LEED 2009 FOR CORE AND SHELL DEVELOPMENT

For Public Use and Display

LEED 2009 for Core and Shell Development Rating System

USGBC Member Approved November 2008 (Updated July 2012)

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 18,000 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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TRADEMARKS

ACKNOWLEDGMENTS

The LEED 2009 Rating System has been made possible only through the efforts of many dedicated volunteers, staff members, and others in the USGBC community. The Rating System improvement work was managed and implemented by USGBC staff and included review and input by many Technical Advisory Group (TAG) members with oversight by the LEED Steering Committee. We extend our deepest gratitude to all of our LEED committee members who participated in the development of this rating system, for their tireless volunteer efforts and constant support of USGBC's mission:

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Dennis Stanke	Trane Company

The LEED 2009 for Core and Shell Rating System builds on the work of those who helped create previous versions:

LEED for Core & Shell Version 2.0 Core Committee

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Ken Wilson	Envision Design
Sally Wilson	CB Richard Ellis
Jerry Yudelson	Greenway Consulting Group, LLC

LEED 2009 FOR CORE & SHELL DEVELOPMENT PROJECT CHECKLIST

Sustainable Sites			**28 Possible Points**
☑	Prerequisite 1	Construction Activity Pollution Prevention	Required
☐	Credit 1	Site Selection	1
☐	Credit 2	Development Density and Community Connectivity	5
☐	Credit 3	Brownfield Redevelopment	1
☐	Credit 4.1	Alternative Transportation—Public Transportation Access	6
☐	Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	2
☐	Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
☐	Credit 4.4	Alternative Transportation—Parking Capacity	2
☐	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	Tenant Design and Construction Guidelines	1
Water Efficiency			**10 Possible Points**
☑	Prerequisite 1	Water Use Reduction	Required
☐	Credit 1	Water Efficient Landscaping	2-4
☐	Credit 2	Innovative Wastewater Technologies	2
☐	Credit 3	Water Use Reduction	2-4
Energy and Atmosphere			**37 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	3–21
☐	Credit 2	On-site Renewable Energy	4
☐	Credit 3	Enhanced Commissioning	2
☐	Credit 4	Enhanced Refrigerant Management	2
☐	Credit 5.1	Measurement and Verification—Base Building	3
☐	Credit 5.2	Measurement and Verification—Tenant Submetering	3
☐	Credit 6	Green Power	2
Materials and Resources			**13 Possible Points**
☑	Prerequisite 1	Storage and Collection of Recyclables	Required
☐	Credit 1	Building Reuse—Maintain Existing Walls, Floors and Roof	1-5
☐	Credit 2	Construction Waste Management	1-2
☐	Credit 3	Materials Reuse	1
☐	Credit 4	Recycled Content	1-2
☐	Credit 5	Regional Materials	1-2
☐	Credit 6	Certified Wood	1

Indoor Environmental Quality — 12 Possible Points

☑	Prerequisite 1	Minimum Indoor Air Quality Performance	Required
☑	Prerequisite 2	Environmental Tobacco Smoke (ETS) Control	Required
☐	Credit 1	Outdoor Air Delivery Monitoring	1
☐	Credit 2	Increased Ventilation	1
☐	Credit 3	Construction Indoor Air Quality Management Plan—During Construction	1
☐	Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
☐	Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
☐	Credit 4.3	Low-Emitting Materials—Flooring Systems	1
☐	Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
☐	Credit 5	Indoor Chemical and Pollutant Source Control	1
☐	Credit 6	Controllability of Systems—Thermal Comfort	1
☐	Credit 7	Thermal Comfort—Design	1
☐	Credit 8.1	Daylight and Views—Daylight	1
☐	Credit 8.2	Daylight and Views—Views	1

Innovation in Design — 6 Possible Points

☐	Credit 1	Innovation in Design	1-5
☐	Credit 2	LEED Accredited Professional	1

Regional Priority — 4 Possible Points

☐	Credit 1	Regional Priority	1-4

LEED 2009 for Core & Shell Development

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.

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. 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 Green Building Rating System for Core and Shell Development is a set of performance standards for certifying the design and construction of commercial or institutional buildings and high-rise residential buildings of all sizes, both public and private. 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 Core and Shell Development Rating System 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 Core and Shell Development 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 1 of these rating levels with a formal letter of certification.

When to Use LEED 2009 for Core & Shell

The LEED for Core & Shell Rating System is a market-specific application that recognizes the unique nature of core and shell development. The LEED for Core & Shell Rating System acknowledges the limited level of influence a developer can exert in a speculatively developed building.

LEED for Core & Shell was developed to serve the speculative development market, in which project teams do not control all scopes of a whole building's design and construction. Depending on how the project is structured, this scope can vary significantly from project to project. The LEED for Core & Shell Rating System addresses a variety of project types and a broad project range.

LEED for Core & Shell can be used for projects in which the developer controls the design and construction of the entire core and shell base building (e.g., mechanical, electrical, plumbing, and fire protection systems) but has no control over the design and construction of the tenant fit-out. Examples of this type of project can be a commercial office building, medical office building, retail center, warehouse, and lab facility.

If a project is designed and constructed to be partially occupied by the owner or developer, then the owner or developer has direct influence over that portion of the interior build-out work. For these projects, LEED for New Construction may be more appropriate. Please see the Rating System Selection Policy, located in the LEED resources section of www.usgbc.org, for more information about choosing a rating system.

Because of the nature of the core and shell project type and scope, LEED for Core & Shell certification has some unique aspects. Further guidance on these can be found in the appendixes to the Rating System. Project teams should review these appendixes for guidance. Additional Appendices are available in the LEED Reference Guide for Green Design & Construction, 2009 Edition.

Core & Shell Appendix 1 – Default Occupancy Counts

- Guidance is provided for Core & Shell projects, which typically do not know what the actual building occupancy, for how for determining FTE and transient occupants.

Core & Shell Appendix 2 – Core & Shell Energy Modeling Guidelines

- Guidance is provided on how to model building systems that are beyond the developer's scope of work.

Core & Shell Appendix 3 – Core & Shell Project Scope Checklist

- This checklist is to be provided to GBCI for certification and precertification, and is intended to show what portions of the work is within the developer's control.

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 Core and Shell 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 New Construction 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.

LEED for Core & Shell Precertification Application

Precertification is formal recognition by GBCI that the owner or developer has established LEED for Core & Shell certification as a goal. Precertification is unique to LEED for Core & Shell, and projects may pursue it, or not, at their discretion. It gives core and shell building owners and developers a marketing tool to attract potential tenants and financiers who recognize the benefits of a LEED-certified building. Precertification generally occurs early in the design process and is based on declared goals and the intent to use green strategies, systems, and/or features, not actual achievement of these features.

Once a project is registered as a LEED Core & Shell project with GBCI, a project team that chooses to seek precertification may complete the LEED Core & Shell precertification documentation requirements and submit the project for review. Because much of the value of precertification occurs early in a project's development, the project team's documentation and GBCI's review is necessarily less rigorous and comprehensive than the LEED Core & Shell certification application. Project teams must confirm that the project intends to meet the requirements of a credit. For detailed information on Core & Shell precertification, refer to Appendix 5.

Precertification is not required for a documented and completed building, nor is it confirmation of, or a commitment to achieve, LEED for Core & Shell certification. Precertification is not LEED Certification. Please see Appendix 5 for further information on LEED 2009 for Core & Shell precertification.

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 and visit www.usgbc.org or www.gbci.org.

III. MINIMUM PROGRAM REQUIREMENTS

The LEED 2009 Minimum Program Requirements (MPRs) define 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.

To view the MPRs and the MPR Supplemental Guidance, visit the LEED Resources and Tools section of www.usgbc.org/projecttools.

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 Core and Shell 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 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/.

SUSTAINABLE SITES

SS Prerequisite 1: Construction Activity Pollution Prevention

Required

Intent

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

Requirements

Create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The 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:

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

The EPA's construction general permit outlines the provisions necessary to comply with Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) program. While the permit only applies to construction sites greater than 1 acre (0.4 hectare), 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.

Potential Technologies & Strategies

Create an erosion and sedimentation control plan during the design phase of the project. Consider employing strategies such as temporary and permanent seeding, mulching, earthen dikes, silt fencing, sediment traps and sediment basins.

SS Credit 1: Site Selection

1 Point

Intent

To 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 7CFR 657.5). Projects outside the U.S. may use a local equivalent.
- Previously undeveloped land whose elevation is lower than 5 feet (1.5 meters) above the elevation of the 100-year flood as defined by the Federal Emergency Management Agency (FEMA), an equivalent local regulatory agency, or a professional hydrologist.
- Land specifically identified as habitat for any species on federal or state threatened or endangered lists. Projects outside the U.S. may use a local equivalent.
- Land within 100 feet (30 meters) of any wetlands as defined by the U.S. Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, or a local equivalent definition outside the U.S., 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 (15 meters) of a water body, defined as seas, lakes, rivers, streams and tributaries that support or could support aquatic life, 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 and projects which are operated by and support the function of the park are exempt).

Potential Technologies & Strategies

During the site selection process, give preference to sites that do not include sensitive elements or restrictive land types. Select a suitable building location and design the building with a minimal footprint to minimize disruption of the environmentally sensitive areas identified above.

SS Credit 2: Development Density and Community Connectivity

5 Points

Intent

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

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 (13,800 square meters per hectare 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:

- Is located on a previously developed site
- Is within 1/2 mile (800 meters) of a residential area or neighborhood with an average density of 10 units per acre net (10 units per 0.4 hectare net)
- Is within 1/2 mile (800 meters) of at least 10 basic services
- Has pedestrian access between the building and the services

For mixed-use projects, no more than 1 service within the project boundary may be counted as 1 of the 10 basic services, provided it is open to the public. No more than 2 of the 10 services required may be anticipated (i.e. at least 8 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

Proximity is determined by drawing a 1/2-mile (800-meter) radius around a main building entrance on a site map and counting the services within that radius.

Potential Technologies & Strategies

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

SS Credit 3: Brownfield Redevelopment

1 Point

Intent

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

Requirements

OPTION 1

Develop on a site documented as contaminated by means of an ASTM E1903-97 Phase II Environmental Site Assessment, or a local voluntary cleanup program. Projects outside the U.S. may use a local equivalent to ASTM E1903-97 Phase II Environmental Site Assessment.

OR

OPTION 2

Develop on a site defined as a brownfield by a local, state, tribal or national government agency, whichever is most stringent.

For projects where asbestos is found and remediated also earn this credit. Testing should be done in accordance with EPA Reg 40CFR part 763, when applicable.

Potential Technologies & Strategies

During the site selection process, give preference to brownfield sites. Identify tax incentives and property cost savings. Coordinate site development plans with remediation activity, as appropriate.

SS Credit 4.1: Alternative Transportation—Public Transportation Access

6 Points

Intent

To reduce pollution and land development impacts from automobile use.

Requirements

OPTION 1. Rail Station, Bus Rapid Transit Station & Ferry Terminal Proximity

Locate the project within 1/2-mile (800-meter) walking distance (measured from a main building entrance) of an existing or planned and funded commuter rail, light rail, subway station, bus rapid transit[1] station or commuter ferry terminal.

OR

OPTION 2. Bus Stop Proximity

Locate the project within 1/4-mile (400-meter) walking distance (measured from a main entrance) of 1 or more stops for 2 or more public, campus, or private bus lines usable by building occupants.

OR

OPTION 3. Rideshare Proximity

Projects outside the U.S. may locate the project within 1/4-mile (400-meter) walking distance (measured from a main building entrance) of 1 or more stops for 2 or more existing rideshare options2 that that meet the definition of public transportation3 and are authorized by the local transit authority if one exists.

Potential Technologies & Strategies

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

1 Bus rapid transit is an enhanced bus system that operates on exclusive bus lanes or other transit rights-of-way; it is designed to combine the flexibility of buses with the efficiency of rail.

2 Rideshare is a transit service that involves sharing a single vehicle with multiple people, excluding large-scale vehicles such as buses and trains. The rideshare transit facility must include a signed stop and a clearly defined waiting area. Additionally, the rideshare must include an enclosed passenger seating area, fixed route service, fixed fare structure, continuous daily operation, and the ability to pick up and drop off multiple riders. Rideshare options must hold 4 or more passengers, except for human-powered conveyances which must hold 2 or more passengers.

3 Public transportation consists of bus, rail, or other transit services for the general public that operate on a regular, continual basis.

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

2 Points

Intent

To reduce pollution and land development impacts from automobile use.

Requirements

CASE 1. Commercial or Institutional Projects 300,000 Square Feet (28,000 Square Meters) or Less

Provide secure bicycle racks and/or storage within 200 yards (200 meters) of a building entrance for 3% or more of all building users (calculated on average for the year)

Provide shower and changing facilities in the building, or within 200 yards (200 meters) of a building entrance, for 0.5% of full-time equivalent (FTE) occupants.

CASE 2. Commercial or Institutional Projects Larger Than 300,000 Square Feet (28,000 Square Meters)

Provide secure bicycle storage for 3% of the occupants for up to 300,000 square feet (28,000 square meters), then an additional 0.5% for the occupants for the space over 300,000 square feet (28,000 square meters). Mixed-use buildings with a total gross square footage greater than 300,000 square feet (28,000 square meters) must apply this calculation for each use of the building

Provide shower and changing facilities in the building, or within 200 yards (200 meters) of a building entrance, for 0.5% of FTE occupants.

CASE 3. Residential Projects

Provide covered storage facilities for securing bicycles for 15% or more of building occupants. Case 3 must be used by residential buildings or the residential portion of a mixed use building.

ALL CASES

See Appendix 1 — Default Occupancy Counts for occupancy count requirements and guidance.

Potential Technologies & Strategies

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

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

3 Points

Intent

To 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.

For project types that demonstrate market barriers to the definition of preferred parking[1] closest to the main entrance, alternatives may be considered on a case-by-case basis.

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.

Potential Technologies & Strategies

Provide transportation amenities such as alternative-fuel refueling stations. Consider sharing the costs and benefits of refueling stations with neighbors.

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. 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 eligible 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 2 years.

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

SS Credit 4.4: Alternative Transportation—Parking Capacity

2 Points

Intent

To reduce pollution and land development impacts from automobile use.

Requirements

CASE 1. Non-Residential Projects

OPTION 1

Size parking capacity to meet but not exceed minimum local zoning requirements.

OR

OPTION 2

For projects that provide parking for less than 3% of full-time equivalent (FTE) building occupants:

Provide preferred parking[1] for carpools or vanpools, marked as such, for 3% of total parking spaces.

OR

OPTION 3

Provide no new parking.

OR

OPTION 4

For projects that have no minimum local zoning requirements, provide 25% fewer parking spaces than the applicable standard listed in the 2003 Institute of Transportation Engineers (ITE) "Parking Generation" study at http://www.ite.org.

CASE 2. Residential Projects

OPTION 1

Size parking capacity to meet but not exceed minimum local zoning requirements.

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

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. 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 eligible 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 2 years.

OR

OPTION 2

Provide no new parking.

CASE 3. Mixed Use (Residential with Commercial/Retail) Projects

OPTION 1

Mixed-use buildings with less than 10% commercial area must be considered residential and adhere to the residential requirements in Case 2. For mixed-use buildings with more than 10% commercial area, the commercial space must adhere to non-residential requirements in Case 1 and the residential component must adhere to residential requirements in Case 2.

OR

OPTION 2

Provide no new parking.

See Appendix 1 — Default Occupancy Counts for occupancy count requirements and guidance.

ALL CASES

See Appendix 1 — Default Occupancy Counts for occupancy count requirements and guidance.

Potential Technologies & Strategies

Minimize parking lot/garage size. Consider sharing parking facilities with adjacent buildings. Consider alternatives that will limit the use of single-occupancy vehicles.

SS Credit 5.1: Site Development—Protect or Restore Habitat

1 Point

Intent

To 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 (12 meters) beyond the building perimeter and parking garages;
- 10 feet (3 meters) beyond surface walkways, patios, surface parking and utilities less than 12 inches (30 centimeters) in diameter;
- 15 feet (4.5 meters) beyond primary roadway curbs and main utility branch trenches;
- 25 feet (8 meters) 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 (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 with limited landscape opportunities may also donate offsite land in perpetuity, equal to 60% of the previously developed area (including the building footprint), to a land trust within the same EPA Level III Ecoregion identified for the project site. The land trust must adhere to the Land Trust Alliance 'Land Trust Standards and Practices' 2004 Revision.

1 Greenfield sites are those that are not previously developed or graded and remain in a natural state. For international projects only: For the compliance path described by Case 1, rural landscapes are considered the same as greenfield sites. A rural landscape is a natural area modified by agro-forestry-pastoral activities, with environmental, aesthetic, cultural and historical values resulting from the interrelationship between its physical and biological aspects and traditional human activities.

2 Previously developed areas are those that previously contained buildings, roadways, parking lots or were graded or altered by direct human activities.

3 Native/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.

Potential Technologies & Strategies

Survey greenfield sites to identify site elements and adopt a master plan for developing the project site. Carefully site the building to minimize disruption to existing ecosystems, and design the building to minimize its footprint. Strategies include stacking the building program, tuck-under parking and sharing parking facilities with neighbors. Establish clearly marked construction boundaries to minimize disturbance of the existing site, and restore previously degraded areas to their natural state. For previously developed sites, use local and regional governmental agencies, consultants, educational facilities, and native plant societies as resources for the selection of appropriate native or adapted plants. Prohibit plants listed as invasive or noxious weed species. Once established, native/adapted plants require minimal or no irrigation, do not require active maintenance such as mowing or chemical inputs such as fertilizers, pesticides or herbicides, and provide habitat value and promote biodiversity through avoidance of monoculture plantings.

SS Credit 5.2: Site Development—Maximize Open Space

1 Point

Intent

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

Requirements

CASE 1. Sites with Local Zoning Open Space Requirements

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%.

CASE 2. Sites 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.

CASE 3. Sites with Zoning Ordinances but No Open Space Requirements

Provide vegetated open space equal to 20% of the project's site area.

ALL CASES

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

For projects 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 and the side slope gradients average 1:4 (vertical: horizontal) or less and are vegetated.

Potential Technologies & Strategies

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

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

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

Requirements

OPTION 1. Design Storms

CASE 1. Sites with Existing Imperviousness 50% or Less

PATH 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

PATH 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.

OR

OPTION 2. Percentile Rainfall Events

CASE 1. Non-Zero Lot Line Projects

In a manner best replicating natural site hydrology[1] processes, manage onsite[2] the runoff from the developed site for the 95th percentile of regional or local rainfall events using Low Impact Development (LID)[3] and green infrastructure[4].

1 Natural Site Hydrology is defined as the natural land cover function of water occurrence, distribution, movement, and balance.

2 Manage Onsite refers to capturing and retaining the specified volume of rainfall to mimic natural hydrologic function. This includes, but is not limited to, strategies that manage volume through evapotranspiration, infiltration, or capture and reuse.

3 Low Impact Development (LID) is defined as an approach to managing stormwater runoff that emphasizes on-site natural features to protect water quality by replicating the natural land cover hydrologic regime of watersheds and addressing runoff close to its source. Examples include better site design principles such as minimizing land disturbance, preserving vegetation, minimizing impervious cover, and design practices like rain gardens, vegetated swales and buffers, permeable pavement, rainwater harvesting, and soil amendments. These are engineered practices that may require specialized design assistance.

4 Green Infrastructure is a soil and vegetation-based approach to wet weather management that is cost-effective, sustainable, and environmentally friendly. Green infrastructure management approaches and technologies infiltrate, evapotranspire, capture and reuse stormwater to maintain or restore natural hydrologies (US EPA).

Use daily rainfall data and the methodology in the United States Environmental Protection Agency's Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act to determine the 95th percentile amount.

OR

CASE 2. Zero Lot Line Projects

For zero lot line projects located in urban areas with a minimum density of 1.5 FAR (13,800 square meters per hectare net), in a manner best replicating natural site hydrology processes, manage onsite the runoff from the developed site for the 85th percentile of regional or local rainfall events using LID and green infrastructure.

Potential Technologies & Strategies

Design the project site to maintain natural stormwater flows by promoting infiltration. Specify vegetated roofs, pervious paving, and other measures to minimize impervious surfaces. Reuse stormwater for nonpotable uses such as landscape irrigation, toilet and urinal flushing, and custodial uses.

SS Credit 6.2: Stormwater Design—Quality Control

1 Point

Intent

To 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 postdevelopment 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.

Potential Technologies & Strategies

Use alternative surfaces (e.g., vegetated roofs, pervious pavement, grid pavers) and nonstructural techniques (e.g., rain gardens, vegetated swales, disconnection of imperviousness, rainwater recycling) to reduce imperviousness and promote infiltration and thereby reduce pollutant loadings.

Use sustainable design strategies (e.g., low-impact development, environmentally sensitive design) to create integrated natural and mechanical treatment systems, such as constructed wetlands, vegetated filters and open channels to treat stormwater runoff.

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 (102 centimeters) of rainfall each year. Semiarid watersheds receive between 20 and 40 inches (51 and 102 centimeters) of rainfall per year, and arid watersheds receive less than 20 inches (51 centimeters) 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 (2.5 centimeters) of rainfall
- Semiarid Watersheds — 0.75 inches (1.9 centimeters) of rainfall
- Arid Watersheds — 0.5 inches (1.3 centimeters) of rainfall

SS Credit 7.1: Heat Island Effect—Nonroof

1 Point

Intent

To 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.

Potential Technologies & Strategies

Employ strategies, materials and landscaping techniques that reduce the heat absorption of exterior materials. Use shade (calculated on June 21, noon solar time) from native or adapted trees and large shrubs, vegetated trellises or other exterior structures supporting vegetation. Consider using new coatings and integral colorants for asphalt to achieve light-colored surfaces instead of blacktop. Position photovoltaic cells to shade impervious surfaces.

Consider replacing constructed surfaces (e.g., roof, roads, sidewalks, etc.) with vegetated surfaces such as vegetated roofs and open grid paving or specify high-albedo materials, such as concrete, to reduce heat absorption.

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

To 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:

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

Alternatively, the following equation may be used to calculate compliance:

$$\frac{\left[\text{Area of Roof A} \times \frac{\text{SRI of Roof A}}{\text{Required SRI}}\right] + \left[\text{Area of Roof B} \times \frac{\text{SRI of Roof B}}{\text{Required SRI}}\right] + \ldots}{0.75} \geq \text{Total Roof Area}$$

Roof Type	Slope	SRI
Low-sloped roof	≤ 2:12 (15%)	78
Steep-sloped roof	> 2:12 (15%)	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:

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

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.

Alternatively, a weighted average approach may be used to calculate compliance for multiple materials:

$$\frac{\left[\text{Area of Roof A} \times \frac{\text{SRI of Roof A}}{\text{Required SRI}}\right] + \left[\text{Area of Roof B} \times \frac{\text{SRI of Roof B}}{\text{Required SRI}}\right]}{0.75} + \frac{\text{Area of Vegetated Roof}}{0.5} \geqq \text{Total Roof Area}$$

Roof Type	Slope	SRI
Low-sloped roof	≤ 2:12 (15%)	78
Steep-sloped roof	> 2:12 (15%)	29

Potential Technologies & Strategies

Consider installing high-albedo and vegetated roofs to reduce heat absorption. Default values will be available in the LEED Reference Guide for Green Building Design and Construction, 2009 Edition.. Product information is available from the Cool Roof Rating Council Web site, at http://www.coolroofs.org, and the ENERGY STAR® Web site, at http://www.energystar.gov.

SS Credit 8: Light Pollution Reduction

1 Point

Intent

To 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 1 of the 2 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. 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[1].

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 (0.1 horizontal and vertical lux) at the LEED project 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).

1 The requirement to use ASHRAE Addenda 1 is unique to this credit and does not obligate Project teams to use ASHRAE approved addenda for other credits.

LZ2: Low (**primarily residential zones, neighborhood business districts, light industrial 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 (1.0 horizontal and vertical lux) at the LEED project boundary and no greater than 0.01 horizontal footcandles (0.1 horizontal lux) 10 feet (3 meters) beyond the LEED project 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 (2.0 horizontal and vertical lux) at the LEED project boundary and no greater than 0.01 horizontal footcandles (0.1 horizontal lux) 15 feet (4.5 meters) 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[2] (**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 (6.5 horizontal and vertical lux) at the LEED project boundary and no greater than 0.01 horizontal footcandles(0.1 horizontal lux) 15 feet (4.5 meters) 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 LEED project boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the LEED project 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 LEED project boundary for a length of 2 times the driveway width centered at the centerline of the driveway.

Potential Technologies & Strategies

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

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

SS Credit 9: Tenant Design and Construction Guidelines

1 Point

Intent

To educate tenants about implementing sustainable design and construction features in their tenant improvement build-out.

Tenant design and construction guidelines benefit the Core & Shell certified project in 2 important ways: First, the guidelines will help tenants design and build sustainable interiors and adopt green building practices; second, the guidelines will help in coordinating LEED 2009 for Commercial Interiors and LEED 2009 for Core and Shell Development certifications.

Requirements

Publish an illustrated document that provides tenants with the following design and construction information:

- A description of the sustainable design and construction features incorporated in the core & shell project and the project's sustainability goals and objectives, including those for tenant spaces.
- Information on LEED for Commercial Interiors and how the core and shell building contributes to achieving these credits.
- Information that enables a tenant to coordinate space design and construction with the core and shell's building systems. Specific LEED 2009 for Commercial Interiors credits to be addressed when applicable include the following:
  - Water use reduction.
  - Optimize energy performance, lighting power.
  - Optimize energy performance, lighting controls.
  - Optimize energy performance, HVAC.
  - Energy use and metering.
  - Measurement and verification.
  - Ventilation and outdoor air delivery.
  - Construction indoor air quality management.
  - Indoor chemical and pollutant source control.
  - Controllability of systems.
  - Thermal comfort.
  - Daylighting and views.
  - Commissioning.
  - Elimination or control of environmental tobacco smoke.
- Recommendations, including examples, for sustainable strategies, products, materials, and services.

Potential Technologies & Strategies

Provide a copy of the tenant design and construction guidelines to tenants.

WATER EFFICIENCY

WE Prerequisite 1: Water Use Reduction

Required

Intent

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

Requirements

Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation).

Calculate the baseline according to the commercial and/or residential baselines outlined below.[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, showers, kitchen sink faucets and pre-rinse spray valves.

Commercial Fixtures, Fittings, and Appliances	Current Baseline (Imperial units)	Current Baseline (Metric units)
Commercial toilets	1.6 gallons per flush (gpf)* Except blow-out fixtures: 3.5 (gpf)	6 liters per flush (lpf) Except blow-out fixtures: 13 lpf
Commercial urinals	1.0 (gpf)	4 lpf
Commercial lavatory (restroom) faucets	2.2 gallons per minute (gpm) at 60 pounds per square inch (psi), private applications only (hotel or motel guest rooms, hospital patient rooms) 0.5 (gpm) at 60 (psi)** all others except private applications 0.25 gallons per cycle for metering faucets	8.5 liters per minute (lpm) at 4 bar (58 psi), private applications only (hotel or motel guest rooms, hospital patient rooms) 2.0 lpm at 4 bar (58 psi), all others except private applications 1 liter per cycle for metering faucets
Showerheads	2.5 (gpm) at 80 (psi) per shower stall ****	9.5 lpm at 5.5 bar (80 psi)
For projects with commercial pre-rinse spray valves, the flow rate must comply with the ASME A112.18.1 standard of 1.6 gpm (6 lpm) or less.		

Residential Fixtures, Fittings, and Appliances	Current Baseline (Imperial units)	Current Baseline (Metric units)
Residential toilets	1.6 (gpf)***	6 liters per flush (lpf)
Residential lavatory (bathroom) faucets	2.2 (gpm) at 60 psi	8.5 lpm at 4 bar (58 psi)
Residential kitchen faucet		
Residential showerheads	2.5 (gpm) at 80 (psi) per shower stall****	9.5 lpm at 5.5 bar (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 (2.0 lpm at 4 bar (58 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/9.5 lpm) per shower compartment, where the floor area of the shower compartment is less than 2,500 square inches (1.5 square meters). For each increment of 2,500 square inches (1.5 square meters) 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.

The following fixtures, fittings and appliances are outside the scope of the water use reduction calculation:

- Commercial Steam Cookers
- Commercial Dishwashers
- Automatic Commercial Ice Makers
- Commercial (family-sized) Clothes Washers
- Residential Clothes Washers
- Standard and Compact Residential Dishwashers

Potential Technologies & Strategies

WaterSense-certified fixtures and fixture fittings should be used where available. Use high-efficiency fixtures (e.g. water closets and urinals) and dry fixtures, such as toilets attached to composting systems, to reduce potable water demand. Consider using alternative on-site sources of water (e.g. rainwater, stormwater, and air conditioner condensate) and graywater for nonpotable applications such as custodial uses and toilet and urinal flushing. The quality of any alternative source of water used must be taken into consideration based on its application or use.

WE Credit 1: Water Efficient Landscaping

2–4 Points

Intent

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

Requirements

OPTION 1. Reduce by 50% (2 points)

Reduce potable water consumption for irrigation by 50% from a calculated midsummer baseline case or using the month with the highest irrigation demand.

Reductions must be attributed to any combination of the following items:

- Plant species, density and microclimate factor
- Irrigation efficiency
- Use of captured rainwater
- Use of recycled wastewater
- Use of water treated and conveyed by a public agency specifically for nonpotable uses

Groundwater seepage that is pumped away from the immediate vicinity of building slabs and foundations may be used for landscape irrigation to meet the intent of this credit. However, the project team must demonstrate that doing so does not affect site stormwater management systems.

OR

OPTION 2. No Potable Water Use or Irrigation[1] (4 points)

Meet the requirements for Option 1.

AND

PATH 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

PATH 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.

1 If the percent reduction of potable water is 100% AND the percent reduction of total water is equal to or greater than 50%, then Option 2 is earned, for a total of 4 points.

Potential Technologies & Strategies

Perform a soil/climate analysis to determine appropriate plant material and design the landscape with native or adapted plants to reduce or eliminate irrigation requirements. Where irrigation is required, use high-efficiency equipment and/or climate-based controllers.

WE Credit 2: Innovative Wastewater Technologies

2 Points

Intent

To reduce wastewater generation and potable water demand, while increasing the local aquifer recharge.

Requirements

OPTION 1

Reduce potable water use for building sewage conveyance by 50% through the use of water-conserving fixtures (e.g., water closets, urinals) or nonpotable water (e.g.,captured rainwater, recycled graywater, and on-site or municipally treated wastewater).

OR

OPTION 2

Treat 50% of wastewater on-site to tertiary standards. Treated water must be infiltrated or used on-site.

Potential Technologies & Strategies

Specify high-efficiency fixtures and dry fixtures (e.g., composting toilet systems and nonwater-using urinals) to reduce wastewater volumes. Consider reusing stormwater or graywater for sewage conveyance or on-site mechanical and/or natural wastewater treatment systems. Options for on-site wastewater treatment include packaged biological nutrient removal systems, constructed wetlands and high-efficiency filtration systems.

WE Credit 3: Water Use Reduction

2–4 Points

Intent

To further increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

Requirements

Employ strategies that in aggregate use less water than the water use baseline calculated for the building (not including irrigation).

The minimum water savings percentage for each point threshold is as follows:

Percentage Reduction	Points
30%	2
35%	3
40%	4

Calculate the baseline according to the commercial and/or residential baselines outlined below.[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, showers, kitchen sink faucets and pre-rinse spray valves.

Commercial Fixtures, Fittings, and Appliances	Current Baseline (Imperial units)	Current Baseline (Metric units)
Commercial toilets	1.6 gallons per flush (gpf)* Except blow-out fixtures: 3.5 (gpf)	6 liters per flush (lpf) Except blow-out fixtures: 13 lpf
Commercial urinals	1.0 (gpf)	4 lpf
Commercial lavatory (restroom) faucets	2.2 gallons per minute (gpm) at 60 pounds per square inch (psi), private applications only (hotel or motel guest rooms, hospital patient rooms) 0.5 (gpm) at 60 (psi)** all others except private applications 0.25 gallons per cycle for metering faucets	8.5 liters per minute (lpm) at 4 bar (58 psi), private applications only (hotel or motel guest rooms, hospital patient rooms) 2.0 lpm at 4 bar (58 psi), all others except private applications 1 liter per cycle for metering faucets
Showerheads	2.5 (gpm) at 80 (psi) per shower stall ****	9.5 lpm at 5.5 bar (80 psi)
For projects with commercial pre-rinse spray valves, the flow rate must comply with the ASME A112.18.1 standard of 1.6 gpm (6 lpm) or less.		

Residential Fixtures, Fittings, and Appliances	Current Baseline (Imperial units)	Current Baseline (Metric units)
Residential toilets	1.6 (gpf)***	6.1 liters per flush (lpf)
Residential lavatory (bathroom) faucets	2.2 (gpm) at 60 psi	8.5 lpm at 4 bar (58 psi)
Residential kitchen faucet		
Residential showerheads	2.5 (gpm) at 80 (psi) per shower stall****	9.5 lpm at 5.5 bar (80 psi) per shower stall

1 Table 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

Residential Fixtures, Fittings, and Appliances	Current Baseline (Imperial units)	Current Baseline (Metric units)

* 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 (2.0 lpm at 4 bar (58 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/9.5 lpm) per shower compartment, where the floor area of the shower compartment is less than 2,500 square inches (1.5 square meters). For each increment of 2,500 square inches (1.5 square meters) 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.

The following fixtures, fittings and appliances are outside the scope of the water use reduction calculation:

- Commercial Steam Cookers
- Commercial Dishwashers
- Automatic Commercial Ice Makers
- Commercial (family-sized) Clothes Washers
- Residential Clothes Washers
- Standard and Compact Residential Dishwashers

Potential Technologies & Strategies

WaterSense-certified fixtures and fixture fittings where available. Use high-efficiency fixtures (e.g., water closets and urinals) and dry fixtures, such as toilets attached to composting systems, to reduce the potable water demand. Consider using alternative on-site sources of water (e.g., rainwater, stormwater, and air conditioner condensate, graywater) for nonpotable applications (e.g., toilet and urinal flushing custodial uses. The quality of any alternative source of water being used must be taken into consideration based on its application or use.

ENERGY & ATMOSPHERE

EA Prerequisite 1: Fundamental Commissioning of Building Energy Systems

Required

Intent

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

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

Requirements

The following commissioning process activities 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's design and construction management, though the CxA may be an employee of any firms 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(4,600 gross square meters), the CxA may be a qualified person on the design or construction teams who has the required experience.
- The owner must document the owner's project requirements. The design team must develop the basis of design. 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 (if they are installed as part of the core and shell project):

- 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).

Potential Technologies & Strategies

Engage a CxA as early as possible in the design process. Determine the owner's project requirements, develop and maintain a commissioning plan for use during design and construction and incorporate commissioning requirements in bid documents. Assemble the commissioning team, and prior to occupancy verify the performance of energy consuming systems. Complete the commissioning reports with recommendations prior to accepting of the commissioned systems.

Owners are encouraged to seek out qualified individuals to lead the commissioning process. Qualified individuals are identified as those who possess a high level of experience in the following areas:

- Energy systems design, installation and operation.
- Commissioning planning and process management.
- Hands-on field experience with energy systems performance, interaction, start-up, balancing, testing, troubleshooting, operation and maintenance procedures.
- Energy systems automation control knowledge.

Owners are encouraged to consider including water-using systems, building envelope systems, and other systems in the scope of the commissioning plan as appropriate. The building envelope is an important component of a facility that impacts energy consumption, occupant comfort and indoor air quality. While this prerequisite does not require building envelope commissioning, an owner can achieve significant financial savings and reduce the risk of poor indoor air quality by including it in the commissioning process.

The LEED Reference Guide for Green Building Design and Construction, 2009 Edition provides guidance on the rigor expected for this prerequisite for the following:

- Owner's project requirements.
- Basis of design.
- Commissioning plan.
- Commissioning specification.
- Performance verification documentation.
- Commissioning report.

EA Prerequisite 2: Minimum Energy Performance

Required

Intent

To 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. Projects outside the U.S. may use a USGBC approved equivalent standard[2].

Appendix G of ANSI/ASHRAE/IESNA 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:

- 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]) or USGBC approved equivalent.
- Inclusion of all energy costs 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]) or USGBC approved equivalent. 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 (nonprocess) 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 prerequisite may do so at their discretion. Addenda must be applied consistently across all LEED credits.

2 Projects outside the U.S. may use an alternative standard to ANSI/ASHRAE/IESNA Standard 90.1-2007 if it is approved by USGBC as an equivalent standard using the process located at www.usgbc.org/leedisglobal.

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) or USGBC approved equivalent 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

Comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide appropriate to the project scope, outlined below. Project teams must comply with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located. Projects outside the U.S. may use ASHRAE/ASHRAE/IESNA Standard 90.1-2007 Appendices B and D to determine the appropriate climate zone.

PATH 1. ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004

The building must meet the following requirements:

- Less than 20,000 square feet (1,800 square meters).
- Office occupancy.

PATH 2. ASHRAE Advanced Energy Design Guide for Small Retail Buildings 2006

The building must meet the following requirements:

- Less than 20,000 square feet (1,800 square meters).
- Retail occupancy.

PATH 3. ASHRAE Advanced Energy Design Guide for Small Warehouses and Self Storage Buildings 2008

The building must meet the following requirements:

- Less than 50,000 square feet (4,600 square meters).
- Warehouse or self-storage occupancy.

OR

OPTION 3. Prescriptive Compliance Path: Advanced Buildings™ Core Performance™ Guide

Comply with the prescriptive measures identified in the Advanced Buildings™ Core Performance™ Guide developed by the New Buildings Institute. The building must meet the following requirements:

- Less than 100,000 square feet (9,300 square meters).
- Comply with Section 1: Design Process Strategies, and Section 2: Core Performance Requirements.
- Health care, warehouse and laboratory projects are ineligible for this path.

Projects outside the U.S. may use ASHRAE/ASHRAE/IESNA Standard 90.1-2007 Appendices B and D to determine the appropriate climate zone.

Potential Technologies & Strategies

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

If a local code has demonstrated quantitative and textual equivalence following, at a minimum, the U.S. Department of Energy (DOE) standard process for commercial energy code determination, then the results of that analysis may be used to correlate local code performance with ANSI/ASHRAE/IESNA Standard 90.1-2007. Details on the DOE process for commercial energy code determination can be found at http://www.energycodes.gov/implement/determinations_com.stm.

EA Prerequisite 3: Fundamental Refrigerant Management

Required

Intent
To 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.

Existing small HVAC units (defined as containing less than 0.5 pounds [0.227 kg] of refrigerant) and other equipment, such as standard refrigerators, small water coolers and any other equipment that contains less than 0.5 pounds (0.227 kg) of refrigerant, are not considered part of the base building system and are not subject to the requirements of this prerequisite.

Potential Technologies & Strategies
When reusing existing HVAC systems, conduct an inventory to identify equipment that uses CFC-based refrigerants and provide a replacement schedule for these refrigerants. For new buildings, specify new HVAC equipment in the base building that uses no CFC-based refrigerants.

EA Credit 1: Optimize Energy Performance

3–21 Points

Intent

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

Requirements

Select 1 of the 3 compliance path options described below. Project teams documenting achievement using any of the 3 options are assumed to be in compliance with EA Prerequisite 2: Minimize Energy Performance.

OPTION 1. Whole Building Energy Simulation (3–21 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. Projects outside the U.S. may use a USGBC approved equivalent standard[2]. The minimum energy cost savings percentage for each point threshold is as follows:

New Buildings	Existing Building Renovations	Points
12%	8%	3
14%	10%	4
16%	12%	5
18%	14%	6
20%	16%	7
22%	18%	8
24%	20%	9
26%	22%	10
28%	24%	11
30%	26%	12
32%	28%	13
34%	30%	14
36%	32%	15
38%	34%	16
40%	36%	17
42%	38%	18
44%	40%	19
46%	42%	20
48%	44%	21

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.

2 Projects outside the U.S. may use an alternative standard to ANSI/ASHRAE/IESNA Standard 90.1-2007 if it is approved by USGBC as an equivalent standard using the process located at www.usgbc.org/leedisglobal.

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]) or USGBC approved equivalent.
- 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]) or USGBC approved equivalent. 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 (nonprocess) 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) or USGBC approved equivalent 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.

OR

OPTION 2. Prescriptive Compliance Path: ASHRAE Advanced Energy Design Guide (1 Point)

Comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide appropriate to the project scope, outlined below. Project teams must comply with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located. Projects outside the U.S. may use ASHRAE/ASHRAE/IESNA Standard 90.1-2007 Appendices B and D to determine the appropriate climate zone.

PATH 1. ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004

The building must meet the following requirements:

- Less than 20,000 square feet (1,800 square meters).
- Office occupancy.

PATH 2. ASHRAE Advanced Energy Design Guide for Small Retail Buildings 2006

The building must meet the following requirements:

- Less than 20,000 square feet (1,800 square meters).
- Retail occupancy.

PATH 3. ASHRAE Advanced Energy Design Guide for Small Warehouses and Self Storage Buildings 2008

The building must meet the following requirements:

- Less than 50,000 square feet (4,600 square meters).
- Warehouse or self-storage occupancy.

OR

OPTION 3. Prescriptive Compliance Path: Advanced Buildings™ Core Performance™ Guide (1–3 points)

Comply with the prescriptive measures identified in the Advanced Buildings™ Core Performance™ Guide developed by the New Buildings Institute. The building must meet the following requirements:

- Less than 100,000 square feet (9,300 square meters).
- Comply with Section 1: Design Process Strategies, and Section 2: Core Performance Requirements.
- Health care, warehouse and laboratory projects are ineligible for this path.

Points achieved under Option 3 (1 point):

- 1 point is available for all projects (office, school, public assembly, and retail projects) less than 100,000 square feet (9,300 square meters) that comply with Sections 1 and 2 of the Core Performance Guide.
- Up to 2 additional points are available to projects that implement performance strategies listed in Section 3: Enhanced Performance. For every 3 strategies implemented from this section, 1 point is available.
- The following strategies are addressed by other aspects of LEED and are not eligible for additional points under EA Credit 1:
  - 3.1 — Cool Roofs
  - 3.8 — Night Venting
  - 3.13 — Additional Commissioning

Projects outside the U.S. may use ASHRAE/ASHRAE/IESNA Standard 90.1-2007 Appendices B and D to determine the appropriate climate zone.

Potential Technologies & Strategies

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

If a local code has demonstrated quantitative and textual equivalence following, at a minimum, the U.S. Department of Energy (DOE) standard process for commercial energy code determination the results of that analysis may be used to correlate local code performance with ANSI/ASHRAE/IESNA Standard 90.1-2007. Details on the DOE process for commercial energy code determination can be found at http://:www.energycodes.gov/implement/determinations_com.stm.

EA Credit 2: On-site Renewable Energy

4 Points

Intent

To 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 (CBECS) database to determine the estimated electricity use.

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

Percentage Renewable Energy	Points
1%	4

Potential Technologies & Strategies

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

EA Credit 3: Enhanced Commissioning

2 Points

Intent

To 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:

- 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 must have documented commissioning authority experience in at least 2 building projects.
  - 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.
  - The CxA must report results, findings and recommendations directly to the owner.
- The CxA must conduct, at a minimum, 1 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.
- 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.
- The CxA or other project team members must develop a systems manual that gives future operating staff the information needed to understand and optimally operate the commissioned systems.
- The CxA or other project team members must verify that the requirements for training operating personnel and building occupants have been completed.
- 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.

Potential Technologies & Strategies

Although it is preferable that the CxA be contracted by the owner for the enhanced commissioning credit, the CxA may also be contracted through the design firms or construction management firms not holding construction contracts.

The LEED Reference Guide for Green Building Design and Construction, 2009 Edition provides detailed guidance on the rigor expected for the following process activities:

- Commissioning design review.
- Commissioning submittal review.
- Systems manual.

EA Credit 4: Enhanced Refrigerant Management

2 Points

Intent

To 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

Complete both of the following:

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:

Imperial units

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

Metric units

$$LCGWP + LCODP \times 10^5 \leq 13$$

Calculation definitions for LCGWP + LCODP x 10^5 ≤ 100 (Imperial units)	**Calculation definitions for LCGWP + LCODP x 10^5 ≤ 13 (Metric units)**
LCODP = [ODPr x (Lr x Life +Mr) x Rc]/Life	LCODP = [ODPr x (Lr x Life +Mr) x Rc]/Life
LCGWP = [GWPr x (Lr x Life +Mr) x Rc]/Life	LCGWP = [GWPr x (Lr x Life +Mr) x Rc]/Life
LCODP: Lifecycle Ozone Depletion Potential (lb CFC 11/Ton-Year)	LCODP: Lifecycle Ozone Depletion Potential (kg CFC 11/(kW/year))
LCGWP: Lifecycle Direct Global Warming Potential (lb CO_2/Ton-Year)	LCGWP: Lifecycle Direct Global Warming Potential (kg CO_2/(kW/year))
GWPr: Global Warming Potential of Refrigerant (0 to 12,000 lb CO_2/lbr)	ODPr: Ozone Depletion Potential of Refrigerant (0 to 0.2 kg CFC 11/kg r)
ODPr: Ozone Depletion Potential of Refrigerant (0 to 0.2 lb CFC 11/lbr)	GWPr: Global Warming Potential of Refrigerant (0 to 12,000 kg CO_2/kg r)
Lr: Refrigerant Leakage Rate (0.5% to 2.0%; default of 2% unless otherwise demonstrated)	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)	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)	Rc: Refrigerant Charge (0.065 to 0.65 kg of refrigerant per kW of ARI rated or Eurovent Certified cooling capacity)
Life: Equipment Life (10 years; default based on equipment type, unless otherwise demonstrated)	Life: Equipment Life (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:

Imperial units

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

Metric units

$$\sum \left(\frac{LCGWP + LCODP \times 10^5}{Qtotal} \right) \times Qunit \leq 13$$

Calculation definitions for $[\sum (LCGWP + LCODP \times 10^5) \times Qunit] / Qtotal \leq 100$ (Imperial units)	**Calculation definitions for $[\sum (LCGWP + LCODP \times 10^5) \times Qunit] / Qtotal \leq 13$ (Metric units)**
Qunit = Gross ARI rated cooling capacity of an individual HVAC or refrigeration unit (Tons)	Qunit = Eurovent Certified cooling capacity of an individual HVAC or refrigeration unit (kW)
Qtotal = Total gross ARI rated cooling capacity of all HVAC or refrigeration	Qtotal = Total Eurovent Certified cooling capacity of all HVAC or refrigeration (kW)

Small HVAC units (defined as containing less than 0.5 pounds [0.227 kg] of refrigerant) and other equipment, such as standard refrigerators, small water coolers and any other cooling equipment that contains less than 0.5 pounds (0.227 kg) 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 — CFCs, hydrochlorofluorocarbons (HCFCs) or halons.

Potential Technologies & Strategies

Design and operate the facility without mechanical cooling and refrigeration equipment. Where mechanical cooling is used, utilize base building HVAC&R systems for the refrigeration cycle that minimize direct impact on ozone depletion and climate change. Select HVAC&R equipment with reduced refrigerant charge and increased equipment life. Maintain equipment to prevent leakage of refrigerant to the atmosphere. Use fire suppression systems that do not contain HCFCs or halons.

EA Credit 5.1: Measurement and Verification—Base Building

3 Points

Intent

To provide for the ongoing accountability of building energy consumption over time.

Requirements

OPTION 1

Develop and implement a measurement and verification (M&V) plan consistent with Option D: Calibrated Simulation (Savings Estimation Method 2) as specified by the International Performance Measurement & Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction, April 2003.

The documentation must include the following:

- A description of the infrastructure design.
- Existing meter locations.
- Existing meter specifications.
- 1-line electrical schematics identifying end-use circuits.
- Guidelines for carrying out tenant sub-metering.

OR

OPTION 2

Develop a and implement a measurement and verification (M&V) plan consistent with Option B: Energy Conservation Measure Isolation, as specified by the International Performance Measurement & Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction, April 2003.

The documentation must include the following:

- A description of the infrastructure design.
- Existing meter locations.
- Existing meter specifications.
- 1-line electrical schematics identifying end-use circuits.
- Guidelines for carrying out tenant sub-metering.

OR

OPTION 3 (1 point)

Meet MPR 6 through compliance Opttion1: Energy and Water Data Release Form. Projects must register an account in ENERGY STAR's Portfolio Manager tool and share the project file with the USGBC master account.

Potential Technologies & Strategies

Develop an M&V plan to evaluate building and/or energy system performance. Characterize the building and/or energy systems through energy simulation or engineering analysis. Install the necessary metering equipment to measure energy use. Track performance by comparing predicted performance to actual performance, broken down by component or system as appropriate. Evaluate energy efficiency by comparing actual performance to baseline performance.

While the IPMVP describes specific actions for verifying savings associated with energy conservation measures (ECMs) and strategies, this LEED credit expands upon typical IPMVP M&V objectives. M&V activities should not necessarily be confined to energy systems where ECMs or energy conservation strategies have been implemented. The IPMVP provides guidance on M&V strategies and their appropriate applications for various situations. These strategies should be used in conjunction with monitoring and trend logging of significant energy systems to provide for the ongoing accountability of building energy performance.

EA Credit 5.2: Measurement and Verification—Tenant Submetering

3 Points

Intent

To provide for ongoing accountability of building electricity consumption performance over time.

Requirements

Include a centrally monitored electronic metering network in the base building design that is capable of being expanded to accommodate the future tenant submetering as required by LEED 2009 for Commercial Interiors Rating System EA Credit 3: Measurement and Verification.

Develop a tenant measurement and verification (M&V) plan that documents and advises future tenants of this opportunity and the means of achievement.

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

Potential Technologies & Strategies

Install the necessary metering and submetering equipment to measure energy use. Develop and implement an M&V plan that can be utilized and expanded by the tenant and that compares predicted savings to actual energy performance.

For the corrective action process, consider installing diagnostics within the control system to alert the staff when equipment is not being optimally operated. Conditions that might warrant alarms to alert staff could include:

- Leaking valves in the cooling and heating coils within air handling units.
- Missed economizer opportunities (e.g., faulty economizer damper controls).
- Software and manual overrides allowing equipment to operate 24 hours a day/7 days a week.
- Equipment operation during unusual circumstances (e.g., boiler on when outside air temperature is above 65°F (18°C)).

Besides control diagnostics, consider employing retro-commissioning services or dedicating staff to investigate increases in energy usage (such a staff member is usually a resource conservation manager — see http://www.energy.state.or.us/rcm/rcmhm.htm for additional information).

EA Credit 6: Green Power

2 Points

Intent

To 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 core and shell building's electricity from renewable sources, as defined by the Center for Resource Solutions' Green-e Energy product certification requirements or an equivalent.

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

If the green power is not Green-e Energy certified, equivalence must exist for both major Green-e Energy program criteria: 1) current green power performance standards, and 2) independent, third-party verification that those standards are being met by the green power supplier over time.

The core and shell building's electricity is defined as the electricity usage of the core and shell square footage, as defined by the Building Owners and Managers Association (BOMA) Standards, but not less than 15% of the building total gross square footage.

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 (CBECS) database to determine the estimated electricity use.

Potential Technologies & Strategies

Determine the energy needs of the building and investigate opportunities to engage in a green power contract. Green power is derived from solar, wind, geothermal, biomass or low-impact hydro sources. Visit http://www.green-e.org/energy for details about the Green-e Energy program. The green power product purchased to comply with credit requirements need not be Green-e Energy certified. Other sources of green power are eligible if they satisfy the Green-e Energy program's technical requirements. Renewable energy certificates (RECs), tradable renewable certificates (TRCs), green tags and other forms of green power that comply with the technical requirements of the Green-e Energy program may be used to document compliance with this credit.

MR Prerequisite 1: Storage and Collection of Recyclables

Required

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

Requirements
Provide an easily-accessible dedicated area or areas that for the collection and storage of materials for recycling for the entire building. Materials must include at a minimum paper, corrugated cardboard, glass, plastics and metals.

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

MR Credit 1: Building Reuse—Maintain Existing Walls, Floors and Roof

1–5 Points

Intent

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

Requirements

Maintain 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
25%	1
33%	2
42%	3
50%	4
75%	5

Hazardous materials that are remediated as a part of the project must be excluded from the calculation of the percentage maintained. If the project includes an addition that is more than 6 times the square footage of the existing building, this credit is not applicable.

Potential Technologies & Strategies

Consider reusing existing, previously occupied building structures, envelopes and elements. Remove elements that pose a contamination risk to building occupants and upgrade components that would improve energy and water efficiency, such as windows, mechanical systems and plumbing fixtures.

MR Credit 2: Construction Waste Management

1–2 Points

Intent

To divert construction and demolition debris from disposal in landfills and incineration facilities. Redirect recyclable recovered resources back to the manufacturing process. Redirect 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

Potential Technologies & Strategies

Establish goals for diversion from disposal in landfills and incineration facilities and adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, mineral fiber panel, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Construction debris processed into a recycled content commodity which has an open market value (e.g. wood derived fuel [WDF], alternative daily cover material, etc.) may be applied to the construction waste calculation. Designate a specific area(s) on the construction site for segregated or comingled collection of recyclable materials, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials. Note that diversion may include donation of materials to charitable organizations and salvage of materials on-site.

MR Credit 3: Materials Reuse

1 Point

Intent

To reuse building materials and products to reduce demand for virgin materials and reduce waste, thereby lessening impacts associated with the extraction and processing of virgin resources.

Requirements

Use salvaged, refurbished or reused materials, the sum of which constitutes at least 5%, based on cost, of the total value of materials on the project.

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment cannot be included in this calculation. Include only materials permanently installed in the project. Furniture may be included if it is included consistently in MR Credit 3: Materials Reuse through MR Credit 6: Certified Wood.

Potential Technologies & Strategies

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

MR Credit 4: Recycled Content

1–2 Points

Intent

To increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

Requirements

Use materials with recycled content[1] such that the sum of postconsumer[2] recycled content plus 1/2 of the preconsumer[3] content constitutes at least 10% or 20%, based on cost, of the total value of the materials in the project. The minimum percentage materials recycled for each point threshold is as follows:

Recycled Content	Points
10%	1
20%	2

The recycled content value of a material assembly is determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

Mechanical, electrical and plumbing components and specialty items such as elevators cannot be included in this calculation. Include only materials permanently installed in the project. Furniture may be included if it is included consistently in MR Credit 3: Materials Reuse through MR Credit 6: Certified Wood.

Potential Technologies & Strategies

Establish a project goal for recycled content materials and identify material suppliers that can achieve this goal. During construction, ensure that the specified recycled content materials are installed. Consider a range of environmental, economic and performance attributes when selecting products and materials.

1 Recycled content is defined in accordance with the International Organization of Standards document, ISO 14021 — Environmental labels and declarations — Self-declared environmental claims (Type II environmental labeling).

2 Postconsumer 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.

3 Preconsumer material is defined as material diverted from the waste stream during the manufacturing process. Reutilization of materials (i.e., rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it) is excluded.

MR Credit 5: Regional Materials

1–2 Points

Intent

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

Requirements

Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within a specified distance of the project site for a minimum of 10% or 20%, based on cost, of the total materials value. If only a fraction of a product or material is extracted, harvested, or recovered and manufactured locally, then only that percentage (by weight) can contribute to the regional value. The minimum percentage regional materials for each point threshold is as follows:

Regional Materials	Points
10%	1
20%	2

OPTION 1

All building materials or products have been extracted, harvested or recovered, as well as manufactured within a 500 mile (800 kilometer) radius of the project site.

OR

OPTION 2

Building materials or products shipped by rail or water have been extracted, harvested or recovered, as well as manufactured within a 500 mile (800 kilometer) total travel distance of the project site using a weighted average determined through the following formula:

(Distance by rail/3) + (Distance by inland waterway/2) + (Distance by sea/15) + (Distance by all other means) ≤ 500 miles [800 kilometers]

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment must not be included in all calculations. Include only materials permanently installed in the project. Furniture may be included if it is included consistently in MR Credit 3: Materials Reuse through MR Credit 7: Certified Wood.

Potential Technologies & Strategies

Establish a project goal for locally sourced materials, and identify materials and material suppliers that can achieve this goal. During construction, ensure that the specified local materials are installed, and quantify the total percentage of local materials installed. Consider a range of environmental, economic and performance attributes when selecting products and materials.

MR Credit 6: Certified Wood

1 Point

Intent

To encourage environmentally responsible forest management.

Requirements

Use a minimum of 50% (based on cost) of wood-based materials and products that are certified in accordance with the Forest Stewardship Council's principles and criteria, for wood building components. These components include at a minimum , structural framing and general dimensional framing, flooring, sub-flooring, wood doors and finishes.

Include only materials permanently installed in the project. Wood products purchased for temporary use on the project (e.g., formwork, bracing, scaffolding, sidewalk protection, and guard rails) may be included in the calculation at the project team's discretion. If any such materials are included, all such materials must be included in the calculation. If such materials are purchased for use on multiple projects, the applicant may include these materials for only one project, at its discretion. Furniture may be included if it is included consistently in MR Credits 3. Materials Reuse, through MR Credit 6, Certified Wood.

Potential Technologies & Strategies

Establish a project goal for FSC-certified wood products and identify suppliers that can achieve this goal. During construction, ensure that the FSC-certified wood products are installed and quantify the total percentage of FSC-certified wood products installed.

INDOOR ENVIRONMENTAL QUALITY

IEQ Prerequisite 1: Minimum Indoor Air Quality Performance

Required

Intent

To 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

CASE 1. Mechanically Ventilated Spaces

Mechanical ventilation systems must be designed using the ventilation rate procedure as defined by ASHRAE 62.1-2007, or the applicable local code, whichever is more stringent.

OPTION 1. ASHRAE Standard 62.1-2007 or Non-U.S. Equivalent

Meet the minimum requirements of Sections 4 through 7 of ASHRAE Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality (with errata but without addenda). Projects outside the U.S. may use a local equivalent to Sections 4 through 7 of ASHRAE Standard 62.1-2007.

OR

OPTION 2. CEN Standards EN 15251: 2007 and EN 13779: 2007

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

CASE 2. Naturally Ventilated Spaces

Naturally ventilated buildings must comply with ASHRAE Standard 62.1-2007, Paragraph 5.1 (with errata but without addenda[1]).

Potential Technologies & Strategies

Design ventilation systems to meet or exceed the minimum outdoor air ventilation rates as described in the ASHRAE standard. Balance the impacts of ventilation rates on energy use and indoor air quality to optimize for energy efficiency and occupant comfort. Use the ASHRAE Standard 62.1-2007 Users Manual (with errata but without addenda[1]) for detailed guidance on meeting the referenced requirements.

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

If the building has a zero lot line condition, or cannot establish a 25-foot (8-meter) nonsmoking boundary around the building, prohibit smoking on the property and choose one of the following options:

OPTION 1

Prohibit smoking in the building.

Prohibit on-property smoking within 25 feet (8 meters) of entries, outdoor air intakes and operable windows. Provide signage to allow smoking in designated areas, prohibit smoking in designated areas or prohibit smoking on the entire property.

OR

OPTION 2

CASE 1. Non-Residential Projects

Prohibit smoking in the building except in designated smoking areas.

Prohibit on-property smoking within 25 feet (8 meters) of entries, outdoor air intakes and operable windows. Provide signage to allow smoking in designated areas, prohibit smoking in designated areas or prohibit smoking on the entire property.

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

Verify performance of the smoking rooms' differential air pressures by conducting 15 minutes of measurement, with a minimum of 1 measurement every 10 seconds, of the differential pressure in the smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. Conduct the testing with each space configured for worst-case conditions of transport of air from the smoking rooms (with closed doors) to adjacent spaces.

CASE 2. Residential and Hospitality Projects

Prohibit smoking in all common areas of the building.

Locate any exterior designated smoking areas, including balconies where smoking is permitted, at least 25 feet (8 meters) from entries, outdoor air intakes and operable windows opening to common areas.

Prohibit on-property smoking within 25 feet (8 meters) of entries, outdoor air intakes and operable windows. Provide signage to allow smoking in designated areas, prohibit smoking in designated areas or prohibit smoking on the entire property.

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

Minimize uncontrolled pathways for ETS transfer between individual residential units by sealing penetrations in walls, ceilings and floors in the residential units and by sealing vertical chases adjacent to the units.

Weather-strip all doors in the residential units leading to common hallways to minimize air leakage into the hallway[1].

Demonstrate acceptable sealing of residential units by a blower door test conducted in accordance with ANSI/ASTM-E779-03, Standard Test Method for Determining Air Leakage Rate By Fan Pressurization. Projects outside the U.S. may use a local equivalent to ANSI/ASTM-E779-03, Standard Test Method for Determining Air Leakage Rate By Fan Pressurization.

Use the progressive sampling methodology defined in Chapter 4 (Compliance Through Quality Construction) of the Residential Manual for Compliance with California's 2001 Energy Efficiency Standards. Residential units must demonstrate less than 1.25 square inches leakage area per 100 square feet (8 square centimeters of leakage area per 10 square meters) of enclosure area (i.e., sum of all wall, ceiling and floor areas).

Potential Technologies & Strategies

Prohibit smoking in commercial buildings or effectively control the ventilation air in smoking rooms. For residential buildings, prohibit smoking in common areas and design building envelope and systems to minimize ETS transfer among dwelling units.

1 If the common hallways are pressurized with respect to the residential units, then doors in the residential units leading to the common hallways need not be weather-stripped provided that the positive differential pressure is demonstrated as in Option 2, Case 1, considering the residential unit as the smoking room.

IEQ Credit 1: Outdoor Air Delivery Monitoring

1 Point

Intent

To provide capacity for ventilation system monitoring to help promote occupant comfort and well-being.

Requirements

Install permanent monitoring systems to ensure that ventilation systems maintain design minimum requirements. Configure all monitoring equipment to generate an alarm when the 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 CO_2 concentrations within all densely occupied spaces—i.e., those with a design occupant density of 25 people or more per 1,000 square feet (95 square meters). CO_2 monitors must be between 3 and 6 feet (between 1 and 2 meters) 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 15% of the design minimum outdoor air rate, based on the value determined in IEQ Prerequisite 1: Minimum Indoor Air Quality Performance, for mechanical ventilation systems where 20% or more of the design supply airflow serves nondensely occupied spaces.

CASE 2. Naturally Ventilated Spaces

Monitor CO_2 concentrations within all naturally ventilated spaces. CO_2 monitors must be between 3 and 6 feet (between 1 and 2 meters) above the floor. One CO_2 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.

Potential Technologies & Strategies

Install CO_2 and airflow measurement equipment and feed the information to the heating, ventilating, and air conditioning (HVAC) system and/or building automation system (BAS) to trigger corrective action, if applicable. If such automatic controls are not feasible with the building systems, use the measurement equipment to trigger alarms that inform building operators or occupants of a possible deficiency in outdoor air delivery.

Installation of CO_2 sensors in tenant spaces is not required during core and shell construction, and tenants are not required to install CO_2 monitors; however, they should be made aware of the capability of the core and shell system to monitor CO_2. The core and shell systems must be designed with the capacity for CO_2 monitoring. This entails a building automation system that can be expanded to include future tenant CO_2 points.

IEQ Credit 2: Increased Ventilation

1 Point

Intent

To provide additional outdoor air ventilation to improve indoor air quality (IAQ) and promote occupant comfort, well-being and productivity.

Requirements

CASE 1. Mechanically Ventilated Spaces

OPTION 1. ASHRAE Standard 62.1-2007 or Non-U.S. Equivalent

Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2007 (with errata but without addenda[1]) as determined by IEQ Prerequisite 1: Minimum Indoor Air Quality Performance. Projects outside the U.S. may use a local equivalent to ASHRAE Standard 62.1-2007 if the same is used for IEQ Prerequisite 1: Minimum Indoor Air Quality Performance.

OR

OPTION 2. CEN Standard EN 15251: 2007

Projects outside the U.S. may earn this credit by increasing breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by Annex B of Comité Européen de Normalisation (CEN) Standard EN 15251: 2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics as determined by IEQ Prerequisite 1: Minimum Indoor Air Quality Performance.

CASE 2. Naturally Ventilated Spaces[2]

Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 2.8 of the CIBSE Applications Manual 10: 2005, Natural Ventilation in Non-domestic Buildings.

AND

OPTION 1. CIBSE or Non-U.S. Equivalent

Show that the natural ventilation systems design meets the recommendations set forth in the CIBSE manuals appropriate to the project space.

PATH 1

Use CIBSE Applications Manual 10: 2005, Natural Ventilation in Non-domestic Buildings. Projects outside the U.S. may use a local equivalent.

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 The core and shell buildings that are designed to be naturally ventilated must provide the capability for the tenant build-out to meet the requirements of this credit.

OR

PATH 2

Use CIBSE AM 13:2000, Mixed Mode Ventilation. Projects outside the U.S. may use a local equivalent.

OR

OPTION 2. Airflow Model

Use a macroscopic, multizone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE Standard 62.1-2007 section 6 (with errata but without addenda[1]), for at least 90% of occupied spaces. Projects outside the U.S. may use Annex B of Comité Européen de Normalisation (CEN) Standard EN 15251: 2007 or a local equivalent to section 6 of ASHRAE Standard 62.1-2007 to define the minimum ventilation rates.

Potential Technologies & Strategies

For mechanically ventilated spaces: Use heat recovery, where appropriate, to minimize the additional energy consumption associated with higher ventilation rates.

For naturally ventilated spaces, follow the 8 design steps described in the Carbon Trust Good Practice Guide 237:

- Develop design requirements.
- Plan airflow paths.
- Identify building uses and features that might require special attention .
- Determine ventilation devices.
- Size ventilation devices.
- Estimate external driving pressures.
- Select types of ventilation devices.
- Analyze the design.

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

IEQ Credit 3: Construction Indoor Air Quality Management Plan—During Construction

1 Point

Intent

To reduce indoor air quality (IAQ) problems resulting from construction or renovation and promote the comfort and well-being of construction workers and building occupants.

Requirements

Develop and implement an IAQ management plan after installation of all finishes and completion of building cleaning but before occupancy:

- During construction, meet or exceed the recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines For Occupied Buildings Under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3).
- Protect stored on-site and installed absorptive materials from moisture damage.
- If permanently installed air handlers are used during construction, filtration media must be used at each return air grille that meets one of the following criteria below. Replace all filtration media immediately prior to occupancy.
    - Filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 as determined by ASHRAE Standard 52.2-1999 (with errata but without addenda).
    - Filtration media is Class F5 or higher, as defined by CEN Standard EN 779-2002, Particulate air filters for general ventilation, Determination of the filtration performance.
    - Filtration media with a minimum dust spot efficiency of 30% or higher and greater than 90% arrestance on a particle size of 3–10 μg.

Potential Technologies & Strategies

Adopt an IAQ management plan to protect the heating, ventilation, and air conditioning (HVAC) system during construction, control pollutant sources, and interrupt contamination pathways. Sequence the installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile and gypsum wallboard. Coordinate with IEQ Credit 5: Indoor Chemical & Pollutant Source Control to determine the appropriate specifications and schedules for filtration media.

If possible, avoid using permanently installed air handlers for temporary heating/cooling during construction. Consult the LEED Reference Guide for Green Building Design and Construction, 2009 Edition for more detailed information on how to ensure the well-being of construction workers and building occupants if permanently installed air handlers must be used during construction.

IEQ Credit 4.1: Low-Emitting Materials—Adhesives and Sealants

1 Point

Intent

To 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

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.

Architectural Applications	VOC Limit (g/L less water)	Specialty Applications	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 and asphalt adhesives	50	Special purpose contact adhesive	250
Drywall and panel adhesives	50	Structural wood member adhesive	140
Cove base adhesives	50	Sheet applied rubber lining operations	850
Multipurpose construction adhesives	70	Top and trim adhesive	250
Structural glazing adhesives	100		
Substrate Specific Applications	**VOC Limit (g/L less water)**	**Sealants**	**VOC Limit (g/L less water)**
Metal to metal	30	Architectural	250
Plastic foams	50	Roadway	250
Porous material (except wood)	50	Other	420
Wood	30		
Fiberglass	80		
Sealant Primers	**VOC Limit (g/L less water)**		
Architectural, nonporous	250		
Architectural, porous	775		
Other	750		

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

- Aerosol Adhesives must comply withGreen Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.

Aerosol Adhesives	VOC Limit
General purpose mist spray	65% VOCs by weight
General purpose web spray	55% VOCs by weight
Special purpose aerosol adhesives (all types)	70% VOCs by weight

This table excludes adhesives and sealants integral to the water-proofing system or that are not building related.

Potential Technologies & Strategies

Specify low-VOC materials in construction documents. Ensure that VOC limits are clearly stated in each section of the specifications where adhesives and sealants are addressed. Common products to evaluate include general construction adhesives, flooring adhesives, fire-stopping sealants, caulking, duct sealants, plumbing adhesives and cove base adhesives. Review product cut sheets, material safety data (MSD) sheets, signed attestations or other official literature from the manufacturer clearly identifying the VOC contents or compliance with referenced standards.

IEQ Credit 4.2: Low-Emitting Materials—Paints and Coatings

1 Point

Intent

To 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

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

- Architectural paints and coatings applied to interior walls and ceilings must not exceed the volatile organic compound (VOC) content limits established in Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993.
- Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates must not exceed the VOC content limit of 250 g/L (2 lb/gal) established in Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997.
- Clear wood finishes, floor coatings, stains, primers, sealers, and shellacs applied to interior elements must not exceed the VOC content limits established for those coating types in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.

Potential Technologies & Strategies

Specify low-VOC paints and coatings in construction documents. Ensure that VOC limits are clearly stated in each section of the specifications where paints and coatings are addressed. Track the VOC content of all interior paints and coatings during construction.

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

IEQ Credit 4.3: Low-Emitting Materials—Flooring Systems

1 Point

Intent

To 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

OPTION 1

All flooring must comply with the following as applicable to the project scope:

- All carpet installed in the building interior must meet one of the following requirements:
  - Meets the testing and product requirements of the Carpet and Rug Institute Green Label Plus.
  - Maximum VOC concentrations are less than or equal to those specified in the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda, using the office scenario as defined in Table 7.5 within the practice. The additional VOC concentration limits listed in Section 9.1a must also be met.
  - Maximum VOC concentrations meet the California requirements specified above based on the following:
    - California Department of Public Health (CDPH) Standard Method V1.1-2010 using test results obtained at the 14 day time point.
    - Projects outside the U.S. may use the German AgBB/DIBt testing method and all testing methods based on AgBB/DIBt method (GUT, EMICODE, Blue Angel) using test results obtained at the 3 day or 7 day or 14 day time point. For caprolactam, if test results obtained at the 3 day or 7 day time point is used, the emission concentration must be less than 1/2 of the concentration limit specified above because the emission may not have peaked at the measured time points.

    If a European testing method (AgBB/DIBt GUT, EMICODE, Blue Angel) had used parameters for calculating test results different from those specified in the referenced California method, then the European test results for carpets or floorings need to be converted into California air concentrations by multiplication with 0.7.
- All carpet cushion installed in the building interior must meet the requirements of the Carpet and Rug Institute Green Label program.
- All carpet adhesive must meet the requirements of IEQ Credit 4.1: Adhesives and Sealants, which includes a volatile organic chemical (VOC) limit of 50 g/L (0.4 lb/gal).

- All hard surface flooring installed in the building interior must meet one of the following requirements:
  - Meet the requirements of the FloorScore standard (current as of the date of this rating system, or more stringent version) as shown with testing by an independent third-party.
  - Demonstrate maximum VOC concentrations less than or equal to those specified in the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda, using the office scenario as defined in Table 7.5 within the practice.
  - Maximum VOC concentrations meet the California requirements specified above based on the following:
    - California Department of Public Health (CDPH) Standard Method V1.1-2010 using test results obtained at the 14 day time point.
    - Projects outside the U.S. may use the German AgBB/DIBt testing method and all testing methods based on AgBB/DIBt method (GUT, EMICODE, Blue Angel) using test results obtained at the 3 day or 7 day or 14 day time point. For caprolactam, if test results obtained at the 3 day or 7 day time point is used, the emission concentration must be less than 1/2 of the concentration limit specified above because the emission may not have peaked at the measured time points.

    If a European testing method (AgBB/DIBt GUT, EMICODE, Blue Angel) had used parameters for calculating test results different from those specified in the referenced California method, then the European test results for carpets or floorings need to be converted into California air concentrations by multiplication with 0.7.
  - Mineral-based finish flooring products such as tile, 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.
- Concrete, wood, bamboo, and cork floor finishes such as sealer, stain and finish must meet the requirements of South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.
- Tile setting adhesives and grout must meet South Coast Air Quality Management District (SCAQMD) Rule 1168. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.
- For carpet adhesive, concrete, wood, bamboo and cork floor finishes, and tile setting adhesives, compliance can be demonstrated with test results of:
  - Total volatiles fraction, based on one of the following, provided that water and exempt compounds are subtracted from total volatiles test results and the mass VOC content is calculated consistent with SCAQMD Rule 1113 and Rule 1168:
    - ASTM D2369
    - EPA method 24
    - ISO 11890 part 1

- Total volatile organic compounds fraction, based on one of the following, provided that all VOCs with a boiling point up to 280°C (536°F) are included, and exempt compounds are subtracted from total volatiles test results and the mass VOC content is calculated consistent with SCAQMD Rule 1113 and Rule 1168:
  - ASTM D6886
  - ISO 11890 part 2

OR

OPTION 2

All flooring elements installed in the building interior must meet the testing and product requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. Mineral-based finish flooring products such as tile, 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.

Potential Technologies & Strategies

Clearly specify requirements for product testing and/or certification in the construction documents. Select products that are either certified under the Green Label Plus program or for which testing has been done by qualified independent laboratories in accordance with the appropriate requirements.

IEQ Credit 4.4: Low-Emitting Materials—Composite Wood and Agrifiber Products

1 Point

Intent

To 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

Composite wood and agrifiber products used on the interior of the building (i.e. inside the weatherproofing system) must contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies must not containadded urea-formaldehyde resins.

Composite wood and agrifiber products are defined as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates and door cores. Materials considered fit-out are not considered base building elements and are not included.

Potential Technologies & Strategies

Specify wood and agrifiber products that contain no added urea-formaldehyde resins. Specify laminating adhesives for field and shop-applied assemblies that contain no added urea-formaldehyde resins. Review product cut sheets, material safety data (MSD) sheets, signed attestations or other official literature from the manufacturer.

IEQ Credit 5: Indoor Chemical and Pollutant Source Control

1 Point

Intent

To 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 (3 meters) 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, grills 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. Projects that do not have entryway systems cannot achieve this credit.
- Sufficiently exhaust each space where hazardous gases or chemicals may be present or used (e.g. garages, housekeeping and laundry areas and copying and printing rooms) to create negative pressure with respect to adjacent spaces when the doors to the room are closed. For each of these spaces, provide self-closing doors and deck-to-deck partitions or a hard-lid ceiling. The exhaust rate must be at least 0.50 cubic feet per minute (cfm) per square foot (0.15 cubic meters per minute per square meter), with no air recirculation. The pressure differential with the surrounding spaces must be at least 5 Pascals (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.
- In mechanically ventilated buildings, each ventilation system that supplies outdoor air shall comply with the following:
  - Particle filters or air cleaning devices shall be provided to clean the outdoor air at any location prior to its introduction to occupied spaces.
  - These filters or devices shall meet one of the following criteria:
    - Filtration media is rated a minimum efficiency reporting value (MERV) of 13 or higher in accordance with ASHRAE Standard 52.2.
    - Filtration media is Class F7 or higher, as defined by CEN Standard EN 779: 2002, Particulate air filters for general ventilation, Determination of the filtration performance.
    - Filtration media has a minimum dust spot efficiency of 80% or higher and greater than 98% arrestance on a particle size of 3–10 μg.
  - Clean air filtration media shall be installed in all air systems after completion of construction and prior to occupancy.

Potential Technologies & Strategies

Design facility cleaning and maintenance areas with isolated exhaust systems for contaminants. Maintain physical isolation from the rest of the regularly occupied areas of the building. Install permanent architectural entryway systems such as grills or grates to prevent occupant-borne contaminants from entering the building. Install high-level filtration systems in air handling units processing outside supply air. Ensure that air-handling units can accommodate required filter sizes and pressure drops.

IEQ Credit 6: Controllability of Systems—Thermal Comfort

1 Point

Intent

To provide a high level of thermal comfort system control[1] by individual occupants or groups in multi-4occupant spaces (e.g., classrooms or conference areas) and promote their productivity, comfort and well-being.

Requirements

Provide individual comfort controls for 50% (minimum) of the 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 (6 meters) inside and 10 feet (3 meters) 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]).

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 IEQ Credit 7.1: Thermal Comfort—Design and include the primary factors of air temperature, radiant temperature, air speed and humidity.

Core and shell projects that do not purchase and/or install the mechanical system or operable windows (or a combination of both) have not met the intent of this credit.

See Appendix 1 — Default Occupancy Counts for occupancy count requirements and guidance.

Potential Technologies & Strategies

Design the building and systems with comfort controls to allow adjustments to suit individual needs or those of groups in shared spaces. ASHRAE Standard 55-2004 (with errata but without addenda) identifies the factors of thermal comfort and a process for developing comfort criteria for building spaces that suit the needs of the occupants involved in their daily activities. Control strategies can be developed to expand on the comfort criteria, and enable individuals to make adjustments to suit their individual needs and preferences. These strategies may involve system designs incorporating operable windows, hybrid systems integrating operable windows and mechanical systems, or mechanical systems alone. Individual adjustments may involve individual thermostat controls, local diffusers at floor, desk or overhead levels, control of individual radiant panels or other means integrated into the overall building, thermal comfort systems and energy systems design. In addition, designers should evaluate the closely tied interactions between thermal comfort as required by ASHRAE Standard 55-2004 (with errata but without addenda[1]) and acceptable indoor air quality as required by ASHRAE Standard 62.1-2007 (with errata but without addenda[1]), whether natural or mechanical ventilation.

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

1 Point

Intent
To provide a comfortable thermal environment that promotes occupant productivity and well-being.

Requirements
Design heating, ventilating and air conditioning (HVAC) systems and the building envelope to meet the requirements of one of the options below.

The core and shell base building mechanical system must allow for the tenant build-out to meet the requirements of this credit. See Appendix 1 — Default Occupancy Counts for occupancy count requirements and guidance. Project teams that design their project for mechanical ventilation that do not purchase or install the mechanical system are not eligible achieve this credit.

OPTION 1. ASHRAE Standard 55-2004 or Non-U.S. Equivalent

Meet the requirements of ASHRAE Standard 55-2004, Thermal Environmental Conditions for Human Occupancy (with errata but without addenda37). Demonstrate design compliance in accordance with the Section 6.1.1 documentation. Projects outside the U.S. may use a local equivalent to ASHRAE Standard 55-2004 Thermal Comfort Conditions for Human Occupancy Section 6.1.1.

OPTION 2. ISO 7730: 2005 & CEN Standard EN 15251: 2007

Projects outside the U.S. may earn this credit by designing heating, ventilating and air conditioning (HVAC) systems and the building envelope to meet the requirements of International Organization for Standardization (ISO) 7730: 2005 Ergonomics of the thermal environment, Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria; and CEN Standard EN 15251: 2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics.

Potential Technologies & Strategies
Establish comfort criteria according to ASHRAE Standard 55-2004 (with errata but without addenda[1]) that support the desired quality and occupant satisfaction with building performance. Design the building envelope and systems with the capability to meet the comfort criteria under expected environmental and use conditions. Evaluate air temperature, radiant temperature, air speed, and relative humidity in an integrated fashion and coordinate these criteria with IEQ Prerequisite 1: Minimum IAQ Performance, IEQ Credit 1: Outdoor Air Delivery Monitoring, and IEQ Credit 2: Increased Ventilation.

IEQ Credit 8.1: Daylight and Views—Daylight

1 Point

Intent

To provide for the 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

Through 1 of the 4 options, achieve daylighting in at least the following spaces[1]:

Regularly Occupied Spaces	Points
75%	1

OPTION 1. Simulation

Demonstrate through computer simulation that the applicable spaces achieve daylight illuminance levels of a minimum of 10 footcandles (fc) (110 lux) and a maximum of 500 fc (5,400 lux) 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 (110 lux) illuminance level.

OR

OPTION 2. Prescriptive

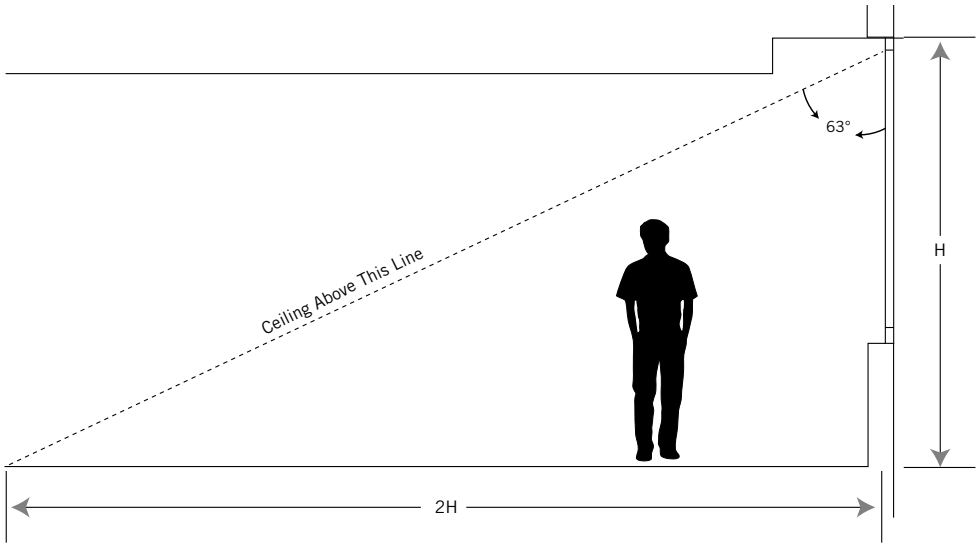
For sidelighting zones:

- 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 (0.8 meters) 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 the next page).

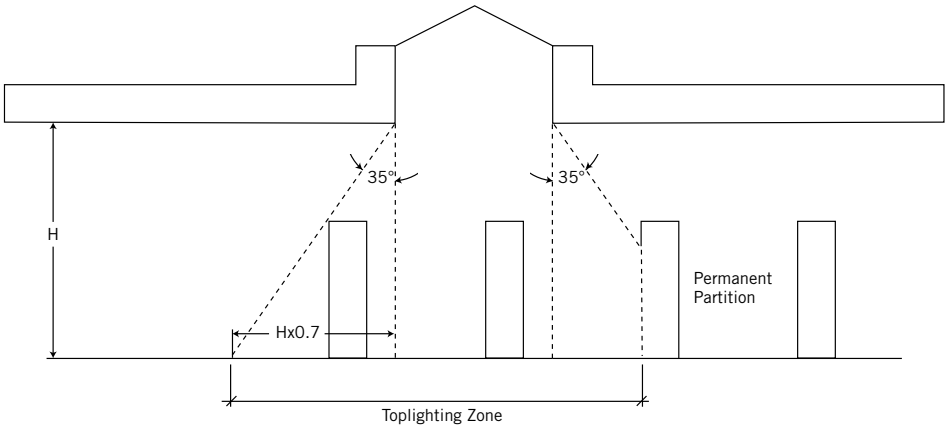
1 Exceptions for areas where tasks would be hindered by the use of daylight will be considered on their merits.



- 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 toplighting zones:

- The toplighting 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 toplighting zone) between 3% and 6% of the total 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 (110 lux) and a maximum of 500 fc (5,400 lux) has been achieved in applicable spaces. Measurements must be taken on a 10-foot (3-meter) grid and shall be 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 (110 lux) illuminance level.

OR

OPTION 4. Combination

Any of the above calculation methods may be combined to document the minimum daylight illumination in the applicable spaces.

Potential Technologies & Strategies

Design the building to maximize interior daylighting. Strategies to consider include building orientation, shallow floor plates, increased building perimeter, exterior and interior permanent shading devices, high-performance glazing, and high-ceiling reflectance values; additionally, automatic photocell-based controls can help reduce energy use. Predict daylight factors via manual calculations, or model daylighting strategies with a physical or computer model to assess footcandle (lux) levels and daylight factors achieved.

IEQ Credit 8.2: Daylight and Views—Views

1 Point

Intent

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

Requirements

Achieve a direct line of sight to the outdoor environment via vision glazing between 30 inches and 90 inches (between 0.8 meters and 2.3 meters) above the finish floor for building occupants in 90% of all regularly occupied areas. Determine the area with direct line of sight by totaling the regularly occupied floor area that meets the following criteria:

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

The line of sight may be drawn through interior glazing. For private offices, the entirefloor area of the office may be counted if 75% or more of the area has a direct line of sight to perimeter vision glazing. For multioccupant spaces, the actual floor area with a direct line of sight to perimeter vision glazing is counted.

The core and shell design must incorporate a feasible tenant layout(s) per the default occupancy counts (or some other justifiable occupancy count) that can be used in the analysis of this credit.

Potential Technologies & Strategies

Design the space to maximize daylighting and view opportunities. Strategies to consider include lower partitions, interior shading devices, interior glazing and automatic photo-cell based controls.

This credit requires consideration of tenant design for views that can be implemented during future tenant build-out. Core and shell design documents should include drawings or specifications that detail the design assumptions and information on how the tenant can use this capability. If design and construction guidelines are created for tenants, this information should also be included in the guidelines.

INNOVATION IN DESIGN

ID Credit 1: Innovation in Design

1–5 Points

Intent

To 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 (1-5 points)

Achieve significant, measurable environmental performance using a strategy not addressed in the LEED 2009 for Core and Shell Development Rating System.

One point is awarded for each innovation achieved. No more than 5 points under IDc1 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 Core and Shell Development prerequisite or credit that allows exemplary performance as specified in the LEED Reference Guide for Green Building Design & Construction, 2009 Edition. 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 IDc1 may be earned through PATH 2— Exemplary Performance.

PATH 3. Pilot Credit (1-5 points)

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 up to 5 Pilot Credits Total.

Potential Technologies & Strategies

Substantially exceed a LEED 2009 for Core and Shell Development performance credit such as energy performance or water efficiency. Apply strategies or measures that demonstrate a comprehensive approach and quantifiable environment and/or health benefits.

ID Credit 2: LEED Accredited Professional

1 Point

Intent

To 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).

Potential Technologies & Strategies

Educate the project team members about green building design and construction, the LEED requirements and application process early in the life of the project. Consider assigning integrated design and construction process facilitation to the LEED AP.

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 projects' region. A database of Regional Priority credits and their geographic applicability is available on the USGBC website, http://www.usgbc.org.

One point is awarded for each Regional Priority credit achieved; no more than 4 credits identified as Regional Priority credits may be earned. The USGBC has prioritized credits for projects located in the U.S., Puerto Rico, the U.S. Virgin Islands, and Guam. All other international projects should check the database for eligible Regional Priority credits.

Potential Technologies & Strategies
Determine and pursue the prioritized credits for the project location.

APPENDIX 1

Default Occupancy Counts

Because of the speculative nature of core and shell construction, a project team may not know the final occupant count during the LEED certification process. Determining and demonstrating compliance with some LEED credits can prove challenging and complex. For projects that do not know the final occupant count, a default table has been developed.

Core & Shell projects that do not have final occupancy counts must utilize the default occupancy counts provided in this appendix. Projects that know the tenant occupancy must use the actual numbers, as long as the gross square foot per employee is not greater than that in the default occupancy count table. If code requirements is required gross square foot per occupant is less than those in the table, this is also acceptable. Default occupancy counts are provided for typical core and shell project types. If the buildings and circumstances are not covered in this appendix, provide documentation for comparable buildings demonstrating average gross square foot per occupant when estimating the core and shell's building occupancy.

Table 1. Default Occupancy Numbers

	Gross Square Feet per Occupant	
	Employees	**Transients**
General office	250	0
Retail, general	550	130
Retail or service (e.g., financial, auto)	600	130
Restaurant	435	95
Grocery store	550	115
Medical office	225	330
R&D or laboratory	400	0
Warehouse, distribution	2,500	0
Warehouse, storage	20,000	0
Hotel	1,500	700
Educational, daycare	630	105
Educational, K–12	1,300	140
Educational, postsecondary	2,100	150

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

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

- SS Credit 4.2: Alternative Transportation, Bicycle Storage and Changing Rooms
- SS Credit 4.4: Alternative Transportation—Parking Capacity
- WE Prerequisite 1: Water Use Reduction
- WE Credit 2: Innovative Wastewater Technologies
- WE Credit 3: Water Use Reduction
- EA Prerequisite 2: Minimum Energy Performance
- EA Credit 1: Optimized Energy Performance
- IEQ Prerequisite 1: Minimum Indoor Air Quality Performance
- IEQ Credit 1: Outdoor Air Delivery Monitoring
- IEQ Credit 2: Increased Ventilation
- IEQ Credit 6: Controllability of Systems—Thermal Comfort
- IEQ Credit 7: Thermal Comfort—Design
- IEQ Credit 8: Daylight and Views

The defaults provided above are based on gross square foot per occupant and not net or leasable square foot per occupant. Gross square footage is defined as the sum of all areas on all floors of a building included within the outside faces of the exterior wall including all floor penetrations that connect one floor to another. This can be determined by taking the building foot print and multiplying it by the number of floors in the building. Projects which contain underground and/or structured parking, may exclude that area from the gross square footage used for the calculation. Other spaces such as common areas, mechanical spaces, and circulation should be included in the gross square footage of the building.

Determining FTE Occupants

If the occupancy count for full-time equivalents (FTEs) is not known, calculate the default occupancy using Equation 1. If the tenant occupancy is known, calculate the FTE for both full- and part-time employees, assuming that an 8-hour occupant has a FTE value of 1.0; part-time occupants have a FTE value based on their hours per day divided by the standard occupancy period (typically 8 hours; other durations may be used if appropriate). Use Equation 2.

Equation 1

$$\text{FTE Occupants} = \frac{\text{Building Gross Square Feet}}{\text{Gross Square Feet per FTE}}$$

Equation 2

$$\text{FTE Occupants} = \frac{\text{Occupant Hours}}{\text{8 Hours}}$$

EXAMPLE

A mixed-used retail and commercial office building of 620,000 gross square feet has a single-shift occupancy. The transient occupant numbers used below are taken from the default data in Table 1.

Step 1. Determine the area for each occupancy type in the building, and then the gross square feet per FTE and transient occupants.

Table 2. Sample Calculations for Area per Occupancy Type

Occupancy Type	Area (sf)		
	Total	Per FTE	Per Transient Occupant
Commercial office	550,000	250	0
Retail space	50,000	550	130
Restaurant	20,000	225	95
Total Building			620,000

STEP 2

Calculate the FTE occupancy and transient occupancy for each occupancy type.

FTE Occupants

Commercial: $\frac{550{,}000}{250} = 2{,}200$

Retail space: $\frac{50{,}000}{550} = 90.9$, or 91

Restaurant: $\frac{20{,}000}{225} = 88.8$, or 89

Transient Occupants

Retail space: $\frac{50{,}000}{130} = 384.6$, or 385

Restaurant: $\frac{20{,}000}{95} = 211$

STEP 3

Add the FTE and transient occupants for each space to determine whole building occupancy.

Commercial:	2,200	+	0		
Retail space:	91	+	385		
Restaurant:	89	+	211		
Total	2,380	+	596	=	2976

APPENDIX 2

Core & Shell Energy Modeling Guidelines

These guidelines are intended to ensure that projects in different markets approach the energy modeling requirements in a similar manner, and to establish a minimum benchmark for energy optimization. The energy modeling is based on the ANSI/ASHRAE/IESNA 90.1–2007 Building Performance Rating Method. This can be used for developing a whole building model when the core and shell work is known but the tenant space development is unknown.

Tenant space is defined as an area that meets all the following conditions:

- It is served by separate, exclusive components.
- Its components are specifically designed for the area.
- All appropriate energy-using components are metered and apportioned and/or billed to the tenant.
- The tenant will pay for these components.

The core and shell building is defined as the parts of the building that are not tenant space. Any constraints or guidance issued to the tenant, such as a maximum level of lighting density or restrictions on occupancy type, must be outlined in the tenant lease or sales agreement (see Appendix 4).

Step 1. Model the proposed building.

Core and Shell Building

- Model the heating, ventilation, and air-conditioning (HVAC) system as described in the design documents. If the HVAC system is not yet designed, use the same HVAC system as the baseline model, per ANSI/ASHRAE/IESNA Standard 90.1–2007, Table G3.1.1A.
- Model the building envelope as shown in the architectural drawings.
- Model the lighting power as shown in the design documents for all core and shell spaces.

Tenant Spaces

- If the team is pursuing any additional energy-saving opportunities not associated with the core and shell areas, outline the opportunities or requirements in the tenant lease or sales agreement (see Appendix 4). Tenant space occupancy numbers must be determined by using the default space occupancies outlined in Appendix 1.
- Model electric meters for lighting power in tenant spaces. Choose a space type classification for the building spaces in Appendix 1. Use lighting levels shown in ANSI/ASHRAE/IESNA 90.1–2007, Table 9.6.1 for the space type classification, or Table 9.5.1 for overall building type. If the tenant lighting is designed and installed as part of the core and shell work, the project team may model the designed lighting systems.
- Model separate meters for tenant plug loads and process loads. Use the values in Table 1 to model tenant plug loads, or provide documentation for the modeled loads (see the process energy section of EA Credit 1). These default plug loads do not necessarily reflect all process loads; the values are recommended but not required to achieve the 25% process loads.

Table 1. Default Tenant Receptacle Loads, by Occupancy Type

Occupancy Type	Receptacle Load (W/sf)
General office	1.5
Retail, general	1.35
Retail, service	1.35
Restaurant	0.8
Grocery store	2.5
Medical office building	1.5
R&D or laboratory building	1.4
Warehouse, distribution	0.65

Source: Derived from energy modeling exercises undertaken by OWP/P.

STEP 2. Model the baseline building.

Core & Shell Building

- Model the baseline building HVAC system per ANSI/ASHRAE/IESNA 90.1–2007, Table G3.1.1A.
- For the building envelope, comply with the prescriptive requirements of ANSI/ASHRAE/IESNA 90.1–2007.
- Model the lighting power by the space type classification of ANSI/ASHRAE/IESNA 90.1–2007, Chart 9.6.1.

Tenant Spaces

- Model separate electric meters for the lighting in the tenant spaces. Use the same lighting power as modeled in the proposed building, unless efficiencies can be supported by a tenant sales or lease agreement.
- Model separate meters for receptacle loads and process loads in the tenant scope. Use the same values for receptacle loads as used in the proposed building.

STEP 3. Perform energy simulations of the proposed building and the baseline building.

STEP 4. Compare the resulting annual energy costs.

From the simulation, determine the annual energy costs of the budget building and the design building, then calculate the percentage savings for annual energy costs.

Verify that at least 25% of the overall energy cost is process load. If process loads are less than 25% of overall energy cost, prepare supporting documentation or increase plug loads in the energy model to meet the requirement. Process loads greater than 25% are acceptable.

Renewable energy should be included in the energy model or accounted for using the exceptional calculation method.

APPENDIX 3

LEED for Core & Shell Project Scope

The checklist below represents an interactive LEED-Online checklist that helps project teams identify and document the scope of Core & Shell projects. The checklist is a summary description of the building occupancy and its full-time equivalent (FTE) employees and transient occupants.

The checklist also identifies who has control of each building system—that is, the party that has design control and oversight of the construction activities for a given system. The core and shell developer may have sole control over a system, or the tenant may have independent control over a system; alternatively, the tenant may have control over a system but the developer may enforce system requirements through a sales agreement or tenant lease, thereby influencing its design and/or construction. Refer to Appendix 4, Tenant Lease and Sales Agreement, for further information on this option.

Portions of systems may be controlled by both the core and shell developer and the tenant, or the systems listed may not be a part of the project at all. Complete the checklist to reflect varied conditions; a team may check zero, one, or multiple boxes for each system listed below.

Building Use and Occupancy

Project name						
Size (gross sf)						
Occupancy Type	**Percentage of Total Building**	**Occupancy Type Area (gross sf)**	**Area per FTE (gross sf)**	**FTEs**	**Area per Transient (gross sf)**	**Transients**
General office						
Retail, general						
Retail, service						
Restaurant						
Grocery store						
Medical office building						
R&D or laboratory building						
Warehouse, distribution						
Warehouse, storage						
Hotel						
Educational, daycare						
Educational, K–12						
Educational, postsecondary						
Other (specify):						
Total building occupancy						
Total FTEs						
Total transients						

Control of Building Systems

Fill in the table below based on the division of work throughout the project. In some cases, multiple or no boxes may be checked.

	Main Lobby			Main Corridor			Secondary Lobby, Corridors			Buildouts			HVAC			Electrical			Plumbing		
Floor finishes																					
Wall finishes																					
Ceiling finishes																					
Air terminal equipment																					
Air inlets and outlets																					
Light fixtures																					
Lighting controls																					
AHUs/RTUs/ Air supply equipment																					
Chillers																					
Cooling tower																					
Boilers																					
Primary ductwork																					
Electrical panels																					
Switchgear																					
Bus duct																					
Water closets																					
Urinals																					
Showers																					
Public lavatory faucets, aerators																					
Public metering lavatory faucets, aerators																					
Kitchen sinks																					
Janitor sinks																					
Metering faucets																					
	Owner/Developer	Tenant	Lease Agreement	Owner/Developer	Tenant	Lease Agreement	Owner/Developer	Tenant	Lease Agreement	Owner/Developer	Tenant	Lease Agreement	Owner/Developer	Tenant	Lease Agreement	Owner/Developer	Tenant	Lease Agreement	Owner/Developer	Tenant	Lease Agreement