Fixtures, Fittings, and Appliances	Current Baseline
Toilets	1.6 gallons per flush (gpf)*
Urinals	1.0 (gpf)
Lavatory (restroom) faucets	2.2 gallons per minute (gpm) at 60 pounds per square inch (psi), private applications only (e.g., hospital patient rooms) 0.5 (gpm) at 60 (psi)** all others except private applications 0.25 gallons per cycle for metering faucets
Pre-rinse spray valves (for food service applications)	Flow rate ≤ 1.6 (gpm)
Showerheads	2.5 gpm at 80 psi per shower stall***

* EPAct 1992 standard for toilets applies to both commercial and residential models.

** In addition to EPAct requirements, the American Society of Mechanical Engineers standard for public lavatory faucets is 0.5 gpm at 60 psi (ASME A112.18.1-2005). This maximum has been incorporated into the national Uniform Plumbing Code and the International Plumbing Code.

*** Residential shower compartment (stall) in dwelling units: The total allowable flow rate from all flowing showerheads at any given time, including rain systems, waterfalls, bodysprays, bodyspas and jets, must be limited to the allowable showerhead flow rate as specified above (2.5 gpm) per shower compartment, where the floor area of the shower compartment is less than 2,500 square inches. For each increment of 2,500 square inches of floor area thereafter or part thereof, an additional showerhead with total allowable flow rate from all flowing devices equal to or less than the allowable flow rate as specified above must be allowed. Exception: Showers that emit recirculated nonpotable water originating from within the shower compartment while operating are allowed to exceed the maximum as long as the total potable water flow does not exceed the flow rate as specified above.

1 Tables adapted from information developed and summarized by the U.S. Environmental Protection Agency (EPA) Office of Water based on requirements of the Energy Policy Act (EPAct) of 1992 and subsequent rulings by the Department of Energy, requirements of the EPAct of 2005, and the plumbing code requirements as stated in the 2006 editions of the Uniform Plumbing Code or International Plumbing Code pertaining to fixture performance.

AND

Process Water Use

Employ strategies that in aggregate use 20% less water than the process water use baseline calculated for equipment performance requirements as listed in Table 2. Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the project scope): clothes washers, dishwashers, ice machines, food steamers and combination ovens.

Exemptions from calculations:

- Appliances and equipment for which water is used toward human consumption may be excluded. For example, bread misters, soda machines, coffee making machines, misters for produce and fixtures used to fill sinks for washing produce.
- Fixtures whose flow rates are regulated by health codes may be excluded from the calculation. For example, regulated medical equipment is excluded. See WE Prerequisite 2: Minimize Potable Water Use for Medical Equipment Cooling for requirements applicable to heat rejecting medical equipment.

For applicable equipment not addressed in Tables 1 or 2, additional equipment performance baseline requirements may be proposed, provided that documentation supporting the proposed benchmark or industry standard is provided.

Table 2: Equipment Performance Requirements Table

Equipment	Baseline
Commercial Clothes Washer – less than 80 lbs	9 gallon/CF/cycle
Commercial Dishwashers	
Undercounter – high temp	1.98 gallon/rack
Undercounter – low temp	1.95 gallon/rack
Door type – high temp	1.44 gallon/rack
Door type – low temp	1.85 gallon/rack
Single tank rack conveyor – high temp	1.13 gallon/rack
Single tank rack conveyor – low temp	1.23 gallon/rack
Multi-tank rack conveyor – high temp	1.1 gallon/rack
Multi-tank rack conveyor – low temp	0.99 gallon/rack
Flight type	180 gallon/hour
Commercial Ice Machines	
Water-cooled ice machine capacity < 450 lb/day	<25 gal/100 lb ice
Air-cooled ice machine capacity > 450 lb/day	<25 gal/100 lb ice
Air-cooled ice machine with remote condensing unit (w/o remote compressor) capacity < 1000 lb/day	<25 gal/100 lb ice
Air-cooled ice machine with remote condensing unit (w/o remote compressor) capacity > 1000 lb/day	<25 gal/100 lb ice
Air-cooled ice machine with remote condensing unit (with remote compressor) capacity < 934 lb/day	<25 gal/100 lb ice
Air-cooled ice machine with remote condensing unit (with remote compressor) capacity > 934 lb/day	<25 gal/100 lb ice
Air-cooled ice machine Self Contained Unit (SCU)	<25 gal/100 lb ice
Water-cooled ice machines	Must be on closed cooling loop
Water-cooled ice machines once through cooling	Not allowed
Food Steamers	
Boiler type steam cooker – batch cooking	8 gallon/hour/pan
Boilerless type steam cooker – high production/cook to order	8 gallon/hour/pan
Combination Oven	40 gph
Countertop or stand mounted	40 gph
Roll-in	60 gph
Other equipment	Performance baseline based on industry standards

WE Prerequisite 2: Minimize Potable Water Use for Medical Equipment Cooling

Required

Intent

Minimize potable water use for medical equipment cooling.

Requirements

For ALL medical equipment in the project, demonstrate that potable water use will be minimized for equipment cooling. Potable water usage is ONLY acceptable in emergency backup systems or where local requirements mandate. The following is required:

- No potable water use for once through cooling for ALL medical equipment that rejects heat. (Note: This credit does not apply to potable water for cooling tower makeup or for other evaporative cooling systems. Refer to WE Credit 4: Process Water Use Reduction for more details.)
- Where local requirements mandate limiting the discharge temperature of fluids into the drainage system, a tempering device must be used that runs water only when the equipment discharges hot water. Alternatively, provide a thermal recovery heat exchanger that allows drained discharge water to be cooled below code-required maximum discharge temperatures while simultaneously preheating inlet makeup water or, if the fluid is steam condensate, return it to the boiler.
- An owner may elect to use potable water in an open-loop (once-through) configuration as the emergency back-up cooling system only, not as the primary cooling system. The primary cooling system in these critical applications MUST be a closed-loop system requiring no potable water usage. Such emergency back-up systems shall only be used in the event that the primary, closed-loop cooling equipment has failed, and such a failure is visually and audibly indicated at the point-of-use and alarmed at a continuously monitored location.

WE Credit 1: Water Efficient Landscaping—No Potable Water Use or No Irrigation

1 Point

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

OPTION 1

Use only captured rainwater, recycled wastewater, recycled graywater or water treated and conveyed by a public agency specifically for nonpotable uses for irrigation.

OR

OPTION 2

Install landscaping that does not require permanent irrigation systems. Temporary irrigation systems used for plant establishment are allowed only if removed within a period not to exceed 18 months of installation.

WE Credit 2: Water Use Reduction—Measurement and Verification

1-2 Points

Intent

Provide for the ongoing accountability and optimization of building water consumption performance over time.

Requirements

Install meters to track the following water uses (as applicable to the project):

- Cooling tower make-up and blowdown
- Incoming water to the project
- Purified water system (reverse osmosis and/or de-ionized)
- Filter backwash water
- Water use in dietary department
- Water use in laundry
- Outdoor Irrigation systems
- Steam boiler systems make-up water

AND

Install meters to track the water use in any two (for one point) or any three (for two points) of the following:

- Water use in laboratory
- Water use in central sterile and processing department
- Water use in physio- and hydrotherapy treatment areas
- Water use in surgical suite
- Closed-loop hydronic systems make-up water
- Cold-water make-up for domestic hot water systems

AND

The Measurement and Verification (M&V) period shall cover a period of no less than one year of post-construction occupancy.

Use the International Performance Measurement and Verification Protocol (IPMVP) Volume 1, Concepts for Determining Energy and Water Savings, March 2002, to provide for long term continuous measurement of potable cold water uses within the facility. [Option D: Calibrated Simulation (Savings Estimation Method 2 - See Volume III, April 2003, for description of Option D, Savings Estimation Method) – for new construction; or Option B: Retrofit Measure Isolation – for renovation].

WE Credit 3: Water Use Reduction

1–3 Points

Intent

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

Requirements

Project teams earn points by achieving the following percent reductions for both building water use and process water use. The minimum water savings percentage for each point threshold is as follows:

Percentage Reduction	Points
30%	1
35%	2
40%	3

Building Water Use

Employ strategies that in aggregate use less water than the water use baseline calculated for the building (not including irrigation). The baseline shall meet the requirements of the Energy Policy Act (EPAct) of 1992 and subsequent rulings by the Department of Energy, requirements of the EPAct of 2005, and the plumbing code requirements as stated in the 2006 editions of the Uniform Plumbing Code or International Plumbing Code pertaining to fixture performance. [1]

Calculations are based on estimated occupant usage and must include only the following fixtures and fixture fittings (as applicable to the project scope): water closets, urinals, lavatory faucets, and pre-rinse spray valves. Fixtures used for clinical use, such as surgical scrub sinks and exam room sinks are exempt from this calculation.

Table 1: National Efficiency Baselines for Commercial and Residential Water-Using Fixtures, Fittings and Appliances

Fixtures, Fittings, and Appliances	Current Baseline
Toilets	1.6 gallons per flush (gpf)*
Urinals	1.0 (gpf)
Lavatory (restroom) faucets	2.2 gallons per minute (gpm) at 60 pounds per square inch (psi), private applications only (e.g., hospital patient rooms) 0.5 (gpm) at 60 (psi)** all others except private applications 0.25 gallons per cycle for metering faucets
Pre-rinse spray valves (for food service applications)	Flow rate ≤ 1.6 (gpm)
Showerheads	2.5 gpm at 80 psi per shower stall****

* EPAct 1992 standard for toilets applies to both commercial and residential models.

** In addition to EPAct requirements, the American Society of Mechanical Engineers standard for public lavatory faucets is 0.5 gpm at 60 psi (ASME A112.18.1-2005). This maximum has been incorporated into the national Uniform Plumbing Code and the International Plumbing Code.

*** EPAct 1992 standard for toilets applies to both commercial and residential models.

**** Residential shower compartment (stall) in dwelling units: The total allowable flow rate from all flowing showerheads at any given time, including rain systems, waterfalls, bodysprays, bodyspas and jets, must be limited to the allowable showerhead flow rate as specified above (2.5 gpm) per shower compartment, where the floor area of the shower compartment is less than 2,500 square inches. For each increment of 2,500 square inches of floor area thereafter or part thereof, an additional showerhead with total allowable flow rate from all flowing devices equal to or less than the allowable flow rate as specified above must be allowed. Exception: Showers that emit recirculated nonpotable water originating from within the shower compartment while operating are allowed to exceed the maximum as long as the total potable water flow does not exceed the flow rate as specified above.

1 Tables adapted from information developed and summarized by the U.S. Environmental Protection Agency (EPA) Office of Water based on requirements of the Energy Policy Act (EPAct) of 1992 and subsequent rulings by the Department of Energy, requirements of the EPAct of 2005, and the plumbing code requirements as stated in the 2006 editions of the Uniform Plumbing Code or International Plumbing Code pertaining to fixture performance.

AND

Process Water Use

Employ strategies that in aggregate use less water than the process water use baseline calculated for equipment performance requirements as listed in Table 2. Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the project scope): clothes washers, dishwashers, ice machines, food steamers and combination ovens.

Exemptions from calculations:

- Appliances and equipment for which water is used toward human consumption may be excluded. For example, bread misters, soda machines, coffee making machines, misters for produce and fixtures used to fill sinks for washing produce.
- Fixtures whose flow rates are regulated by health codes may be excluded from the calculation. For example, regulated medical equipment is excluded. See WE Prerequisite 2 for requirements applicable to heat rejecting medical equipment.

For applicable equipment not addressed in Tables 1 or 2, additional equipment performance baseline requirements may be proposed, provided that documentation supporting the proposed benchmark or industry standard is provided.

Table 2: Equipment Performance Requirements Table

Equipment	Baseline
Commercial Clothes Washer – less than 80 lbs	9 gallon/CF/cycle
Commercial Dishwashers	
Undercounter – high temp	1.98 gallon/rack
Undercounter – low temp	1.95 gallon/rack
Door type – high temp	1.44 gallon/rack
Door type – low temp	1.85 gallon/rack
Single tank rack conveyor – high temp	1.13 gallon/rack
Single tank rack conveyor – low temp	1.23 gallon/rack
Multi-tank rack conveyor – high temp	1.1 gallon/rack
Multi-tank rack conveyor – low temp	0.99 gallon/rack
Flight type	180 gallon/hour
Commercial Ice Machines	
Water-cooled ice machine capacity < 450 lb/day	<25 gal/100 lb ice
Air-cooled ice machine capacity > 450 lb/day	<25 gal/100 lb ice
Air-cooled ice machine with remote condensing unit (w/o remote compressor) capacity < 1000 lb/day	<25 gal/100 lb ice
Air-cooled ice machine with remote condensing unit (w/o remote compressor) capacity > 1000 lb/day	<25 gal/100 lb ice
Air-cooled ice machine with remote condensing unit (with remote compressor) capacity < 934 lb/day	<25 gal/100 lb ice
Air-cooled ice machine with remote condensing unit (with remote compressor) capacity > 934 lb/day	<25 gal/100 lb ice
Air-cooled ice machine Self Contained Unit (SCU)	<25 gal/100 lb ice
Water-cooled ice machines	Must be on closed cooling loop
Water-cooled ice machines once through cooling	Not allowed
Food Steamers	
Boiler type steam cooker – batch cooking	8 gallon/hour/pan
Boilerless type steam cooker – high production/cook to order	8 gallon/hour/pan
Combination Oven	40 gph
Countertop or stand mounted	40 gph
Roll-in	60 gph
Other equipment	Performance baseline based on industry standards

WE Credit 4.1: Water Use Reduction—Building Equipment

1 Point

Intent

Reduce or eliminate the use of potable water for non-potable process use in building system equipment.

Requirements

- Install only dry vacuum pumps for central vacuum systems and all other systems except for vacuum systems for sterilizing, which may use oil-lubricated liquid ring pumps.
- Do not install venturi vacuum systems for sterilizers.
- For air compressors, install either air cooling or closed-loop cooling, such as a cooling tower or chilled water system.
- Large frame X-ray processors and/or developers of more than 150 mm (six inches) in length or width shall use film processor water recycling units. Smaller X-ray equipment, such as a dental X-ray film processor, is exempt from this requirement.

WE Credit 4.2: Water Use Reduction—Cooling Towers

1 Point

Intent

Reduce or eliminate the use of potable water for non-potable process use in building system equipment.

Requirements

- Cooling towers for air conditioning systems, such as chilled water systems, shall achieve a minimum of five cycles of concentration based on a ratio of the conductivity of the water being discharged (blowdown) divided by the conductivity of the feed (makeup) water(s), or four cycles of concentration, if the makeup water hardness exceeds 200 mg/l expressed as calcium carbonate, or shall achieve a minimum discharge (blowdown) concentration of 1500 mg/L (1500 ppm) expressed as calcium carbonate, or 175 mg/L (175 ppm) of silica measured as silicon dioxide, whichever is met first.
- Cooling towers shall be equipped with makeup and blowdown meters, conductivity controllers and overflow alarms and efficient drift eliminators that reduce drift loss to less than, or equal to, 0.001% of recirculating water in a counter-flow tower or 0.005% in a cross-flow tower.
- Use no more potable water than 2.3 gallons per ton hour for cooling tower make-up.

WE Credit 4.3: Water Use Reduction—Food Waste Systems

1 Point

Intent

Reduce or eliminate the use of potable water for non-potable process use in building system equipment.

Requirements

When a food waste disposer system is used, the following requirements must be met:

- Use cold water. (This is a common code requirement.)
- Equip systems with a load sensing device that regulates the water use to 1 gpm in a no-load situation and 3 to 8 gpm in a full-load situation.
- Automatic time shutoff that shall have a ten-minute time-out system with a push button to reactivate.

When pulpers, extractors, scrap basket or strainer-type systems are used, the following requirements must be met:

- Mechanical pulpers/extractors and mechanical scrapper systems shall use no more than 2 gpm of potable water, excluding end-of-day, wash-down cycles.
- Non-mechanical strainer (scrapper) baskets shall not be part of a flowing trough collection system connected to potable water at a rate greater than 2 gpm.
- Automatic time shutoff that shall have a ten-minute time-out system with a push button to reactivate.

EA Prerequisite 1: Fundamental Commissioning of Building Energy Systems

Required

Intent

Verify that the project's energy-related systems are installed and calibrated to perform according to the owner's project requirements, basis of design and construction documents.

Benefits of commissioning include reduced energy use, lower operating costs, fewer 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 must be completed by the project team:

- Designate an individual as the commissioning authority (CxA) to lead, review and oversee the completion of the commissioning process activities.
  - The CxA must have documented commissioning authority experience in at least 2 building projects.
  - The individual serving as the CxA must be independent of the project design and construction management, though the CxA may be an employee of any firm providing those services. The CxA may be a qualified employee or consultant of the owner.
  - The CxA must report results, findings and recommendations directly to the owner.
  - For projects smaller than 50,000 gross square feet, the CxA may be a qualified person on the design or construction team who has the required experience.
- The owner must document the owner's project requirements (OPR). The design team must develop the basis of design (BOD). The CxA must review these documents for clarity and completeness. The owner and design team must be responsible for updates to their respective documents.
- Develop and incorporate commissioning requirements into the construction documents.
- Develop and implement a commissioning plan.
- Verify the installation and performance of the systems to be commissioned.
- Complete a summary commissioning report.

Commissioned Systems

Commissioning process activities must be completed for the following energy-related systems, at a minimum:

- Heating, ventilating, air conditioning and refrigeration (HVAC&R) systems (mechanical and passive) and associated controls
- Lighting and daylighting controls
- Domestic hot water systems
- Renewable energy systems (e.g., wind, solar)

EA Prerequisite 2: Minimum Energy Performance

Required

Intent

Establish the minimum level of energy efficiency for the proposed building and systems to reduce environmental and economic impacts associated with excessive energy use.

Requirements

OPTION 1. Whole Building Energy Simulation

Demonstrate a 10% improvement in the proposed building performance rating for new buildings, or a 5% improvement in the proposed building performance rating for major renovations to existing buildings, compared with the baseline building performance rating.

Calculate the baseline building performance rating according to the building performance rating method in Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda[1]) using a computer simulation model for the whole building project.

Appendix G of Standard 90.1-2007 requires that the energy analysis done for the building performance rating method include all energy costs associated with the building project. To achieve points using this credit, the proposed design must meet the following criteria:

- Comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) in Standard 90.1-2007 (with errata but without addenda[1]).
- Include all energy costs associated with the building project.
- Compare against a baseline building that complies with Appendix G of Standard 90.1-2007 (with errata but without addenda[1]). The default process energy cost is 25% of the total energy cost for the baseline building. If the building's process energy cost is less than 25% of the baseline building energy cost, the LEED submittal must include documentation substantiating that process energy inputs are appropriate.
- Obtain an energy performance rating for estimated energy use of both the baseline and proposed design from EPA's ENERGY STAR Target Finder design tool and submit the Statement of Energy Design Intent document, generated by Target Finder, as part of the project's design submittal.

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).

Regulated (non-process) energy includes lighting (for the interior, parking garage, surface parking, façade, or building grounds, etc. except as noted above), heating, ventilation and air conditioning (HVAC) (for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), and service water heating for domestic or space heating purposes.

1 Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

Process loads must be identical for both the baseline building performance rating and the proposed building performance rating. However, project teams may follow the exceptional calculation method (ANSI/ASHRAE/IESNA Standard 90.1-2007 G2.5) to document measures that reduce process loads. Documentation of process load energy savings must include a list of the assumptions made for both the base and the proposed design, and theoretical or empirical information supporting these assumptions.

Projects in California may use Title 24-2005, Part 6 in place of ANSI/ASHRAE/IESNA Standard 90.1-2007 for Option 1.

OR

OPTION 2. Prescriptive Compliance Path: ASHRAE Advanced Energy Design Guide (AEDG) for Small Hospitals and Healthcare Facilities.

Comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide for Small Hospitals and Healthcare Facilities. The following restrictions apply:

- Buildings must be 90,000 square feet or less.
- Project teams must fully comply with all applicable criteria as established in the AEDG for the climate zone in which the building is located.

OR

OPTION 3. Prescriptive Compliance Path: Green Guide for Health Care v2.2 Prescriptive Path for Energy Improvements in Hospitals

- Buildings must be over 90,000 square feet.
  1. Comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) in ASHRAE Standard 90.1-2007
  2. Incorporate all Energy Efficiency Measures (EEMs) listed below:
     - High Performance Windows and Glazing
     - Thermally broken metal window frames
     - U value at the center of glass < 0.29
     - Solar heat gain coefficient at the center of glass < 0.38
     - U value of the window including framing effects < 0.40
  3. Lighting Power Density (LPD)
     - Reduce overall LPD a minimum of 10% below IESNA/ASHRAE Standard 90.1 –2007.
  4. Lighting Controls
     - Install occupancy sensor lighting controls, at a minimum, in all offices, storage areas and mechanical spaces to achieve the following lighting energy reduction:
       - Offices: 15% during the day
       - Storage: 60% during the day; 30% at night
       - Mechanical Spaces: 50% for 23 hours/day

5. The HVAC system serving all areas shall include Variable Air Volume (VAV) air handling units supplied by a central chilled water and boiler plant. In addition, provide zoning controls to maintain pressure relationships as specified in the 2010 FGI Guidelines for Design and Construction of Health Care Facilities. Zoning controls shall be used on both supply air and return/exhaust air systems.
6. Reduce fan power a minimum of 10% less than the limit under ASHRAE 90.1-2007.
7. Reduce turndown ratio on VAV boxes in accordance with ASHRAE 90.1-2007 Prescriptive Requirement 6.5.2.1.
8. Reduce exterior lighting power density to 20% below IESNA/ASHRAE 90.1-2007 requirements.
9. Design the heating plant, including boilers and auxiliary equipment, to achieve a minimum system efficiency (BTUH output/ BTUH input) of 90%
10. Design hot and chilled water pumps (3 hp or greater) with variable speed drives and a minimum part load ratio of 30%.
11. For fans and pumps, use only motors that meet National Electrical Manufacturers' Association (NEMA) standards for premium efficiency.
12. Chillers shall operate at a maximum of 0.52 kW/ton at full load and an Integrated Part Load Value (IPLV) of 0.399 kW/ton.

EA Prerequisite 3: Fundamental Refrigerant Management

Required

Intent

Reduce stratospheric ozone depletion.

Requirements

Zero use of chlorofluorocarbon (CFC)-based refrigerants in new base building heating, ventilating, air conditioning and refrigeration (HVAC&R) systems. When reusing existing base building HVAC equipment, complete a comprehensive CFC phase-out conversion prior to project completion. Phase-out plans extending beyond the project completion date will be considered on their merits.

EA Credit 1: Optimize Energy Performance

1–24 Points

Intent

Achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

Requirements

Whole Building Energy Simulation (1–24 points)

Demonstrate a percentage improvement in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda[1]) using a computer simulation model for the whole building project. The minimum energy cost savings percentage for each point threshold is as follows:

New Buildings	Existing Building Renovations	Points
12%	8%	1
14%	10%	2
16%	12%	3
18%	14%	5
20%	16%	7
22%	18%	9
24%	20%	11
26%	22%	13
28%	24%	14
30%	26%	15
32%	28%	16
34%	30%	17
36%	32%	18
38%	34%	19
40%	36%	20
42%	38%	21
44%	40%	22
46%	42%	23
48%	44%	24

1 Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

Appendix G of Standard 90.1-2007 requires that the energy analysis done for the building performance rating method include all the energy costs associated with the building project. To achieve points under this credit, the proposed design must meet the following criteria:

- Compliance with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) in Standard 90.1-2007 (with errata but without addenda[1]).
- Inclusion of all the energy costs within and associated with the building project.
- Comparison against a baseline building that complies with Appendix G of Standard 90.1-2007 (with errata but without addenda[1]). The default process energy cost is 25% of the total energy cost for the baseline building. If the building's process energy cost is less than 25% of the baseline building energy cost, the LEED submittal must include documentation substantiating that process energy inputs are appropriate.

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).

Regulated (non-process) energy includes lighting (e.g., for the interior, parking garage, surface parking, façade, or building grounds, etc. except as noted above), heating, ventilating, and air conditioning (HVAC) (e.g., for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), and service water heating for domestic or space heating purposes.

For this credit, process loads must be identical for both the baseline building performance rating and the proposed building performance rating. However, project teams may follow the exceptional calculation method (ANSI/ASHRAE/IESNA Standard 90.1-2007 G2.5) to document measures that reduce process loads. Documentation of process load energy savings must include a list of the assumptions made for both the base and proposed design, and theoretical or empirical information supporting these assumptions.

Projects in California may use Title 24-2005, Part 6 in place of ANSI/ASHRAE/IESNA Standard 90.1-2007 for Option 1.

EA Credit 2: On-site Renewable Energy

1–8 Points

Intent

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

Requirements

Use on-site renewable energy systems to offset building energy costs. Calculate project performance by expressing the energy produced by the renewable systems as a percentage of the building's annual energy cost and use the table below to determine the number of points achieved.

Use the building annual energy cost calculated in EA Credit 1: Optimize Energy Performance or the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey database to determine the estimated electricity use.

The minimum renewable energy percentage for each point threshold is as follows:

Percentage Renewable Energy	Points
1%	1
3%	2
10%	5
20%	6
30%	7
40%	8

EA Credit 3: Enhanced Commissioning

1-2 Points

Intent

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

Requirements

Implement, or have a contract in place to implement, the following additional commissioning process activities in addition to the requirements of EA Prerequisite 1: Fundamental Commissioning of Building Energy Systems and in accordance with the LEED Reference Guide for Green Building Design and Construction, 2009 Edition Healthcare Supplement:

OPTION 1 (1 Point)

1. Prior to the start of the construction documents phase, designate an independent commissioning authority (CxA) to lead, review and oversee the completion of all commissioning process activities. The CxA shall, at a minimum, perform Tasks 2, 3, and 6. Other team members may perform Tasks 4 and 5.
   a. The CxA must have documented commissioning authority experience in at least two building projects.
   b. The individual serving as the CxA:
      – Must be independent of the work of design and construction.
      – Must not be an employee of the design firm, though he or she may be contracted through them.
      – Must not be an employee of, or contracted through, a contractor or construction manager holding construction contracts.
      – May be a qualified employee or consultant of the owner.
   c. The CxA must report results, findings and recommendations directly to the owner.
   d. This requirement has no deviation for project size.
2. The CxA must conduct, at a minimum, one commissioning design review of the owner's project requirements, basis of design, and design documents prior to the mid-construction documents phase and back-check the review comments in the subsequent design submission.
3. The CxA must review contractor submittals applicable to systems being commissioned for compliance with the owner's project requirements and basis of design. This review must be concurrent with the review of the architect or engineer of record and submitted to the design team and the owner.
4. Develop a systems manual that provides future operating staff the information needed to understand and optimally operate the commissioned systems.
5. Verify that the requirements for training operating personnel and building occupants have been completed.
6. The CxA must be involved in reviewing the operation of the building with operations and maintenance (O&M) staff and occupants within 10 months after substantial completion. A plan for resolving outstanding commissioning-related issues must be included.

OPTION 2 (2 Points)

Achieve Option 1 AND

Commission the building's thermal envelope systems in accordance with the requirements of Option 1. Commissioning of the building envelope shall be in accordance with ASHRAE Guideline 0-2005, the Commissioning Process, and National Institute of Building Sciences (NIBS) Guideline 3-2006, Exterior Enclosure Technical Requirements for the Commissioning Process.

The building thermal envelope entails all exterior wall assemblies separating a building's conditioned spaces from outdoor ambient conditions, including: roof assemblies, vapor barriers, diffusion retarders, air barrier systems, rain-screen layers, flashings, cladding and siding, windows, curtain-wall assemblies, doors, thermal bridges , and utility penetrations, such as piping, electrical conduit, duct-banks and other entry-points made for routing HVAC system components.

In support of the process requirements in Option 1, the following sequence of steps shall be taken to ensure an effective building thermal envelope commissioning process:

- Convene meeting to review with the entire green building project team the goals and objectives of the process and coordinate/assign the related tasks.
- Conduct building thermal envelope design review.
- Develop thermal envelope commissioning work plan and schedule.
- Develop coordinated documentation plan.
- Ascertain functional performance test and inspection procedures (i.e. determine reference standards).
- Review thermal envelope components and assemblies mock-ups where relevant.
- Conduct scheduled field quality assurance inspections per work plan; document inspections.
- Inspect corrections of defects encountered during inspections.
- Prepare final report.

Note: These are typical steps, but not the only options available.

EA Credit 4: Enhanced Refrigerant Management

1 Point

Intent

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

Requirements

OPTION 1

Do not use refrigerants.

OR

OPTION 2

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

$$LCGWP + LCODP \times 105 \leq 100$$

Calculation definitions for LCGWP + LCODP x $10^5 \leq 100$
LCODP = [ODPr x (Lr x Life +Mr) x Rc]/Life
LCGWP = [GWPr x (Lr x Life +Mr) x Rc]/Life
LCODP: Lifecycle Ozone Depletion Potential (lb CFC 11/Ton-Year)
LCGWP: Lifecycle Direct Global Warming Potential (lb CO_2/Ton-Year)
GWPr: Global Warming Potential of Refrigerant (0 to 12,000 lb CO_2/lbr)
ODPr: Ozone Depletion Potential of Refrigerant (0 to 0.2 lb CFC 11/lbr)
Lr: Refrigerant Leakage Rate (0.5% to 2.0%; default of 2% unless otherwise demonstrated)
Mr: End-of-life Refrigerant Loss (2% to 10%; default of 10% unless otherwise demonstrated)
Rc: Refrigerant Charge (0.5 to 5.0 lbs of refrigerant per ton of gross ARI rated cooling capacity)
Life: Equipment Life (10 years; default based on equipment type, unless otherwise demonstrated)

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

$$\frac{\Sigma \left(LCGWP + LCODP \times 10^5 \right) \times Qunit}{Qtotal} \leq 100$$

Calculation definitions for $[\sum (LCGWP + LCODP \times 10^5) \times Qunit] / Qtotal \leq 100$
Qunit = Gross ARI rated cooling capacity of an individual HVAC or refrigeration unit (Tons)
Qtotal = Total gross ARI rated cooling capacity of all HVAC or refrigeration

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

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

EA Credit 5: Measurement and Verification

2 Points

Intent

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

Requirements

Develop and implement a Measurement and Verification (M&V) plan consistent with Option D: Calibrated Simulation (Savings Estimation Method 2) or Option B: Energy Conservation Measure 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.

The M&V period must cover at least 1 year of post-construction occupancy.

Provide a process for corrective action if the results of the M&V plan indicate that energy savings are not being achieved.

In addition, provide evidence of the long-term M&V Plan (minimum two years after the M&V period above).

Develop and implement a long-term M&V Plan consistent with Option B, C, or D of Volume 1 of the IPMVP: Concepts and Options for Determining Energy and Water Savings, March, 2002. The application of Volume I methods is contingent upon establishing a stable base year of operation as a result of the initial Volume III M&V period. If a stable base year cannot be established, the Volume III methods shall be continued into the long-term M&V period.

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

Engage in at least a 2-year renewable energy contract to provide at least 35% of the building's electricity from renewable sources, as defined by the Center for Resource Solutions' Green-e Energy product certification requirements.

All purchases of green power shall be based on the quantity of energy consumed, not the cost.

OPTION 1. Determine Baseline Electricity Use

Use the annual electricity consumption from the results of EA Credit 1: Optimize Energy Performance.

OR

OPTION 2. Estimate Baseline Electricity Use

Use the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey database to determine the estimated electricity use.

EA Credit 7: Community Contaminant Prevention—Airborne Releases

1 Point

Intent

Prevent contaminant releases to air from products of combustion.

Requirements

Meet California South Coast Air Quality Management District standards for all products of combustion. Do not exceed the emission limits below for products of combustion, as outlined in the following California South Coast Air Quality Management District Rules:

- 1110.2 (Amended February 1, 2008), Emissions from Gaseous- and Liquid-Fueled Internal Combustion Engines
- 1111 (Amended July 8, 1983), NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces
- 1121 (Amended September 3, 2004) Control of Nitrogen Oxides from Residential Type, Natural Gas-Fired Water Heaters
- 1146 (Amended November 17, 2000), Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters
- 1146.1 (Amended May 13, 1994), Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters
- 1146.2 (Amended May 5, 2006), Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters

Products of Combustion	Oxides of Nitrogen (NO_x)	Volatile Organic Compounds (VOCs)	Carbon Monoxide (CO)
Gaseous and Liquid-Fueled Stationary Engines – Emergency or Standby Power Uses	11[1]ppm	30[1,2]ppm	70[1]ppm
Gaseous and Liquid-Fueled Stationary Engines – Non-Emergency and Non-Standby Power Uses[5]	0.070 lbs/MW-hr[3]	0.10 lbs/MW-hr[4]	0.20 lbs/MW-hr[3]
Landfill and Digestor Gas-Fired Stationary Engines	bhp>500: ppm = 36 x ECF[1,6]	Landfill Gas: 40[1,2] Digestor Gas: 250 x ECF[1,2,6]	2,000 ppm[1]
Natural-Gas-Fired, Fan-Type Central Furnaces (heating only with input rate less than 175,000 BTUH, or heating and cooling with cooling rate of less than 65,000 BTUH)	40 nanograms (calculated as NO_2) per joule of useful heat delivered to the heated space		
Residential Type, Natural Gas-Fired Water Heaters	15 ppm[7] or 10 nanograms (calculated as NO_2) per joule of heat output		
Boilers, Steam Generators, Water Heaters, and Process Heaters (rated heat input capacity less than or equal to 400,000 BTU per hour)	55 ppm[7] or 40 nanograms (calculated as NO_2) per joule of heat output		

Products of Combustion	Oxides of Nitrogen (NO_x)	Volatile Organic Compounds (VOCs)	Carbon Monoxide (CO)
Boilers, Steam Generators, Water Heaters and Process Heaters rated heat input capacity greater than 400,000 BTU per hour and less than or equal to 2,000,000 BTU per hour)	20 ppm[7] or 40 nanograms (calculated as NO_2) per joule of heat output		400 ppm
Boilers, Steam Generators, Water Heaters, and Process Heaters (rated heat input capacity greater than 2,000,000 BTU per hour and less than 5,000,000 BTU per hour)	30 ppm[7] or 0.037 pounds per million BTU of heat input		400 ppm[7]
Boilers, Steam Generators, Water Heaters, and Process Heaters (rated heat input capacity greater than or equal to 5,000,000 BTU per hour)[8,9]	30 ppm[7] or 0.036 pounds per million BTU of heat input		400 ppm[7]

Notes:
1. Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes.
2. Measured as carbon.
3. The averaging time of the emission standards is 15 minutes.
4. Mass emissions of VOC shall be calculated using a ratio of 16.04 pounds of VOC per lb-mole of carbon.
5. Emissions limits shall be subject to adjustment for engines that produce combined heat and electrical power (see Rule 1110.2)
6. ECF is the efficiency correction factor.
7. Parts per million by volume, corrected to 3% oxygen on a dry basis.
8. Capacity Factor greater than 25%.
9. Units with a heat input capacity greater than 40 million BTU per hour and an annual heat input greater than 200 x 109 BTU per year shall have a continuous in-stack nitrogen oxides monitor or equivalent verification system in compliance with 40 CFR part 60 Appendix B Specification 2.

For engines of 1,000 bhp and greater, install, operate and maintain in calibration a NOX Continuous Emission Monitoring System (CEMS) with data gathering and retrieval capability.

MR Prerequisite 1: Storage and Collection of Recyclables

Required

Intent

Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills and incinerators through reduction, reuse, recycling and composting.

Requirements

Provide an easily-accessible area or areas for the collection and storage of materials for recycling for the entire building in accordance with Section 2.1-5.4.1.2 (and Appendix) of the 2010 FGI Guidelines for Design and Construction of Health Care Facilities.

Establish a collection system and controlled areas serving the portion of the building affected by the project dedicated to the separation, storage and collection of materials for recycling including, at a minimum: paper, corrugated cardboard, glass, plastics, metals, batteries and mercury-containing products and devices[1].

1 Applicable mercury-containing products and devices include, but are not limited to, lamps (such as linear fluorescent, pin-based compact fluorescent, integrally ballasted compact fluorescent, and high-intensity discharge) and dental wastes (such as scrap amalgam, chair side traps, and separator wastes).

MR Prerequisite 2: PBT Source Reduction—Mercury

Required

Intent

Reduce mercury-containing products and devices and mercury discharge through product substitution, capture and recycling.

Requirements

- As part of the recycling collection system developed in compliance with MR Prerequisite 1: Storage and Collection of Recyclables, identify:
  - types of mercury containing products and devices[1] to be collected,
  - criteria governing how they are to be handled by a recycling program, and
  - disposal methods for captured mercury.
- In facilities delivering dental care, specify and install amalgam separation devices that meet or exceed the standard ISO-11143.
- Comply with the mercury elimination requirement outlined in the 2010 FGI Guidelines for Design and Construction of Health Care Facilities (Section A1.3- 4b: Mercury Elimination).
  - 4.2.1.1 New construction. In new construction, healthcare facilities shall not use mercury-containing equipment, including thermostats, switching devices, and other building system sources. (Lamps are excluded.)
  - 4.2.1.2 Renovation. For renovation, healthcare facilities shall develop a plan to phase out mercury-containing products and upgrade current mercury-containing lamps to high efficiency, low mercury or mercury free lamp technology.
- Do not specify or install preheat, T-9, T-10, or T-12 fluorescents or mercury vapor type high intensity discharge (HID) lamps in the project. Do not specify probe start metal halide HID lamps in interior spaces in the project.
- Only specify and install illuminated exit signs that use Light-Emitting Diode (LED) or Light-Emitting Capacitor (LEC) lamps and use less than 5 watts of electricity.

1 Applicable mercury-containing products and devices include, but are not limited to, lamps (such as linear and circular fluorescents, integrally ballasted and non-integrally ballasted compact fluorescents and HIDs) and dental wastes (such as scrap amalgam, chair side traps, and separator wastes).

- Specify and install fluorescent and high-pressure sodium lamps that meet the following criteria:

Fluorescent Lamp	Criteria
T-8 Eight-foot	Maximum 10 mg mercury
T-8 Four-foot or shorter	Maximum 3.5 mg mercury
T-8 U-Bent	Maximum 6 mg mercury
T-5 Linear	Maximum 2.5 mg mercury
T-5 Circular	Maximum 9 mg mercury
Compact fluorescent, non-integral ballast	Maximum 3.5 mg mercury
Compact fluorescent, integral ballast	Maximum 3.5 mg mercury Energy Star® qualified
High Pressure Sodium Lamp	**Criteria**
Up to 400-watt	Maximum 10 mg mercury
Above 400-watt	Maximum 32 mg mercury

MR Credit 1.1: Building Reuse—Maintain Existing Walls, Floors and Roof

1–3 Points

Intent

Extend the lifecycle 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 the existing building structure (including structural floor and roof decking) and envelope (the exterior skin and framing, excluding window assemblies and non-structural roofing material). The minimum percentage building reuse for each point threshold is as follows:

Building Reuse	Points
55%	1
75%	2
95%	3

Hazardous materials that are remediated as a part of the project must be excluded from the calculation of the percentage maintained. Calculate the total area of existing exterior envelope and existing building structure to ensure that the credit goals have been met. Building materials demolished to create courtyards to increase daylighting may be counted as retained in calculations for this credit, provided that the new courtyards meet the requirements of IEQ Credit 8.2: Daylight and Views. If the project includes an addition that is more than 2 times the square footage of the existing building, this credit is not applicable.

Use only areas (square footage) to calculate the quantity of preserved materials. The area to be used in the denominator is the sum of all new and reused floor or roof area and the exterior envelope, including the ground floor, to account for slabs-on-grade and footings or the exterior wall area. The area to be used in the numerator is the sum of reused floor, roof or wall area.

MR Credit 1.2: Building Reuse—Maintain Existing Interior Nonstructural Elements

1 Point

Intent

Extend the lifecycle 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 interior nonstructural elements (e.g., interior walls, doors, floor coverings and ceiling systems) in at least 50% (by area) of the completed building, including additions. Hazardous materials that are remediated as a part of the project scope shall be excluded from the calculation of the percentage maintained. If the project includes an addition with square footage more than 2 times the square footage of the existing building, this credit is not applicable.

MR Credit 2: Construction Waste Management

1–2 Points

Intent

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

Requirements

Recycle and/or salvage nonhazardous construction and demolition debris. Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or comingled. Excavated soil and land-clearing debris do not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout. The minimum percentage debris to be recycled or salvaged for each point threshold is as follows:

Recycled or Salvaged	Points
50%	1
75%	2

MR Credit 3: Sustainably Sourced Materials and Products

1–4 Points

Intent

Reduce the environmental burdens of materials and products acquired to construct building and to upgrade building services.

Requirements

One point and up to a maximum of four will be awarded for each 10% of the total value of all building materials and products used in the project (based on cost) that meet the criteria below. If concrete or steel structural elements are applied toward this credit, the project must include at least two other materials or products from CSI MasterFormat Divisions (other than 03 and 05) to attain the first point. Of the total recycled content, no more than 75% may be steel or concrete.

1. The cost of any individual material or product may be added for each of the following sustainability criteria that the material or product meets:

   - Salvaged, refurbished or reused materials.

   OR

   - Recycled content. The recycled content value is determined by multiplying the recycled content fraction of the assembly (based on weight) by the cost of the assembly. The recycled content fraction is the sum of all post-consumer[1] recycled content plus one-half of the pre-consumer[2] content. Note: The same material cannot contribute to both salvaged and recycled content values.

   OR

   - Regionally sourced/manufactured materials and products that have been extracted, harvested or recovered, as well as manufactured within 500 miles of the project site

   OR

   - Rapidly renewable materials. The rapidly renewable content value is determined by multiplying the rapidly renewable content fraction of the assembly (based on weight) by the cost of the assembly.

   OR

   - Wood certified, in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria. The certified wood content value is determined by multiplying the certified wood content fraction of the assembly (based on weight) by the cost of the assembly. Note: Only virgin wood stock shall contribute towards the certified wood criteria. Certified wood shall not contribute to the rapidly renewable criteria.

   Note: All wood certification requirements will be updated to reflect the new criteria being put forth for member approval across all LEED rating systems.

1 "Post-consumer material" is defined as waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose.

2 "Pre-consumer material" is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials, such as rework, regrind or scrap, generated in a process and capable of being reclaimed within the same process that generated it.

AND

2. Wall, ceiling and flooring systems and finishes, composite wood, agrifiber and fiberglass products, both exterior and interior adhesives, sealants, coatings, roofing, and waterproofing products must meet the relevant IEQ Credit 4: Low-Emitting Materials requirements to contribute toward the credit.

AND

Mechanical, electrical and plumbing components and specialty items, such as elevators, shall not be included in this calculation. Only include materials permanently installed in the project. Furniture is not included (see Credit 5.1-5.3).

Recycled content shall be defined in accordance with the International Organization of Standards Document ISO 14021-1999—Environmental labels and declarations—Self-declared environmental claims (Type II environmental labeling).

Supplemental cementitious materials derived from coal fired power plant wastes shall not have mercury content >5.5ppb (0.0055 mg/L). Fly ash generated as a by-product of municipal solid waste incinerators does not qualify as a recycled-content material for this credit.

MR Credit 4.1: PBT Source Reduction—Mercury in Lamps

1–2 Points

Intent

Reduce the release of Persistent Bioaccumulative and Toxic (PBTs) chemicals associated with the life cycle of building materials.

Requirements

In addition to the credit goals outlined in MR Prerequisite 2: PBT Source Reduction—Mercury, specify and install long lasting reduced mercury fluorescent lamps consistent with the following minimum criteria:

Fluorescent Lamp	Criteria
T-8 Eight-foot (Standard Output)	24,000 rated hours on instant start ballasts OR program start ballasts (3 hour starts)
T-8 Eight-foot (High Output)	18,000 rated hours on instant start ballasts OR program start ballasts (3 hour starts)
T-8 Four-foot (both Standard and High Output)	30,000 rated hours on instant start ballasts OR 36,000 rated hours on program start ballasts (3 hour starts)
T-8 Two-foot and Three-foot	24,000 rated hours on instant start ballasts OR program start ballasts (3 hour starts)
T-8 U-Bent	18,000 rated hours on instant start ballasts OR 24,000 rated hours on program start ballasts (3 hour starts)
T-5 (both Standard and High Output)	25,000 rated hours on program start ballasts
Compact fluorescent lamps, non-integral ballast	12,000 rated hours
Compact florescent lamps, integral ballast, bare bulb	10,000 rated hours
Compact fluorescent lamps, integral ballast, covered models such as globes, reflectors & A-19s	8,000 rated hours
High Pressure Sodium Lamp	**Criteria**
All HPS	Use non cycling type or replace with LED lamps or induction lamps
Note: Longer lamp life contributes to lower mercury use by reducing the frequency of lamp replacement. Do not specify or install circular fluorescent lamps on the project. Do not specify or install probe start metal halide lamps in the project.	

MR Credit 4.2: PBT Source Reduction—Lead, Cadmium and Copper

2 Points

Intent

Reduce the release of Persistent Bioaccumulative and Toxic (PBTs) chemicals associated with the life cycle of building materials.

Requirements

Specify substitutes for materials manufactured with lead and cadmium, as follow:

- Specify and use 100% lead-free solder and flux used to connect plumbing pipe on-site for water intended for human consumption that meets the California AB1953 standard that solder must not contain more than 0.2% lead, and flux not more than a weighted average of 0.25% for wetted surfaces.
- Specify and use pipes, pipe fittings, plumbing fittings and faucets for water intended for human consumption that meets the California AB1953 standard of a weighted average lead content of the wetted surface area of not more than 0.25% lead.
- Specify and use lead-free roofing and flashing.
- Specify and use electrical wire and cable with lead content <300ppm.
- Specify no use of interior or exterior paints containing cadmium or lead. Green Seal certified paints or paints meeting Green Seal criteria exclude metals including cadmium, lead, mercury, antimony, and hexavalent chromium.

For copper pipe applications, reduce or eliminate joint-related sources of copper corrosion:

- use mechanically crimped copper joint system, or
- specify that all solder joints are compliant with ASTM B828 and specify and use ASTM B813 flux.

For renovation projects, ensure the removal and appropriate disposal of disconnected wires with lead stabilizers, consistent with the 2002 National Electric Code requirements.

Note: To comply with the intent of this credit, specify "100% lead free" products. The "lead free" label as defined by the EPA's Safe Drinking Water Act (SDWA) (http://www.epa.gov/safewater/sdwa/index.html) does not provide adequate screening for the purposes of this credit because these products may still contain lead.

The SDWA defines "lead free" as:

- Solders and flux containing 0.2% lead or less.
- Pipes, pipe fittings, and well pumps containing 8% lead or less.
- Lead used for radiation shielding and copper used for MRI shielding are exempt from the requirements of this credit.

MR Credit 5: Furniture and Medical Furnishings

1–2 Points

Intent

Enhance the environmental and human health performance attributes associated with freestanding furniture[1] and medical furnishings products.

Requirements

A percentage of the total value of all freestanding furniture and medical furnishings, including mattresses, foams, panel fabrics, cubicle curtains, window coverings, and other textiles, used in the project (based on cost) must meet the criteria in one of the three options below. The minimum percentage for each point is as follows:

% of Total Material	Points
30%	1
40%	2

Built-in casework and built-in millwork items must be included in the base building calculations, even if manufactured offsite. The dollar value of any individual product may be included in the total qualifying value if the product meets the criteria of any of the three options.

OPTION 1

All components of a furniture or medical furnishing assembly, including textiles, finishes and dyes, must contain less than 100 parts per million (ppm) of at least four of the five following chemical groups:

- Urea formaldehyde.
- Heavy metals including mercury, cadmium, lead, antimony.
- Hexavalent chromium in plated finishes consistent with the Restriction of the Use of Certain Hazardous Substances of the European Union Directive (EU RoHS).
- Stain and non-stick treatments derived from Perfluorinated Compounds (PFCs), including Perfluorooctanoic Acid (PFOA).
- Added antimicrobial treatments.

If the total weight is more than five percent of the product by weight, furniture components must be included.

OPTION 2

All components of a furniture or medical furnishing assembly,(including textiles, finishes and dyes, must contain less than 100 parts per million (ppm) of at least two of the five chemicals of materials listed in Option 1 AND the product must meet or exceed the indoor air quality requirements of California's Special Environmental Requirements, Specifications Section 01350, updated with California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using

1 Furniture is defined as any fixtures, such as shelving, tables, storage units, chairs, desks or cabinets, purchased as a free standing or modular unit, regardless of where the assembly takes place.

Environmental Chambers version 1.1 (CDPH/EHLB/M-500 Standard Method v1.1) as determined by independent laboratory testing and using the standard office building furniture protocol parameters.

The following programs currently utilize 01350 requirements for compliance for furniture:

- Scientific Certification Systems (SCS) Indoor Advantage Gold Environmental Certification Program
- Greenguard Product Emission Standard for Children & Schools

OPTION 3

All components of a furniture or medical furnishing assembly, including textiles, finishes and dyes, must meet the sustainably sourced materials criteria (salvaged, recycled, rapidly renewable, FSC-certified wood, local manufactured) of the MR Credit 3: Sustainably Sourced Materials and Products. Note: Furniture and medical furnishings do not contribute to MR Credit 3.

MR Credit 6: Resource Use—Design for Flexibility

1 Point

Intent

Conserve resources associated with the construction and management of buildings by designing for flexibility and ease of future adaptation, and service life of constituent components and assemblies.

Requirements

Increase building flexibility and ease of adaptive reuse over the life of the structure by employing a minimum of three of the following design and/or space planning strategies:

- Use of interstitial space[1] serving for a minimum 20% of project diagnostic and treatment or other clinical floor area [calculation based on Departmental Gross Square Foot (DGSF)]. Design distribution systems for electrical, information technology, communication, medical gases, and sprinklers with the capability to control multiple zones in clinical spaces. (Inpatient units are included in this calculation.)
- Provide programmed soft space[2], such as administration/storage, equal to a minimum of 5% of total clinical space. Locate soft space adjacent to clinical departments that anticipate growth. Determine strategy for future accommodation of displaced soft space (calculation based on project DGSF).
- Provide shelled space[3] equal to a minimum of 5% of total project departmental clinical space; locate where it can be occupied without displacing occupied space (calculation based on project DGSF).
- Identify horizontal expansion capacity for diagnostic and treatment or other clinical space equal to a minimum of 30% of existing gross square footage (excluding inpatient units) without demolition of occupied space (other than at the connection point of future expansion). Reconfiguration of additional existing occupied space that has been constructed with demountable partition systems is permitted. Design for future vertical expansion on a minimum of 75% of the roof, ensuring that existing operations and service systems will be able to operate at or near capacity during the expansion.
- Designate location(s) for future above-grade parking structure(s) equal to 50% of existing on-grade parking capacity, with direct access to the main hospital lobby/circulation/vertical transportation pathways.
- Use of demountable partitions for 50% of applicable areas as a strategy for future flexibility.
- Use movable/modular casework for a minimum of 50% of casework and custom millwork. (Calculation is based upon the combined value of the two elements, as determined by the cost estimator or contractor).

1 "Interstitial space" is an n intermediate space located between floors, often used to run mechanical equipment, wiring, and other support services to the occupied floors above and/or below.
2 "Soft space" is a lightly programmed area that can be easily displaced to allow a neighboring area, such as a clinical department, opportunity to expand.
3 "Shell space" is an area designed to be fitted out for future expansion. Shell spaces are enclosed by the exterior building shell, but otherwise left unfinished.

IEQ Prerequisite 1: Minimum Indoor Air Quality 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 Sections 6 through 6 of ASHRAE Standard 170-2008, Ventilation of Health Care Facilities (with errata but without addenda[1]).

AND

CASE 1. Mechanically Ventilated Spaces

Mechanical ventilation systems must be designed using the ventilation rates in Section 7 of the standard, the requirements of the 2010 FGI Guidelines for Design and Construction of Health Care Facilities (Table 2.1-2) or the applicable local code, whichever is more stringent.

CASE 2. Naturally Ventilated Spaces

Naturally ventilated buildings or portions of the buildings must comply with ASHRAE Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality, Paragraph 5.1 (with errata but without addenda[1]).

1 Project teams wishing to use ASHRAE approved addenda for the purposes of this prerequisite may do so at their discretion. Addenda must be applied consistently across all LEED credits.

IEQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control

Required

Intent

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

Requirements

OPTION 1

Prohibit smoking in the building.

Prohibit on-property smoking within 50 feet of entries, outdoor air intakes, bus stops, qualifying places of respite, operable windows, and other locations where occupants could inadvertently come in contact with ETS when occupying, entering or leaving the building. Provide signage to allow smoking in designated areas, prohibit smoking in designated areas or prohibit smoking on the entire property.

Designated smoking areas may not be located in or proximate to places of respite used to meet the requirements of SS Credit 9.1: Connection to the Natural World—Places of Respite.

OR

OPTION 2

For residential healthcare occupancies only where accommodation for resident smoking is programmatically mandated:

Prohibit smoking in resident rooms and all common areas of the building.

Locate any exterior designated smoking areas including balconies where smoking is permitted, at least 50 feet from entries, outdoor air intakes, bus stops, operable windows and other locations where occupants could inadvertently come in contact with ETS when occupying, entering or leaving the building. Provide signage to allow smoking in designated areas, prohibit smoking in designated areas, or prohibit smoking on the entire property.

All exterior doors and operable windows in the residential units shall be gasketed to minimize leakage from outdoors.

Provide designated smoking rooms as mandated by the functional program designed to effectively contain, capture and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors, away from air intakes and building entry paths, with no re-circulation of ETS-containing air to non-smoking areas, and enclosed with sealed deck-to-deck partitions. Operate exhaust sufficient to create a negative pressure differential with respect to the surrounding spaces of at least an average of 5 Pascals (Pa) (0.02 inches of water gauge) and a minimum of 1 Pa (0.004 inches of water gauge) when the door(s) to the smoking room are closed.

Verify performance of the smoking room's differential air pressures by conducting 15 minutes of measurement, with a minimum of one measurement every ten seconds, of the differential pressure in the

smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. Conduct the testing with each space configured for worst case conditions of transport of air from the smoking room's (with closed doors) to adjacent spaces.

IEQ Prerequisite 3: Hazardous Material Removal or Encapsulation (Renovations Only)

Required

Intent

Reduce building occupants' potential exposure to hazardous materials, such as asbestos, mercury, lead, PCBs, and mold, in existing buildings undergoing renovation.

Requirements

Develop and implement a hazardous material management program for the construction and pre-occupancy phases of the building.

Identify the applicable local, state and federal regulatory requirements.

Obtain survey records that identify where hazardous materials are located in the building and on the site so that the material(s) present can be addressed appropriately in the ongoing hazardous material management program. If the existing survey records do not cover all areas of the building, conduct a survey to identify where hazardous materials are present in the remaining areas of the building. Include a plan for capture of historical mercury sources in demolition plans, including, but not limited to, piping infrastructure. Collection of any mercury devices shall be designated for recycling and preclude overseas donation/disposal.

Contract must include requirements for reporting and investigating suspect mold encountered in demolition. Identify and remedy the source of water and/or moisture to prevent future mold development.

Remediate contaminated materials with recognized procedures performed by licensed abatement contractors to protect workers, building occupants and the public.

Use lead containment methodologies to prevent release into the air to protect people and prevent soil contamination.

Ensure the removal and appropriate disposal of disconnected wires with lead stabilizers.

Obtain a letter from the licensed abatement contractor stating that all hazardous materials within the affected demolition or renovation areas have been removed or encapsulated, and that all sources of mold/mildew have been identified and remedied. Provide a certified letter of destruction to the owner for record.

IEQ Credit 1: Outdoor Air Delivery Monitoring

1 Point

Intent

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

Requirements

Install permanent monitoring systems to ensure that provide feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements. Configure all monitoring equipment to generate an alarm when airflow values or carbon dioxide (CO_2) levels vary by 10% or more from the design values via either a building automation system alarm to the building operator or a visual or audible alert to the building occupants.

AND

CASE 1. Mechanically Ventilated Spaces

Monitor CO2 concentrations within all densely occupied spaces (those with a design occupant density of 25 people or more per 1,000 square feet). CO2 monitors must be between 3 and 6 feet above the floor.

Provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor air intake flow with an accuracy of plus or minus 5% of the design minimum outdoor air rate, as defined by ASHRAE Standard 170-2008 (with errata but without addenda[1]) for mechanical ventilation systems where 20% or more of the design supply airflow serves non-densely occupied spaces.

CASE 2. Naturally Ventilated Spaces

Monitor CO2 concentrations within all naturally ventilated spaces. CO2 monitors must be between 3 and 6 feet above the floor. One CO2 sensor may be used to monitor multiple non-densely occupied spaces if the natural ventilation design uses passive stack(s) or other means to induce airflow through those spaces equally and simultaneously without intervention by building occupants.

1 Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

IEQ Credit 2: Acoustic Environment

1-2 Points

Intent

Provide building occupants with an indoor healing environment free of intrusive or disruptive levels of sound.

Requirements

Design the facility to meet or exceed the sound and vibration criteria outlined in the 2010 FGI Guidelines for Design and Construction of Health Care Facilities (2010 FGI Guidelines) and the reference document on which it is based, Sound and Vibration Design Guidelines for Health Care Facilities (2010 SV Guidelines).

Option 1 (1 Point)

Sound Isolation

Design sound isolation to achieve speech privacy, acoustic comfort and minimal annoyance from noise-producing sources. Consider sound levels at both the source and receiver locations, the background sound at the receiver locations and the occupant's acoustical privacy and acoustical comfort needs. Speech privacy is defined as "Techniques…to render speech unintelligible to casual listeners" by ANSI T1.535-2001, Telecom Glossary 2007.

Design the facility to meet the criteria outlined in the sections of the 2010 FGI Guidelines Table 1.2-3: Design Criteria for Minimum Sound Isolation Performance between Enclosed Rooms and Table 1.2-4 Speech Privacy for Enclosed Room and Open-Plan Spaces (2010 FGI Guidelines and 2010 SV Guidelines).

Calculate or measure sound isolation and speech privacy descriptors achieved for representative adjacencies as necessary to confirm compliance with criteria as identified in Sections 1.2-6.1.5 and 1.2-6.1.6 (including associated sections of the Appendix) of the 2010 FGI Guidelines and the referenced standard on which it is based: the SV Guidelines.

Room Noise

Consider background sound levels generated by all building mechanical-electrical-plumbing systems, air distribution systems and other facility noise sources under the purview of the project building design-construction team.

Design the facility to meet the 2010 FGI Guidelines' Table 1.2-2 Minimum-Maximum Design Criteria for Noise in representative interior rooms and spaces.

Calculate or measure sound levels in representative rooms and spaces of each type as necessary to confirm compliance with criteria in the above referenced table using a sound level meter that conforms to ANSI S1.4 for type 1 (precision) or type 2 (general purpose) sound measurement instrumentation. For spaces not listed in Table 1.2-2, refer to the ASHRAE 2007 Handbook, Chapter 47, Sound and Vibration Control, Table 42.

Option 2 (2 Points)
Achieve Option 1 AND

Acoustical Finishes

Specify materials, products systems installation details, and other design features to meet the 2010 FGI Guidelines Table 1.2-1 Design Room Sound Absorption Coefficients (including associated sections of the Appendix) and its reference to the 2010 SV Guidelines.

Calculate or measure the room average sound absorption coefficients for representative unoccupied rooms of each type in the building, as necessary, to confirm conformance with the requirements for this credit.

Site Exterior Noise

Minimize the impact of site exterior noise on building facility occupants produced by all exterior noise sources—road traffic, aircraft flyovers, railroads, on-site heliports, emergency power generators during maintenance testing, outdoor facility MEP and building services equipment. Also minimize impacts on the surrounding community produced by all facility MEP equipment and activities as required to meet the lower of the local applicable codes or Table 1.2-1 of the 2010 FGI Guidelines and the supporting Table 1.3-1 of the 2010 SV Guidelines.

Comply with the appropriate sections of the 2010 FGI Guidelines for each category:

- Heliports – A1.3-3.6.2.2
- Generators – 2.1-8.3.3.1
- Mechanical Equipment – 2.1-8.2.1.1
- Building Services – A2.2-5.3

Measure and analyze data to determine the Exterior Noise Classification (A, B, C, or D) of the facility site. See Table A1.2a: Categorization of Health Care Facility Sites by Exterior Ambient Sound in the 2010 FGI Guidelines and Table 1.3-1 in its reference standard, the 2010 SV Guidelines. Design the building envelope composite STC rating based on the 2010 FGI Guidelines for Categorization of Health Care Facility Sites by Exterior Ambient Sound and analyze contract documents to show conformance with requirements for this credit.

For Exterior Site Exposure Categories B, C or D, measure the sound isolation performance of representative elements of the exterior building envelope to determine the composite sound transmission class (STCC) rating for representative façade sections as necessary. Measurements shall generally conform to the current edition of ASTM E966 Standard Guide for Field Measurements of Airborne Sound Insulation of Building Facades and Façade Elements.

IEQ Credit 3.1: Construction Indoor Air Quality Management Plan—During Construction

1 Point

Intent

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

Requirements

Develop and implement an Environmental Quality Management Plan (EQMP) for the construction and preoccupancy phases of the building. Minimize air and noise pollution during the construction process as prescribed below.

For renovations, additions adjacent to occupied facilities or phased occupancy in new construction:

- Follow the 2010 FGI Guidelines for Design and Construction of Health Care Facilities and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) standards to establish an integrated infection control team comprised of the owner, designer and contractor to evaluate infection control risk and document the required precautions in a project-specific plan.
- Use the Infection Control Risk Assessment (ICRA) standard published by the American Society of Healthcare Engineering (ASHE) and the U.S. Centers for Disease Control and Prevention (CDC), as a guideline for construction activities to assess risk and to select mitigation procedures.

For all projects:

- Develop and implement a moisture control plan to address measures that will maintain dry conditions to protect stored on-site and installed absorptive materials from moisture damage. Immediately remove from site and properly dispose of any materials susceptible to microbial growth and replace with new, undamaged materials. Also include strategies for protecting the building from moisture intrusion and occupant exposures to dangerous mold spores.
- If permanently installed air handlers are used during construction:
  - Filtration media with a minimum efficiency reporting value (MERV) of 8 must be used at each return air grille, as determined by ASHRAE Standard 52.2-1999 (with errata but without addenda[1]).
  - Active outdoor air intakes and return air grilles with filtration media must be protected.
  - Temporary filter media must be evaluated and replaced as necessary.
  - Replace all filtration media immediately prior to occupancy.
- Volatile Organic Compound (VOC) Absorption – Schedule construction procedures to minimize exposure of absorbent materials to VOC emissions. Complete "wet" construction procedures such as painting and sealing before storing or installing "dry" absorbent materials such as carpet or ceiling tiles. These materials

1 Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

accumulate pollutants and release them over time. Store fuels, solvents and other sources of VOCs separately from absorbent materials.

- Tobacco Products – Prohibit the use of tobacco products inside the building and within 50 feet (or greater, if local jurisdiction requires) of the building entrance during construction.
- Noise and Vibration Exposure to Occupants and Construction Crews – Develop a plan based upon the British Standard (BS 5228) to reduce noise emissions and vibrations from construction equipment and other non-road engines by specifying low-noise emission design or the lowest decibel level available that meets performance requirements in the British Standard to insure it is within acceptable limits to the occupants. Construction crews must wear ear protection in areas where sounds levels exceed 85 dB for extended period of times.

IEQ Credit 3.2: Construction Indoor Air Quality Management Plan—Before Occupancy

1 Point

Intent

Reduce indoor air quality (IAQ) problems resulting from construction or renovation to help sustain the comfort and well-being of construction workers and building occupants.

Requirements

Develop an IAQ management plan and implement it after all finishes and furnishings have been installed and the building has been completely cleaned before occupancy.

OPTION 1. Flush-Out[1]

PATH 1

After construction ends, prior to occupancy and with all interior finishes installed, install new filtration media and, perform a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of floor area while maintaining an internal temperature of at least 60° F and relative humidity no higher than 60%.

OR

PATH 2

If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of floor area. Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic feet per minute (cfm) per square foot of outside air or the design minimum outside air rate determined in IEQ Prerequisite 1: Minimum Indoor Air Quality Performance, whichever is greater. During each day of the flush-out period, ventilation must begin a minimum of 3 hours prior to occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outside air has been delivered to the space. Note: All finishes and furnishings must be installed prior to flush out.

OR

OPTION 2. Air Testing

Conduct baseline IAQ testing after construction ends and prior to occupancy using testing protocols consistent with the EPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in the LEED Reference Guide for Green Building Design and Construction, 2009 Edition Healthcare Supplement.

1 All finishes must be installed prior to flush-out.

Demonstrate that the contaminant maximum concentration levels listed below are not exceeded:

Contaminant	Maximum Concentration
Formaldehyde	20 micrograms per cubic meter
Particulates (PM10)	20 micrograms per cubic meter
Total volatile organic compounds (TVOCs)	200 micrograms per cubic meter
4-Phenylcyclohexene (4-PCH)*	3 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 if carpets and fabrics with styrene butadiene rubber (SBR) latex backing are installed as part of the base building systems.	

For each sampling point where the maximum concentration limits are exceeded, conduct an additional flush-out with outside air and retest the noncompliant concentrations. Repeat until all requirements are met. When retesting noncompliant building areas, take samples from the same locations as in the first test, although it is not required.

Conduct the air sample testing as follows:

- All measurements must be conducted prior to occupancy, but during normal occupied hours with the building ventilation system started at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the test.
- All interior finishes must be installed, including but not limited to millwork, doors, paint, carpet and acoustic tiles. Movable furnishings such as workstations and partitions should be in place for the testing, although it is not required.
- The number of sampling locations will depend on 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 must not be less than 1 per 25,000 square feet or for each contiguous floor area, whichever is larger. Include areas with the least ventilation and greatest presumed source strength.
- Air samples must be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum 4-hour period.

IEQ Credit 4: Low-Emitting Materials

1-4 Point

Intent

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

Requirements

One point (maximum four) can be achieved for each group of materials that comply with the requirements.

GROUP 1: Interior Adhesives and Sealants

All adhesives and sealants used on the interior of the building (i.e., inside of the weatherproofing system and applied on-site) must comply with the following requirements as applicable to the project scope[1]:

- Adhesives, Sealants and Sealant Primers must comply with South Coast Air Quality Management District (SCAQMD) Rule #1168. Volatile organic compound (VOC) limits listed in the table below correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.
- Aerosol Adhesives must comply with Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.

Adhesives and sealants shall contain no carcinogen or reproductive toxicant components present at more than 1% of total mass of the product as defined in the California Office of Environmental Health Hazard Assessment's (OEHHA) list entitled "Chemicals Known to the State to Cause Cancer" or the Reproductive Toxicity, Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).

GROUP 2: Wall and Ceiling Finishes

Paints and coatings used on the interior of the building—defined as inside of the weatherproofing system and applied on-site—shall not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings. (Rules in effect on July 1, 2008.)

Ceiling tiles, including suspended acoustical tiles, and wall coverings shall comply with the testing and product requirements of the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers version 1.1 (CDPH/EHLB/M-500 Standard Method v1.1) modeled using the standard office building protocol parameters and certified as compliant by an independent third party.

GROUP 3: Flooring

Carpet and all hard surface flooring installed in the building interior shall comply with the testing and product requirements of the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers version 1.1 (CDPH/EHLB/M-500 Standard Method v1.1), modeled using the standard office building protocol parameters and certified as compliant by an independent third party. Mineral-based finish flooring products, such as tile,

1 The use of a VOC budget is permissible for compliance with this credit.

masonry, terrazzo, and cut stone without integral organic-based coatings and sealants and unfinished/untreated solid wood flooring, qualify for credit without any IAQ testing requirements. However, associated, site-applied adhesives, grouts, finishes and sealers must be compliant for a mineral-based or unfinished/untreated solid wood flooring system to qualify for credit.

All carpet cushion installed in the building interior shall comply with the requirements of the Carpet and Rug Institute Green Label program.

All flooring related adhesives shall comply with the requirements of Group 1. Grout shall comply with requirements for ceramic tile adhesive.

Concrete, wood, bamboo, cork and other floor finishes, such as sealer, stain and finish, shall not exceed the VOC limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on July 1, 2008.

GROUP 4: Composite Wood, Agrifiber Products and Batt Insulation Products

Composite wood and agrifiber products used on the interior of the building—defined as inside of the weatherproofing system—shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

Composite wood and agrifiber products are defined as particleboard, medium density fiberboard (MDF), plywood, wheat board, strawboard, panel substrates and door cores. Materials considered furniture, fixtures, and equipment (FF&E) are not considered base building elements and are not included.

Batt insulation products shall contain no added formaldehyde, including urea formaldehyde, phenol formaldehyde, and urea-extended phenol formaldehyde.

GROUP 5: Exterior Applied Products

Adhesives, sealants, coatings, roofing and waterproofing materials—defined as from the weatherproofing system out and applied on-site—shall comply with the VOC limits of California Air Resources Board (ARB) 2007 Suggested Control Measure (SCM) for Architectural Coatings and South Coast Air Quality Management District (SCAQMD) Rule 1168 effective July 1, 2005.

Roofing installations shall not use hot-mopped asphalt installation techniques.

Parking lots and other paved surfaces shall not use coal tar sealants.

For any waterproofing, asphalt roofing needing repair, parking lot sealing or other high VOC emissions outdoor construction process, create a plan to manage fumes and avoid infiltration to occupied spaces. Comply with procedures established by NIOSH's Asphalt Fume Exposures During the Application of Hot Asphalt to Roofs (Publication No. 2003-112).

Reference Table for all IEQ Credit 4 Groups			
Architectural Adhesives (SCAQMD 1168)	**VOC Limit [g/L less water]**	**Specialty Adhesives (SCAQMD 1168)**	**VOC Limit [g/L less water]**
Indoor Carpet Adhesives	50	PVC Welding	510
Carpet Pad Adhesives	50	CPVC Welding	490
Wood Flooring Adhesives	100	ABS Welding	325
Rubber Floor Adhesives	60	Plastic Cement Welding	250
Subfloor Adhesives	50	Adhesive Primer for Plastic	550
Ceramic Tile Adhesives	65	Contact Adhesive	80
VCT & Asphalt Adhesives	50	Special Purpose Contact Adhesive	250
Drywall & Panel Adhesives	50	Structural Wood Member Adhesive	140
Cove Base Adhesives	50	Sheet Applied Rubber Lining Operations	850
Multipurpose Construction Adhesives	70	Top & Trim Adhesive	250
Structural Glazing Adhesives	100		
Interior Sealants (SCAQMD 1168)		**Sealant Primers (SCAQMD 1168)**	**250**
Architectural	250	Architectural Non Porous	775
Other	420	Architectural Porous	750
		Other	750
Exterior Coatings (CARB SCM)		**Substrate Specific Applications (SCAQMD 1168)**	
Aluminum Roof Coatings	400	Metal to Metal	30
Basement Specialty Coatings	400	Plastic Foams	50
Concrete Curing Compounds	350	Porous Material (except wood)	50
Concrete/Masonry Sealers	100	Wood	30
Driveway Sealers	50	Fiberglass	80
Driveway Sealers	50	**Interior Coatings (SCAQMD 1113)**	
Floor Coatings	100	Paints (flat & non-flat, except anti-rust)	50
Industrial Maintenance Coatings	250	Clear wood finishes (varnish, lacquer or sanding sealers)	275
Non flat coatings	100	Floor coatings	50
Non flat high gloss	150	Primers and undercoaters	100
Primers, Sealants, and Undercoaters	100	Swimming pool coatings	340
Quick Dry Enamels	150	Sealers: Waterproofing & all others	100
Reactive Penetrating Sealer	350	Shellacs: Clear	730
Rust Preventative Coatings	250	Shellacs: Pigmented	550
Stains	250	Stains	100
Stone Consolidant	450	Aerosol Adhesives (GS-36)	
Traffic Coatings	100	General purpose mist spray	65% VOCs by weight
Waterproofing Membranes	250	General purpose web spray	55% VOCs by weight
Wood Coatings	275	Special purpose aerosol adhesives (all types)	70% VOCs by weight

IEQ Credit 5: Indoor Chemical and Pollutant Source Control

1 Point

Intent

Minimize building occupant exposure to potentially hazardous particulates and chemical pollutants.

Requirements

Design to minimize and control the entry of pollutants into buildings and later cross-contamination of regularly occupied areas through the following strategies:

- Employ permanent entryway systems at least 10 feet long in the primary direction of travel to capture dirt and particulates entering the building at regularly used exterior entrances. Acceptable entryway systems include permanently installed grates, grill s and slotted systems that allow for cleaning underneath. Roll-out mats are acceptable only when maintained on a weekly basis by a contracted service organization.

AND

- Minimize the entry of contaminants into the building from vehicles, pesticides, herbicides, helipads, diesel generators, designated smoking areas, sources of exhaust air, and other sources of potential contaminant as follows:

  Provide pressurized entryway vestibules at high-volume building entrances:

  Ensure, through the results of mathematical modeling [e.g. Computational Fluid Dynamics (CFD), Gaussian Dispersion Analyses] and/or physical testing (e.g. wind tunnel, tracer gas) that the air contaminant concentrations at outdoor air intakes are less than the thresholds established for the project under worst case meteorological conditions.

  Demonstrate that outside air intake concentrations pollutants meet the limits in the following table OR demonstrate by calculations that indoor concentrations shall not exceed 2.5% of the exposure limits listed in the table.

Pollutants	Maximum Outside Air Intake Concentrations	Standard
Regulated by National Ambient Air Quality Standard (NAAQS)	Allowable Annual average OR 8-hour or 24-hour average where an annual standard does not exist	National Ambient Air Quality Standard (NAAQS)
Other air contaminants	2.5% of 8-hour and short term/ ceiling limits	Most stringent of the following: ▪ Occupational Safety and Health Administration (OSHA) – Permissible Exposure Limits (PELs) ▪ American Council of Governmental Industrial Hygienists (ACGIH) – Threshold Limit Values (TLVs) ▪ National Institute of Occupational Health and Safety (NIOSH) – Recommended Exposure Limits (RELs)

AND

Design to minimize and control cross-contamination of regularly occupied areas:

- Where hazardous gases or chemicals may be present or used—garages, soiled utility areas, sterilization and disinfection areas, housekeeping/laundry areas and copying/printing rooms—exhaust each space sufficiently to create negative pressure with respect to adjacent spaces with the doors to the room closed. For each of these spaces, provide self-closing doors and deck-to-deck partitions or a hard-lid ceiling. The exhaust rate shall be at least six air changes per hour with no air re-circulation. (For rooms containing disinfectant and sterilant applications, provide a minimum of 12 air changes per hour.) The pressure differential with the surrounding spaces shall be at least 5 Pa (0.02 inches of water gauge) on average and 1 Pa (0.004 inches of water) at a minimum, when the doors to the rooms are closed.

IEQ Credit 6.1: Controllability of Systems—Lighting

1 Point

Intent

To provide a high level of lighting system control by individual occupants or specific groups in multi-occupant spaces (e.g., conference areas, critical care areas, emergency room areas) and promote their productivity, comfort and well-being.

Requirements

For All Occupants

Provide lighting system controls for all shared multi-occupant spaces to enable adjustments that meet group needs and preferences.

AND

For Staff Areas

Provide individual lighting controls for 90% (minimum) of the FTE staff (measured at peak periods) to enable adjustments to suit individual task needs and preferences.

AND

For Patient Areas

Provide individual lighting controls for 90% (minimum) of patients to enable adjustments to suit individual task needs and preferences.

Install lighting controls that are readily accessible from the patient bed. In multi-occupant patient spaces, such as recovery rooms, emergency departments, infusion areas, and similar open areas, provide individual lighting controls.

In private rooms, provide occupant controls that are readily accessible from the patient bed for exterior window shades, blinds, and/or curtains. Exempted areas include in-patient critical care, pediatric and psychiatric patient rooms.

IEQ Credit 6.2: Controllability of Systems—Thermal Comfort

1 Point

Intent

Provide a high level of thermal comfort system control[1] by individual occupants or specific groups in multi-occupant spaces and promote their productivity, comfort and well-being.

Requirements

Provide individual thermal comfort controls for every single occupant patient room.

AND

Provide individual thermal comfort controls for 50% (minimum) of the remaining building occupants to enable adjustments to meet individual needs and preferences. Operable windows may be used in lieu of controls for occupants located 20 feet inside and 10 feet to either side of the operable part of a window. The areas of operable window must meet the requirements of ASHRAE Standard 62.1-2007 paragraph 5.1 Natural Ventilation (with errata but without addenda[2]).

AND

Provide comfort system controls for all shared multi-occupant spaces to enable adjustments that meet group needs and preferences.

Conditions for thermal comfort are described in ASHRAE Standard 55-2004 (with errata but without addenda[2]) and include the primary factors of air temperature, radiant temperature, air speed and humidity. Comfort system control for the purposes of this credit is defined as the provision of control over at least one of these primary factors in the occupant's local environment.

1 For the purposes of this credit, comfort system control is defined as control over at least 1 of the following primary factors in the occupant's vicinity: air temperature, radiant temperature, air speed and humidity.

2 Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

IEQ Credit 7: Thermal Comfort—Design and Verification

1 Point

Intent

Provide a comfortable thermal environment that supports and promotes occupant productivity and well-being and provide for the assessment of building occupant's thermal comfort over time.

Requirements

Design heating, ventilating and air conditioning (HVAC) systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy (with errata but without addenda[1]), and local codes or current 2010 FGI Guidelines for Design and Construction of Health Care Facilities (Table 2.1-2: Ventilation Requirements for Areas Affecting Patient Care in Hospitals and Outpatient Facilities), where local codes do not apply. Demonstrate design compliance in accordance with the Section 6.1.1 documentation.

Provide a permanent monitoring system to ensure that the building performs to the desired comfort criteria as determined above.

Agree to implement a thermal comfort survey of building occupants[2] within a period of six to 18 months after occupancy. The survey shall collect anonymous responses about thermal comfort in the building, including an assessment of overall satisfaction with thermal performance and identification of thermal comfort-related problems. Agree to develop a plan for corrective action if the survey results indicate that more than 20% of occupants are dissatisfied with thermal comfort in the building. The plan shall include measurement of relevant environmental variables in problem areas in accordance with ASHRAE Standard 55-2004 (with errata but without addenda[1]) and 2010 FGI Guidelines for Design and Construction of Health Care Facilities.

1 Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

2 In acute care hospitals and outpatient healthcare projects, occupants are defined as full-time staff. For residential health care occupancies, such as long term care or rehabilitation facilities, occupants include both full-time staff and residents.

IEQ Credit 8.1: Daylight and Views—Daylight

2 Points

Intent

To provide building occupants with 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 of two points under IEQ Credit 8.2: Daylight and Views—Views.

AND

Install daylight responsive controls in 100% of the area that meets the daylight quantity thresholds above. Daylight controls must switch or dim electric lights in response to the presence or absence of daylight illumination in the space.

AND

For a minimum of 75% or more of the perimeter area used to qualify under IEQ Credit 8.2, achieve daylighting in at least the following spaces[1], through 1 of the 4 options:

OPTION 1. Simulation

Demonstrate through computer simulations that 75% or more of perimeter area used to qualify under IEQ Credit 8.2 achieve daylight illuminance levels of a minimum of 10 footcandles (fc) and a maximum of 500 fc in a clear sky condition on September 21 at 9 a.m. and 3 p.m.

Provide glare control devices to avoid high-contrast situations that could impede visual tasks. However, designs that incorporate view-preserving automated shades for glare control may demonstrate compliance for only the minimum 10 fc illuminance level.

OR

OPTION 2. Prescriptive

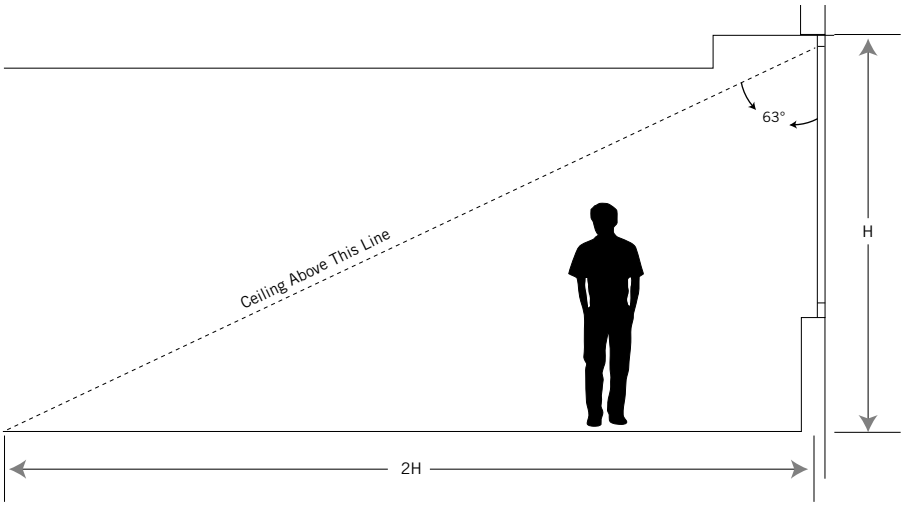
For side-lighting zones:

- Achieve a value, calculated as the product of the visible light transmittance (VLT) and window-to-floor area ratio (WFR) between 0.150 and 0.180.

$$0.150 < VLT \times WFR < 0.180$$

- The window area included in the calculation must be at least 30 inches above the floor.
- In section, the ceiling must not obstruct a line that extends from the window-head to a point on the floor that is located twice the height of the window-head from the exterior wall as measured perpendicular to the glass (see diagram on next page).

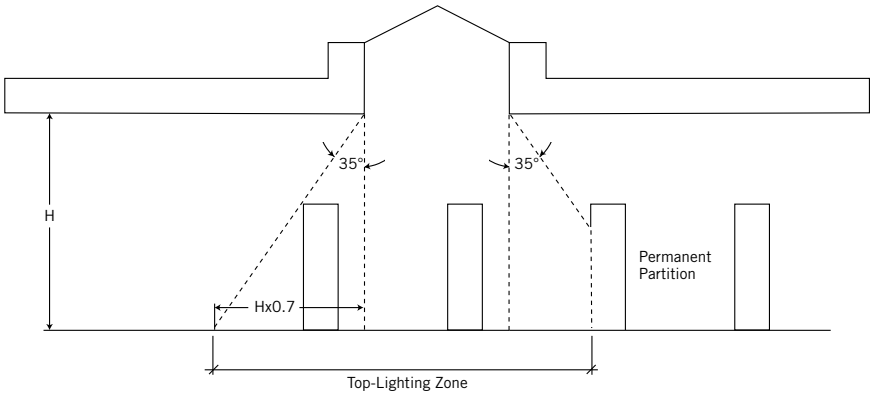
1 Exceptions for areas where tasks would be hindered by the use of daylight will be considered on their merits.



- Provide glare control devices to avoid high-contrast situations that could impede visual tasks. However, designs that incorporate view-preserving automated shades for glare control may demonstrate compliance for only the minimum 0.150 value.

For top-lighting zones:

- The top-lighting zone under a skylight is the outline of the opening beneath the skylight, plus in each direction the lesser of (see diagram below):
  - 70% of the ceiling height,
  - 1/2 the distance to the edge of the nearest skylight,
  - The distance to any permanent partition that is closer than 70% of the distance between the top of the partition and the ceiling.



- Achieve skylight coverage for the applicable space (containing the top-lighting zone) between 3% and 6% of the floor area.
- The skylight must have a minimum 0.5 VLT.

- A skylight diffuser, if used, must have a measured haze value of greater than 90% when tested according to ASTM D1003.

OR

OPTION 3. Measurement

Demonstrate through records of indoor light measurements that a minimum daylight illumination level of 10 fc and a maximum 500 fc has been achieved in at least 75% of the perimeter area used to qualify under IEQ Credit 8.2. Measurements must be taken on a 10-foot grid for all occupied spaces and recorded on building floor plans.

Provide glare control devices to avoid high-contrast situations that could impede visual tasks. However, designs that incorporate view-preserving automated shades for glare control may demonstrate compliance for only the minimum 10 fc value.

OR

OPTION 4. Combination

Any of the above calculation methods may be combined to document the minimum daylight illumination in at least 75% of the perimeter area used to qualify under IEQ Credit 8.2.

IEQ Credit 8.2: Daylight and Views—Views

1-3 Points

Intent

Provide building occupants a connection to the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

Requirements

Provide access to views that meet the following criteria below.

INPATIENT UNITS (1 point)

A minimum of 90% of the inpatient staff and public areas shall be within 20 feet—or twice the window head height, whichever is smaller—of the perimeter. All such perimeter areas must have windows that provide at least an 11° angle of unobstructed view in the vertical and horizontal direction.

NON-INPATIENT AREAS (1-2 points)

In the block planning stage, configure the building floor plates such that the area within 15 feet of the perimeter exceeds the perimeter area requirement as determined by the table outlined below.

Confirm at the conclusion of detailed planning that 90% of the perimeter rooms have windows that provide at least an 11° angle of unobstructed view in the vertical and horizontal direction.

Perimeter Non-IPU Area with Window Access Required		
Floor plate area (bgsf)	Threshold A: 1 point	Threshold B: 2 points
Up to 15,000	7348	8248
20,000	8785	9985
25,000	10087	11587
30,000	11292	13092
35,000	12425	14525
40,000	13500	15900
45,000	14528	17228
50,000 and larger	15516	18516

For both in-patient and non-inpatient areas, portions of side lit areas beyond the 15' view area boundary that meet the requirements of IEQ Credit 8.1: Daylight and Views—Daylight may be included in the qualifying areas of this credit.

For calculation methodology for floor plates that vary in size and configuration, see the LEED Reference Guide for Green Building Design & Construction, 2009 Edition Healthcare Supplement.

ID Prerequisite 1: Integrated Project Planning and Design

Required

Intent

Maximize opportunities for integrated, cost-effective adoption of green design and construction strategies, emphasizing human health as a fundamental evaluative criterion for building design, construction and operational strategies. Utilize innovative approaches and techniques for green design and construction.

Requirements

Use cross-discipline design and decision making, beginning in the programming and pre-design phase. At a minimum, ensure the following process:

Owner's Project Requirements Document. Prepare an Owner's Project Requirements (OPR) document. Develop a health mission statement and incorporate it in the OPR. The health mission statement shall address "triple bottom line" values—economic, environmental and social. It shall include goals to safeguard the health of building occupants, the local community and the global environment, while creating a high-performance healing environment for the building's patients, caregivers and staff.

Preliminary Rating Goals. As early as practical and preferably before schematic design, conduct a preliminary LEED meeting with a minimum of four key project team members and the owner or owner's representative. As part of the meeting, create a LEED® action plan that, at a minimum:

- Determines the LEED certification level to pursue (Certified, Silver, Gold, or Platinum);
- Selects the LEED credits to meet the targeted certification level; and
- Identifies the responsible parties to ensure the LEED requirements for each prerequisite and selected credit are met.

Integrated Project Team. Assemble an integrated project team and include as many of the following professionals as feasible (minimum of four), in addition to the owner or owner's representative.

- Owner's capital budget manager
- Architect or building designer
- Mechanical engineer
- Electrical engineer
- Structural engineer
- Energy modeler
- Equipment planner
- Acoustical consultant
- Telecommunications designer
- Controls designer
- Building science or performance testing agents
- Green building or sustainable design consultant
- Facility green teams
- Physician and nursing teams
- Facility managers
- Environmental services staff
- Functional and space programmers
- Interior designer
- Lighting consultant/designer
- Commissioning agent
- Community representatives
- Civil engineer
- Landscape architect
- Ecologist
- Land planner
- Construction manager or general contractor
- Life cycle cost analyst; construction cost estimator;
- Other disciplines appropriate to the specific project type.

Design Charrette. As early as practical and preferably before schematic design, conduct a one-day, integrated design charrette with the project team as defined above. The goal is to optimize the integration of green strategies across all aspects of building design, construction and operations, drawing on the expertise of all participants.

ID Credit 1: Innovation in Design

1–4 Points

Intent

Provide design teams and projects the opportunity to achieve exceptional performance above the requirements set by the LEED Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED Green Building Rating System.

Requirements

Credit can be achieved through any combination of the Innovation in Design and Exemplary Performance paths as described below:

PATH 1. Innovation in Design (1-4 points)

Achieve significant, measurable environmental performance using a strategy not addressed in the LEED 2009 for Healthcare Rating System.

One point is awarded for each innovation achieved. No more than 4 points under this credit may be earned through PATH 1—Innovation in Design.

Identify the following in writing:

- The intent of the proposed innovation credit.
- The proposed requirement for compliance.
- The proposed submittals to demonstrate compliance.
- The design approach (strategies) used to meet the requirements.

PATH 2. Exemplary Performance (1-3 points)

Achieve exemplary performance in an existing LEED 2009 for Healthcare prerequisite or credit that allows exemplary performance as specified in the LEED Reference Guide for Green Building Design & Construction, 2009 Edition Healthcare Supplement. An exemplary performance point may be earned for achieving double the credit requirements and/or achieving the next incremental percentage threshold of an existing credit in LEED.

One point is awarded for each exemplary performance achieved. No more than 3 points under this credit may be earned through PATH 2— Exemplary Performance.

PATH 3. Pilot Credit (1 point)

Attempt a pilot credit available in the Pilot Credit Library at www.usgbc.org/pilotcreditlibrary. Register as a pilot credit participant and complete the required documentation. Projects may pursue more than 1 pilot credit; however, a maximum of 1 point will be awarded.

ID Credit 2: LEED Accredited Professional

1 Point

Intent

Support and encourage the design integration required by LEED to streamline the application and certification process.

Requirements

At least 1 principal participant of the project team shall be a LEED Accredited Professional (AP).

ID Credit 3: Integrated Project Planning and Design

1 Point

Intent

Maximize opportunities for integrated, cost-effective adoption of green design and construction strategies, emphasizing human health as a fundamental evaluative criterion for building design, construction and operational strategies. Utilize innovative approaches and techniques for green design and construction.

Requirements

Assemble and involve a project team as described in ID Prerequisite 1: Integrated Project Management and Design.

Actively involve all team members referenced above in at least three of the following phases of project design and construction process:

- Conceptual/schematic design
- LEED planning
- Preliminary design
- Energy/envelope systems analysis or design
- Design development
- Final design and construction documents
- Construction administration

Conduct regular meetings with the project team from the end of schematic design until the owner's certificate of occupancy to review project status, introduce new team members to project goals, discuss problems encountered, formulate solutions, review responsibilities and identify next steps. The meetings can be integrated into other required project team meetings. A plan shall be determined for regular integrated team coordination. At a minimum, 12 meetings shall be included with the integrated project team. In these meetings, utilize the framework established by the ANSI Market Transformation to Sustainability Guideline Standard March 2007 revision for distribution Whole System Integration Process (WSIP).

REGIONAL PRIORITY

RP Credit 1: Regional Priority

1–4 Points

Intent

To provide an incentive for the achievement of credits that address geographically-specific environmental priorities.

Requirements

Earn 1-4 of the 6 Regional Priority credits identified by the USGBC regional councils and chapters as having environmental importance for a project's region. A database of Regional Priority credits and their geographic applicability is available on the USGBC website, www.usgbc.org.

One point is awarded for each Regional Priority credit achieved; no more than 4 credits identified as Regional Priority credits may be earned. Projects outside of the U.S. are not eligible for Regional Priority credits.