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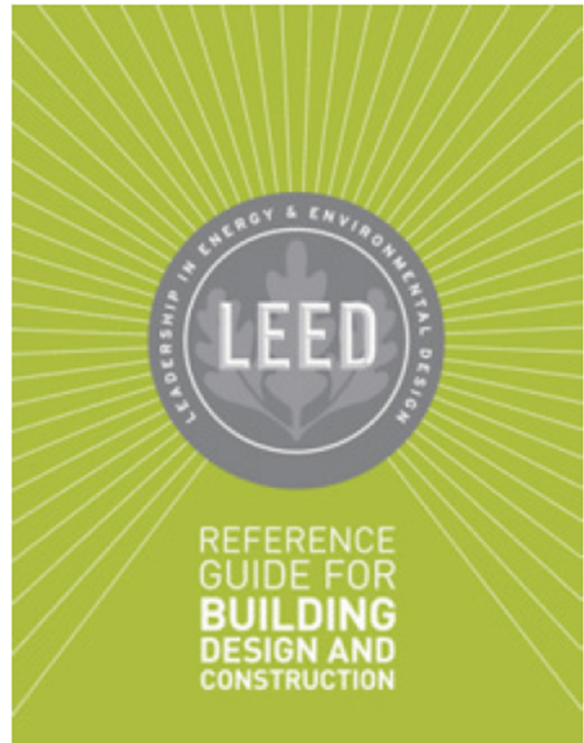
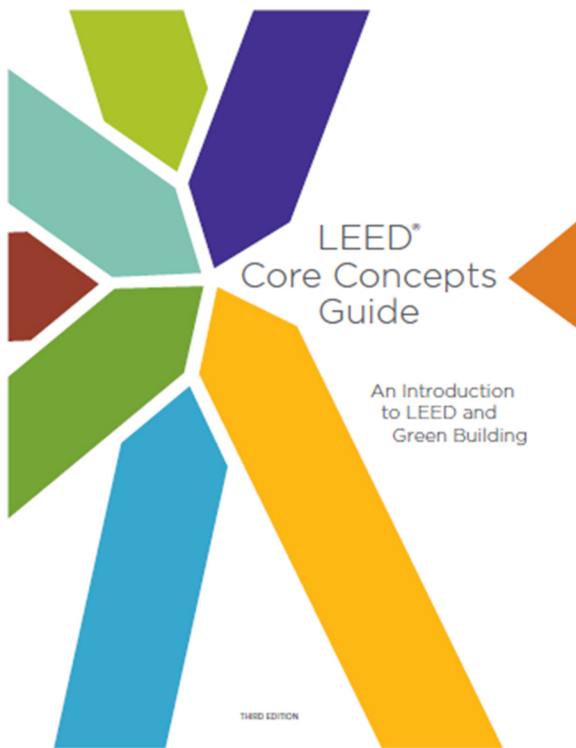


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EXAM STUDY GUIDE

LEED Green Associates have a documented, up-to-date understanding of the most current green building principles and practices, and are committed to their professional future.



Prepared by:

Dr. Osama Abdelgawad

USGBC Faculty™

GBCI #: 10405855



GREEN BUILDING®
CERTIFICATION INSTITUTE



CREDENTIAL OVERVIEW

LEED Credentials



LEED Green Associate. LEED Green Associates have a documented, up-to-date understanding of the most current green building principles and practices, and are committed to their professional future.

LEED AP with Specialty. The LEED AP credential arms you with advanced knowledge in green building as well as expertise in a particular LEED rating system.



LEED AP BD+C

Suits professionals with expertise in the design and construction phases of green buildings, serving the commercial, residential, education and healthcare sectors.



LEED AP O+M

Distinguishes professionals implementing sustainable practices, improving performance, heightening efficiency and reducing environmental impact in existing buildings through enhanced operations and maintenance.



LEED AP ID+C

Serves participants in the design, construction and improvement of commercial interiors and tenant spaces that offer a healthy, sustainable and productive work environment.



LEED AP ND

Applies to individuals participating in the planning, design and development of walkable, neighborhoods and communities.



LEED AP HOMES

Suited for those involved in the design and construction of healthy, durable homes that use fewer resources and produce less waste.



LEED Fellow. The LEED Fellow Program recognizes outstanding LEED APs.

LEED APs who have demonstrated exceptional achievement in key mastery elements related to technical knowledge and skill are eligible for the honor.

They have also made significant contributions in teaching, mentoring, or research with proven outcomes. LEED Fellows have a history of exemplary leadership, impactful commitment, service, and advocacy in green building and sustainability.

<http://www.usgbc.org/credentials>

Getting Started on the LEED Green Associate Credential

Earning the LEED Green Associate credential requires passing a 100 question, multiple-choice exam.

LEED® Green Associate™ Exam

The LEED Green Associate exam tests your general knowledge of green building practices for both commercial and residential spaces and both new construction and existing buildings as well as how to support other professionals working on LEED projects.

STEP 1: **Read** the LEED Green Associate Candidate Handbook at www.usgbc.org.

STEP 2: **Register** for and schedule your exam.

Register in the EXACT name that appears on your I.D. card, and keep your confirmation number.

STEP 3: **Access** the Self-Study Material at lorisweb.com/LEED

STEP 4: **Start studying!**

The exams assess candidates' abilities at three cognitive levels: Recall, Application, and Analysis.

Recall Items: These items assess a candidate's ability to recall factual material that is presented in a similar context to the exam references.

Application Items: These items provide the candidate with a novel problem or scenario that the candidate can solve using familiar principles or procedures described in the exam references.

Analysis Items: These items assess a candidate's ability to break the problem down into its components to create a solution. The candidate must not only recognize the different elements of the problem, but must also evaluate the relationship or interactions of these elements.

Taking the exam

- Two-hour computer-based exam
- 100 randomly delivered multiple-choice questions.
- Your score will be available immediately at the end of the exam, and you will receive a printed score report.
- A passing score is 170 or higher on a scale of 125 to 200.

The LEED v4 exam is based on the following text specifications and references.

The exam questions reflect Task Domains and Knowledge Domains.

Task Domains: Task Domains reflect the tasks necessary to perform LEED safely and effectively. These include concepts such as LEED Project and Team Coordination, LEED Certification Process, Analyses Required for LEED Credits, and Advocacy and Education for Adoption for LEED Rating System.

- LEED Green Associate Tasks (100%)

Knowledge Domains: Knowledge Domains reflect the rating systems' credit categories and what one needs to know. These include concepts such as LEED Process, Integrative Strategies, LEED credit categories, and Project Surroundings and Public Outreach.

- LEED Process (16 questions)
- Integrative Strategies (8 questions)
- Location and Transportation (7 questions)
- Sustainable Sites (7 questions)
- Water Efficiency (9 questions)
- Energy and Atmosphere (10 questions)
- Materials and Resources (9 questions)
- Indoor Environmental Quality (8 questions)
- Project Surroundings and Public Outreach (11 questions)

References

The LEED Green Associate Exam is designed to test the general knowledge of green building practices and how to support other professionals working on LEED projects.

1. U.S. Green Building Council. Green Building and LEED Core Concepts Guide. 3rd Edition. U.S. Green Building Council, 2011.
2. U.S. Green Building Council. Introductory and Overview Sections. LEED Building Design + Construction Reference Guide. v4 Edition. U.S. Green Building Council, 2013. *Note that the introductory and overview sections are available to download separately from purchasing the full reference guide.
3. U.S. Green Building Council. LEED v4 Impact Category and Point Allocation Process Overview. U.S. Green Building Council, 2013.
4. U.S. Green Building Council. LEED v4 User Guide. U.S. Green Building Council, 2013. Web.
5. U.S. Green Building Council. Guide to LEED Certification: Commercial. U.S. Green Building Council, 2014. Web.
6. "LEED Certification Fees." U.S. Green Building Council, 2014. Web.
7. "Rating System Selection Guidance." U.S. Green Building Council, 2014. Web.

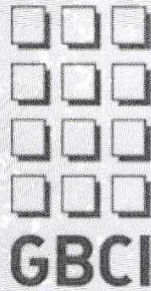
Please note: LEED professional exams are updated on July 1 of every year; this update incorporates LEED addenda published through January of the same year. Additionally, no exams will be offered from June 15-June 30 of each year.

Sample Questions

These sample questions were discarded in the process of creating items for the new LEED Green Associate exam. The items are provided for your convenience to allow you to better familiarize yourself with the format and general content of items on the exam. Correct answers are marked with an asterisk*.

1. When applying for innovation credits, a project team
 - A. Cannot submit any previously awarded innovation credit.
 - B. May receive credit for performance that doubles a credit requirement threshold.*
 - C. May submit a product or strategy that is being used in an existing LEED credit.
 - D. May receive a credit for each LEED Accredited Professional that is on the project team.
2. A developer wants to make a profit by building a new office that maximizes daylighting and views. What actions might the developer take to fulfill all parts of the triple bottom line?
 - A. Restore habitat onsite
 - B. Purchase ergonomic furniture
 - C. Pursue local grants and incentives
 - D. Provide lighting controllability for occupants*

Examination Score Report



LEED Green Associate Exam Score Report

Candidate: Please carefully read through this score report, as it contains details about your examination performance and payment information.

Exam Information

Candidate:	Lori Brown
Exam Track:	LEED Green Associate Exam
Exam Date:	Wednesday, March 30, 2016
Candidate ID:	0010061029
Test Site:	0518

Score Information

Minimum Passing Score:	170
Score Achieved:	192
Result:	Pass

Section Performance

Category	Percent Correct
LEED Process	94%
Integrative Strategies	100%
Location and Transportation	71%
Sustainable Sites	100%
Water Efficiency	100%
Energy and Atmosphere	100%
Materials and Resources	89%
Indoor Environmental Quality	100%
Project Surroundings and Public Outreach	73%

PROMETRIC If you have questions or concerns please contact Green Business Certification Inc. at www.gbci.org/contact

valid only with embossed seal and original signature.
ET
3/30/16

The face of this document has a blue background on white paper. The back of this document contains an artificial watermark. Hold at an angle to view.

Section 1

Introduction to Green Buildings and Communities

The Environmental Impacts of Buildings

In the United States, buildings account for:

- 14% of potable water consumption¹
- 30% of waste output
- 40% of raw materials use²
- 38% of carbon dioxide emissions
- 24% to 50% of energy use
- 72% of electricity consumption³

THE CUMULATIVE EFFECT OF CONVENTIONAL PRACTICES IN THE BUILDING INDUSTRY HAS PROFOUND IMPLICATIONS FOR HUMAN HEALTH, THE ENVIRONMENT, AND THE ECONOMY:

- Clearing of land for development often destroys wildlife habitat
- Extracting, manufacturing, and transporting materials may pollute water and air, release toxic chemicals, and emit greenhouse gases
- Building operations require large inputs of energy and water and generate substantial waste streams
- Transportation to and from buildings by commuters and service providers compounds the harmful environmental effects associated with vehicle use, such as increased energy consumption and pollution

A study by the New Buildings Institute found that in green buildings, average energy use intensities (energy consumed per unit of floor space) are 24% lower than in typical buildings.⁴

Additionally, the U.S. General Services Administration surveyed 12 green buildings in its portfolio and found these savings and improvements:

- 26% less energy usage
- 27% higher levels of occupant satisfaction
- 13% lower maintenance costs
- 33% lower emissions of carbon dioxide (CO₂)⁵

The study concluded that the federal government's green buildings outperform national averages in all measured performance areas—energy, operating costs, water use, occupant satisfaction, and carbon emissions.

What is Green Building?

The process of green building flows throughout the entire life-cycle of a project, beginning at the inception of a project idea and continuing seamlessly until the project reaches the end of its life and its parts are recycled or reused.

Sustainability means creating places that are environmentally responsible, healthful, just, equitable, and profitable.

Triple bottom line is also often used to refer to the concept of sustainability.



The triple bottom line concept incorporates a long-term view for assessing potential effects and best practices for three kinds of resources:

PEOPLE (SOCIAL CAPITAL). All the costs and benefits to the people who design, construct, live in, work in, and constitute the local community and are influenced, directly or indirectly, by a project

PLANET (NATURAL CAPITAL). All the costs and benefits of a project on the natural environment, locally and globally

PROFIT (ECONOMIC CAPITAL). All the economic costs and benefits of a project for all the stakeholders (not just the project owner)



The goal of the triple bottom line, in terms of the built environment, is to ensure that buildings and communities create value for all stakeholders, not just a restricted few.

Making buildings more healthful, more comfortable, and more conducive to productivity for their occupants has special significance in light of studies conducted by the U.S. Environmental Protection Agency (EPA), which found that people in the United States spend, on average, 90% of their time indoors.⁶

Research conducted at Carnegie Mellon University shows that these benefits can translate into a 2% to 16% increase in workers' and students' productivity. Even small increases in productivity can dramatically increase the value of a building.⁷

The Rise of the Green Building Industry

The mission of USGBC is “to transform the way buildings and communities are designed, built and operated, enabling an environmentally and socially responsible, healthy, and prosperous environment that improves the quality of life.”⁸

USGBC supports achievement of this mission through:

- Education Programs
- Research
- Extensive Network of Local Chapters
- Greenbuild International Conference and Expo
- LEED Green Building Program

Green Building and Climate Change

The built environment, including buildings and transportation systems, accounts for more than two-thirds of all greenhouse gas emissions.⁹

- A typical code-compliant 135,000-square-foot office building in a car-oriented suburban location will be responsible for approximately 8,375 tons (T) of carbon, or 11.8 T per person.
- When that same building is moved to a location that is accessible via public transportation, bicycling, or walking, its total emissions decrease.
- When the building is designed and maintained as a green building with improved energy and water performance, the total emissions fall to 3,233 T, or 4.6 T per person.

Green Building Over Time

Carbon emissions provide a useful metric for many aspects of green buildings and communities, including energy, water, solid waste, materials, and transportation, but green building involves more than reducing greenhouse gas emissions.

It is important to set goals for other issues as well, such as indoor air quality, human health, and habitat protection. This comprehensive goal-setting process encourages programs and policies that will lead to sustainable communities.

Commissioning is the process of verifying and documenting that a building and all its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements.

Monitoring and verification systems, which enable facilities personnel to identify and resolve issues that arise over time and even enhance a building's performance throughout the life of the project.

Designing a project to meet both current and evolving needs is one key to sustainability. Buildings that protect the history and character of a place also promote sustainability.

Green Building and Location

Location is a critical element of green building: it can define appropriate strategies, yet it can also limit how green a project can actually be. Depending on the environmental issues that are most critical in a particular area, location can influence a project team's priorities.

Location includes these factors:

- NATURAL CONTEXT.** Climate, sun, wind, orientation, soils, precipitation, local flora and fauna.
- INFRASTRUCTURAL CONTEXT.** Available resources, materials, skills, and connections to utilities, roads and transit.
- SOCIAL CONTEXT.** Connections to the community and other destinations, local priorities, cultural history and traditions, local regulations and incentives.

Green Building Costs and Savings

Consider costs beyond initial cost (first cost)

Integrate cost analysis early in the design phase

Example: specification of more costly, high-performance windows may allow for the use of a smaller, lower-cost heating, ventilation, and air-conditioning (HVAC) system.

A 2007 public opinion survey conducted by the World Business Council for Sustainable Development found that respondents believed, on average, that green features added 17% to the cost of a building, whereas a study of 146 green buildings found an actual average marginal cost of less than 2%.¹²

A University of California–Berkeley study analyzed 694 certified green buildings and compared them with 7,489 other office buildings, each located within a quarter-mile of a green building in the sample.

The researchers found that, on average, certified green office buildings rented for 2% more than comparable nearby buildings. After adjusting for occupancy levels, they identified a 6% premium for certified buildings. The researchers calculated that at prevailing capitalization rates, this adds more than \$5 million to the market value of each property.¹³

Beyond Green

Sustainable buildings that reduce damage to the environment is not enough.

Leaders in the field now speak about buildings and communities that are regenerative, meaning that these sustainable environments evolve with living systems and contribute to the long-term renewal of resources and life.

Regenerative projects strive toward “net-zero”—using no more resources than they can produce.

- Net-zero energy projects use no more energy from the grid than they generate on site. These projects may be connected to the grid, drawing electricity from it at night and contributing energy from onsite renewable energy systems during the day, such that their total energy cost is zero.
- Carbon neutrality, emitting no more carbon emissions than they can either sequester or offset.
- Water balance: they use no more water other than that which falls on site as precipitation
- Produce Zero Waste by recycling, reusing, or composting all materials.

Green Building Expertise

- The green building process is interdisciplinary, iterative, and collaborative.
- Teamwork and critical thinking are valued.
- Everyone needs to learn to ask the right questions and to participate in developing the solutions.
- Feedback loops are built into the entire process.

The new skills required for a green building practice are not just knowledge of new strategies, materials, or equipment, although these are necessary.

Green building practitioners need to learn how teams work, how to facilitate or participate in a productive discussion, how to work with people with different backgrounds and skills, and how to think outside their normal comfort zones when developing ideas.

Training programs can help build these skills by combining experience with more formal classes, workshops, and online education.

Section 2 Sustainable Thinking

Three Major Concepts that are Integral to Green Building and Sustainability

- Systems Thinking
- Life-Cycle Approach
- Integrated Processes

Systems Thinking

system an assemblage of parts that interact in a series of relationships to form a complex whole, which serves particular functions of purposes.

systems thinking understanding the world, including the built environment, as a series of relationships in which all parts influence many other parts.

Open System

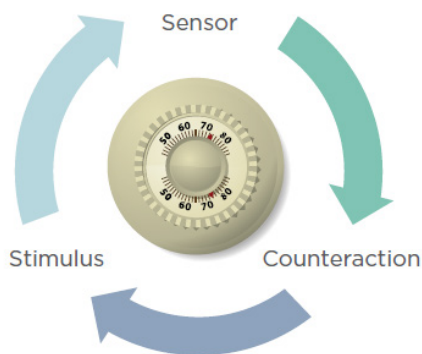
Necessary resources are renewed and exchanged on a regular basis.

Closed System

Maintains itself on a limited amount of resources that are entrenched in that particular system

feedback loop information flows within a system that allow the system to self-organize.

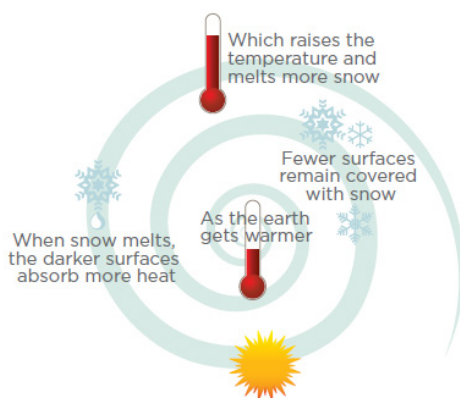
For example, when a thermostat indicates that the temperature in a room is too warm, it sends a signal to turn on the air-conditioning. When the room is sufficiently cooled, the thermostat sends a signal for the air-conditioning to stop.



This type of feedback loop is called a **negative feedback loop** because embedded in the system's response to a change is a signal for the system to stop changing when that response is no longer needed. Negative feedback loops enable a system to self correct and stay within a particular range of function or performance. Thus, they keep systems stable.

The Prius Effect

Delivering real-time energy information in a convenient way by installing meters where operators can act on the information and make changes to use energy more efficiently.



Positive feedback loops, on the other hand, are self-reinforcing: the stimulus causes an effect, and the effect produces even more of that same effect.

Population growth is a positive feedback loop. The more babies who are born, the more people there will be in the population to have more babies. Therefore, the population can be expected to rise until acted upon by another force, such as an epidemic or shortage of resources.

Climate change is a positive feedback loop.

Unchecked, positive feedback loops can create chaos in a system.

To influence the behavior of a system, it is important to find the leverage points—

leverage point a point in a system where a small intervention can yield large changes

Life-Cycle Approach

Life-cycle approach looking at all stages of a project, product or service, adding the dimension of longevity to whole systems thinking.

life-cycle assessment (LCA) an analysis of the environmental aspects and potential impacts associated with a product, process, or service.

Embodied energy the total amount of energy used to harvest or extract, manufacture, transport, install and use a product across its life cycle.

Tools and databases used in conducting LCAs are available from sources in the U.S. government and the private sector.

life-cycle costing (LCC) a process of costing that looks at both purchase and operating costs as well as relative savings over the life of the building or product.

LCC can be used in comparing alternatives with different initial and operating costs.

For a building this usually includes the following costs:

- Initial purchase, acquisition, or construction
- Fuel
- Operation, maintenance, and repair
- Replacement
- Disposal (or residual value for resale or salvage)
- Finance charges
- Other intangible benefits or costs, such as increased employee productivity

The key to sustainability is to establish goals and targets early in the process, understand the systems that are in play, and anticipate how those systems are likely to change and evolve.

Integrative Process

integrated project delivery an approach that involves people, systems, and business structures (contractual and legal agreements) and practices. The process harnesses the talents and insights of all participants to improve results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction. (Adapted from American Institute of Architects)

An integrative process comprises three phases:

Discovery—is also the most important and can be seen as an expansion of what is conventionally called predesign. Actions taken during discovery are essential to achieving a project's environmental goals cost-effectively.

Design and construction — begins with what is conventionally called schematic design. Unlike its conventional counterpart, however, in the integrative process, design will incorporate all of the collective understandings of system interactions that were found during discovery.

Occupancy, operations, and performance feedback — Here, the integrative process measures performance and sets up feedback mechanisms. Feedback is critical to determining success in achieving performance targets, informing building operations, and taking corrective action when targets are missed.

Section 3

Sustainable Thinking at Work: New Processes for Green Building

Green building (also known as green construction or sustainable building) is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and deconstruction.

This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort.

- Minimize Resource Consumption
- Reduce Life Cycle Costs
- Maximize health and productivity for the building's occupants
- Improve environmental performance

Getting Started

Principles for successful practice:

Process.

A good process is essential to good outcomes.

Get in early.

The commitment to green building should be made as early as possible so that it can assist in framing effective goals.

Follow Through

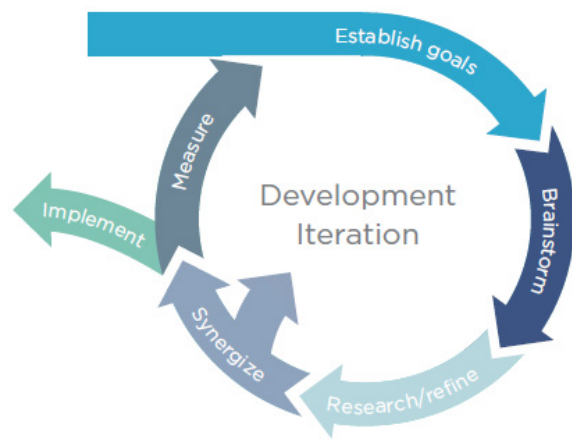
The commitment to green needs to continue throughout the life of the project.

Look Beyond First Cost to Long Term Savings

This new process doesn't typically cost more, but it does shift costs earlier.

Include and Collaborate

Green building demands that a multidisciplinary team of professionals join with members of the community involved or affected by the project to look at the big picture, not just the individual elements that concern each of them most immediately.



An iterative process has a cyclical nature:

- Establish clear goals and overarching commitments
- Brainstorm and develop creative solutions
- Research and refine ideas
- Explore synergies between specific strategies
- Establish metrics for measuring success
- Set new goals based on the work that has been done

Defining critical milestones, assigning champions, and clarifying goals up front will enable projects of all sizes and types to incorporate sustainability more effectively.

Many different types of meetings may be useful in an iterative process. At least one initial strategy meeting or LEED “charrette” generally held at the beginning of the project.

Charrettes are intense workshops designed to produce specific deliverables. Generally held at the beginning of the project, charrettes assist in establishing goals.

Goal

To develop possible design and strategies for greening a space

Deliverables

The typical deliverables from the initial strategy meeting are:

- LEED certification goal (certification level)
- LEED scorecard that shows the targeted credits for pursuit (LEED Checklist)

Team meetings can allow the group to work together creatively on new synergies

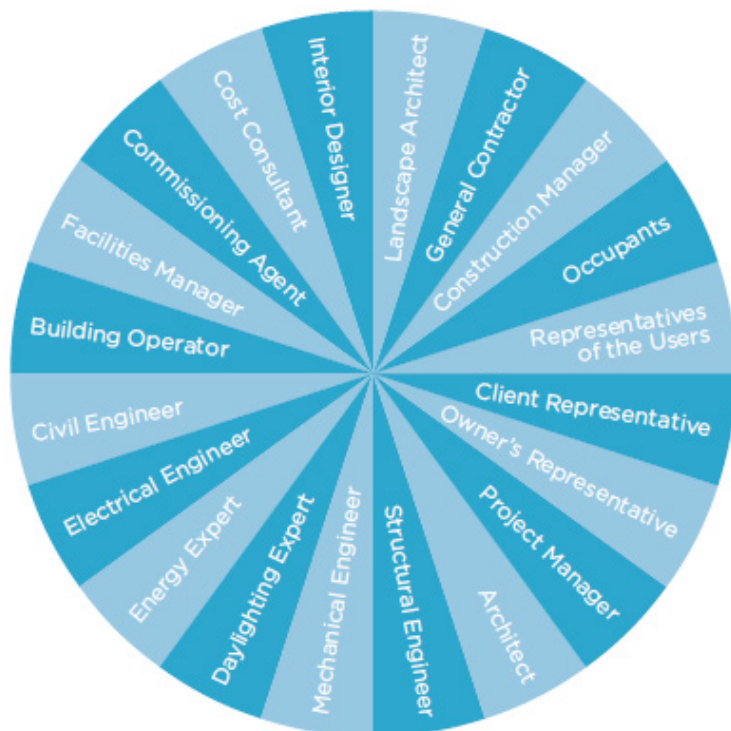
Small task groups provide opportunities to explore particular topics, conduct research, and refine the ideas for presentation at a later team meeting.

Stakeholder meetings are held with neighbors, community members, and others with a vested interest in the project.

Team Selection

The team process favors a design-build or integrative project delivery (IPD) contracting process rather than traditional design-bid-build, in which the contractors are brought in after many elements of the project have been determined.

Design-build and IPD enable team members to participate from the early project stages, including goal setting and initial brainstorming.



- Team members should understand green building and have experience participating in a team.
- Requests for proposals and interviews should include questions about experience in green building and sustainability.
- Specific qualifications to look for might be past participation in integrative design processes, experience on green or LEED-certified projects, and LEED professional credentialing, from LEED Green Associate to LEED Accredited Professional.
- If inexperienced people are on the team, some training and orientation to the process will be necessary.

Members of an Integrative Team

Goal Setting

Every green building project needs to be grounded in strong goals and set a clear pathway to ensure they are achieved.

Clear goals articulate what the project will be designed to accomplish, by:

- Making sure that the vision is clear
- Providing a frame of reference for the whole project
- Defining the sustainability targets and keeping the project on track to meet them

Goals

- S = Specific
- M = Measurable
- A = Attainable
- R = Realistic
- T = Timely

Assessments and Measurements

Metrics

- ➔ Qualitative
- ➔ Quantitative

Observation of the System

Meaningful data gathering and interpretation often require the expertise of technical specialists, such as hydrologists, ecologists, engineers, economists, and anthropologists. There are many tools that can support this effort, such as systematic data collection and analysis and mapping. For existing buildings, information may be obtained through occupant surveys, building walkthroughs, and audits.

To observe and understand the site, team members must ask many questions:

- What are the general climatic patterns of the site? What are the microclimates, and how and why do they occur? How does water fall on and run off the site? How does the sun affect these conditions?
- What are the soils like on the site? Are they rich loam or hard clay? Has the site ever been used for agriculture? Can it be used to grow food now?
- What plants and animals exist on the site? How did they get there? Are they healthy or stressed?
- How does energy get to the site? Is the site remote or connected to a utility grid?
- Are there roads? What type? Where do they go? Do they have sidewalks? How do the current occupants use this infrastructure?
- What kind of buildings are on the site? How tall are they? How do they connect to the street? Are they new or old? Occupied or vacant? What are they used for?

Once all the relevant information about the project has been collected and assessed, it is time to return to the project goals.

Given what the team has learned about the project systems, its needs and resources, do the goals of the project make sense? Are they achievable? Are there other ways to meet those goals by finding other leverage points in the systems?

Exploration and Selection of Technologies and Strategies

Evaluating Strategies

For existing building projects, the evaluation process should take the following steps:

- Set goals
- Benchmark performance
- Identify improvement opportunities
- Prioritize and align improvement opportunities with the project goals
- Implement the program
- Measure performance and undergo third-party verification
- Set revised or new goals

Implementation

From Planning to Practice

Management plans for design-build construction projects are critically important; they must be developed, implemented, and documented.

- A **construction activity pollution prevention plan** addresses measures to prevent erosion, sedimentation, and discharges of potential pollutants to water bodies and wetlands.
- An **indoor environmental quality management plan** spells out strategies to protect the quality of indoor air for workers and occupants; it includes isolating work areas to prevent contamination of occupied spaces, timing construction activities to minimize exposure to off-gassing, protecting the HVAC system from dust, selecting materials with minimal levels of toxicity, and thoroughly ventilating the building before occupancy.
- A **waste management plan** addresses the sorting, collection, and disposal of waste generated during construction or renovation. It must address management of landfill waste as well as recyclable materials.

THE FOLLOWING STRATEGIES CAN HELP PROJECTS MEET SUSTAINABILITY GOALS DURING CONSTRUCTION:

- Reducing the amount of fossil fuels used in construction equipment by minimizing grading and earth moving, as well as using biodiesel or other alternative fuels.
- Preventing air and water pollution by addressing dust and implementing a construction activity pollution prevention plan.
- Ensuring indoor air quality by following an indoor environmental quality management plan for protecting ductwork and pervious materials, preventing dust, and protecting any occupied spaces from pollutants.
- Minimizing landfill waste by reducing construction debris and following a waste management plan that addresses waste separation and hauling, also saving costs.

On-Going Performance

The construction and operations of green building and neighborhood projects are never really complete.

On-going measurement and verification are essential to identifying opportunities for improvement.

- Collect Data. Energy and water audits. Solid waste audits
- Provide Training
- Perform Scheduled Maintenance. Retrocommissioning
- Occupant surveys, including thermal comfort and transportation analysis
- Green purchasing and green housekeeping program assessments

Section 5

About USGBC and LEED

Success depends on these essentials:

- Start early
- Find the right team and process
- Understand the systems across space and time
- Develop clear and measurable goals
- Follow an iterative process to ensure achievement of goals
- Commit to continuous improvement

USGBC's Vision

Buildings and communities will regenerate and sustain the health and vitality of all life within a generation.

About USGBC

Advocacy

Community

Education

Greenbuild International Conference and Expo

LEED Green Building Program

About LEED

LEED FOR Building Design and Construction	LEED BD+C: New Construction LEED BD+C: Core and Shell LEED BD+C: Schools LEED BD+C: Retail LEED BD+C: Healthcare LEED BD+C: Data Centers LEED BD+C: Hospitality LEED BD+C: Warehouses and Distribution Centers LEED BD+C: Homes LEED BD+C: Multifamily Midrise
LEED FOR Interior Design and Construction	LEED ID+C: Commercial Interiors LEED ID+C: Retail LEED ID+C: Hospitality
LEED FOR Building Operations and Maintenance	LEED O+M: Existing Buildings LEED O+M: Data Centers LEED O+M: Warehouses and Distribution Centers LEED O+M: Hospitality LEED O+M: Schools LEED O+M: Retail
LEED FOR Neighborhood Development	LEED ND: Plan LEED ND: Built Project
LEED FOR Homes Design and Construction	Homes and Multifamily Lowrise: Designed for single family homes and multifamily buildings between one and three stories. Multifamily Midrise: Designed for midrise multifamily buildings between four and eight stories.

Rating System Structure

Prerequisites - Required

Credits - Optional

LEED BD+C: New Construction and Major Renovation

0	0	0	Water Efficiency	11
Y			Prereq Outdoor Water Use Reduction	Required
Y			Prereq Indoor Water Use Reduction	Required
Y			Prereq Building-Level Water Metering	Required
			Credit Outdoor Water Use Reduction	2
			Credit Indoor Water Use Reduction	6
			Credit Cooling Tower Water Use	2
			Credit Water Metering	1

Achieving LEED certification requires:

- Meet the Minimum Program Requirements (MPRs)
- Satisfy all prerequisites
- Earn a minimum number of credits for the desired level of certification

Location and Transportation (LT)

The Location and Transportation (LT) category rewards thoughtful decisions about building location, with credits that encourage compact development, alternative transportation, and connection with amenities, such as restaurants and parks. The LT category is an outgrowth of the Sustainable Sites category, which formerly covered location-related topics. Whereas the SS category now specifically addresses on-site ecosystem services, the LT category considers the existing features of the surrounding community and how this infrastructure affects occupants' behavior and environmental performance.

Sustainable Sites (SS)

The Sustainable Sites (SS) category rewards decisions about the environment surrounding the building, with credits that emphasize the vital relationships among buildings, ecosystems, and ecosystem services. It focuses on restoring project site elements, integrating the site with local and regional ecosystems, and preserving the biodiversity that natural systems rely on.

Water Efficiency (WE)

The Water Efficiency (WE) section addresses water holistically, looking at indoor use, outdoor use, specialized uses, and metering. The section is based on an "efficiency first" approach to water conservation. As a result, each prerequisite looks at water efficiency and reductions in potable water use alone. Then, the WE credits additionally recognize the use of nonpotable and alternative sources of water.

Energy and Atmosphere (EA)

The Energy and Atmosphere (EA) category approaches energy from a holistic perspective, addressing energy use reduction, energy-efficient design strategies, and renewable energy sources.

Materials and Resources (MR)

The Materials and Resources (MR) credit category focuses on minimizing the embodied energy and other impacts associated with the extraction, processing, transport, maintenance, and disposal of building materials. The requirements are designed to support a life-cycle approach that improves performance and promotes resource efficiency. Each requirement identifies a specific action that fits into the larger context of a life-cycle approach to embodied impact reduction.

Indoor Environmental Quality (EQ)

The Indoor Environmental Quality (EQ) category rewards decisions made by project teams about indoor air quality and thermal, visual, and acoustic comfort. Green buildings with good indoor environmental quality protect the health and comfort of building occupants. High-quality indoor environments also enhance productivity, decrease absenteeism, improve the building's value, and reduce liability for building designers and owners. This category addresses the myriad design strategies and environmental factors—air quality, lighting quality, acoustic design, control over one's surroundings—that influence the way people learn, work, and live.

Innovation (IN)

Sustainable design strategies and measures are constantly evolving and improving. New technologies are continually introduced to the marketplace, and up- to-date scientific research influences building design strategies. The purpose of this LEED category is to recognize projects for innovative building features and sustainable building practices and strategies.

Regional Priority (RP)

Because some environmental issues are particular to a locale, volunteers from USGBC chapters and the LEED International Roundtable have identified distinct environmental priorities within their areas and the credits that address those issues. These Regional Priority credits encourage project teams to focus on their local environmental priorities.

LEED for Neighborhood Development (LEED ND)

Smart Location and Linkage (SLL)

Smart Location and Linkage focuses on selection of sites that minimize the adverse environmental effects of new development and avoid contributing to sprawl and its consequences. Typical sprawl development—low-density, segregated housing and commercial uses located in automobile-dependent outlying areas—can harm the natural environment: it can consume forestland, destroy or fragment wildlife habitat, degrade water quality by draining wetlands and increasing rainwater runoff, pollute the air and emit greenhouse gases through increased automobile travel, and often displace agriculture from prime farmland to locations where food production requires more energy and chemical inputs. In addition to these direct environmental effects, leapfrog development (a land-use pattern in which new development does not connect coherently to existing development, often leaving haphazard tracts of undeveloped land) can also harm the environment indirectly by promoting additional development in previously undeveloped areas.

Neighborhood Pattern and Design (NPD)

Neighborhood Pattern and Design emphasizes the creation of compact, walkable, mixed-use neighborhoods with good connections to nearby communities. These vibrant neighborhoods provide many important benefits to residents, employees, and visitors and to the environment.

Green Infrastructure and Buildings (GIB)

Green Infrastructure and Buildings focuses on measures that can reduce the environmental consequences of the construction and operation of buildings and neighborhood infrastructure. In the U.S., buildings account for large shares of energy consumption and water use. Globally, construction consumes a major part of the stone, gravel, sand, and virgin wood used in the world. Sustainable building technologies reduce waste and use energy, water, and materials more efficiently than conventional building practices.

Additionally, LEED emphasizes the critical role of the integrative process and ongoing performance monitoring across all phases and project types.

LEED rating systems have 100 base points plus six Innovation points and four Regional Priority points, for a total of 110 points.

The level of certification is determined according to the following scale:

Certified, 40–49 points

Silver, 50–59 points

Gold, 60–79 points

Platinum, 80+ points

Rating System Development and Evolution

Ongoing improvements to LEED are based on principles of transparency, openness, and inclusiveness involving volunteer committees and working groups, as well as USGBC staff, and are approved by a membership-wide vote.

Project Tools

Credit Library

The building blocks of LEED are the credits, and they're all housed within our LEED credit library. Here you'll find credit language, supplemental resources, interpretations and discussions from LEEDuser.

Addenda Database

What are Addenda?

Answer

Addenda incorporate changes, improvements to LEED rating systems and reference guides to help clarify, correct, interpret or provide alternative language. Addenda are subject to USGBC committee review and are published frequently.

What is the difference between a LEED Interpretation and a Project Credit Interpretation Ruling (CIR)?

Answer

LEED Interpretations are similar to Project CIRs but they are precedent setting as the results can be applied to all future LEED projects.

Regional Priority Credit Database

Find regionally focused LEED credits that apply to your project based on zip code.

<http://www.usgbc.org/rpc>

Regional priority credit lookup

FILTER

Select a Version, System, Country and Zip code to view the available regional priority credits.

Pilot Credit Database - <http://www.usgbc.org/help-topic/pilot-credits>

The Pilot Credit Library facilitates the introduction of new credits to the LEED rating systems. The process allows projects to test more innovative credits that haven't been through the complete drafting and balloting process.

Open Pilot Credits

ACP Pilot Credits

Closed Pilot Credits

What is the difference between a pilot credit and a pilot alternative compliance path (ACP)?

Answer

A **Pilot Alternative Compliance Path (ACP)** is a pilot that can be used in place of one of the existing LEED credits. For example, the No Cooling Tower Pilot ACP can be used in place of the LEED v4 Cooling Tower Water Use credit. The number of points available is specified in each Pilot ACP, but typically you can earn some or all of the points available in the corresponding credit by substituting the Pilot ACP and meeting the requirements.

Pilot ACPs are usually testing credits that achieve a similar intent to an existing credit, but through a new strategy.

Standard Pilot Credits, on the other hand, are each worth 1 point, and that point is earned within the innovation category. These are typically ideas and strategies that are entirely new to LEED.

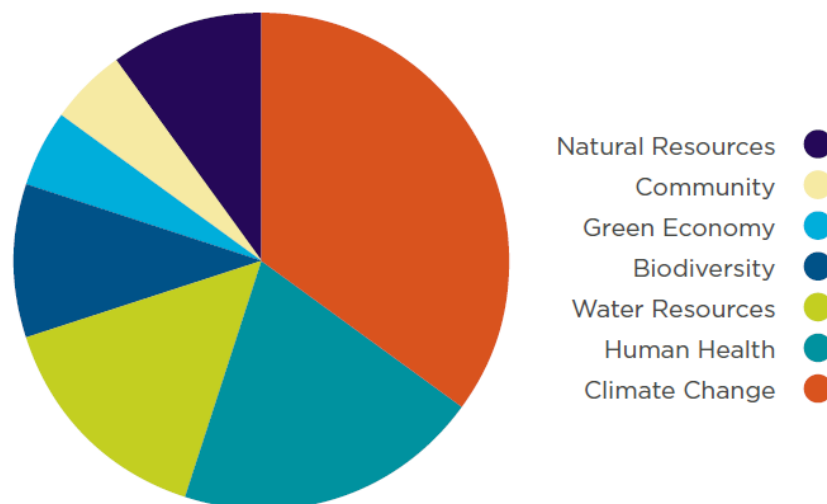
How do I earn a pilot credit?

Answer

- Register for specific pilot credit(s) in LEED Online
- When documenting the credit in the IDc1: Innovation in Design LEED Form, choose the Pilot Credit radio button. List the pilot credit name in the text box, for example: SSpc82: Local Food Production. Then, check the box confirming: I have submitted the LEED Pilot Credit Library Project Registration Form to USGBC.
- Upload the following.
 1. Your pilot registration confirmation email.
 2. Your pilot credit survey completion email.
 3. The credit specific documentation outlined under the submittals section of the pilot credit document.

Credit Weightings

The weightings ensure that LEED assigns higher point values to the credits with the strongest relationship to the impact categories of greatest concern.



Green Building Codes, Standards, and Rating Systems

A landmark national effort to codify green building practices into adoptable, adaptable and enforceable green building codes has produced regulatory documents that are now available as an overlay to more traditional building codes.

The International Green Construction Code (IGCC), including ASHRAE Standard 189.1 as an alternate path to compliance, is a widely supported and first-of-its-kind regulatory framework that recognizes an entire set of risks not otherwise addressed in the codes.

Standard 189.1 provides total building sustainability guidance for designing, building, and operating high-performance green buildings. From site location to energy use to recycling, this standard sets the foundation for green buildings by addressing site sustainability, water use efficiency, energy efficiency, indoor environmental quality (IEQ), and the building's impact on the atmosphere, materials and resources.

Standard 189.1 is a compliance option of the International Green Construction Code™ (IgCC).

Project Certification

Select the Rating System

Check out the Minimum Program Requirements to know if your project is eligible for LEED certification

LEED certification involves four main steps:

1. Register your project by completing key forms and submitting payment.
2. Apply for LEED certification by submitting your completed certification application through LEED Online and paying a certification review fee.
3. Review. Your LEED application is reviewed by GBCI.
4. Certify. Receive the certification decision. If you've earned LEED certification: congratulations!

Volume certification is designed for LEED users looking to certify an entire portfolio of building projects. It streamlines the process by focusing on the similarities in design, operations and delivery—no matter where they are in the world.

LEED campus and multiple building certification is available for several buildings on a single site and offers a number of options to help project owners determine the best way to reach their goals. In some cases, it's one single certification that applies to many buildings. In others, it might be reviewing credits once to be utilized by a number of certifications.

Project Registration

The LEED process begins with registration.

The project team submits a registration form and a fee to GBCI in LEED Online.

It is helpful if the project administrator—the team member who registers the project—has previous green building and LEED project experience; ideally, he or she is a LEED Accredited Professional.

Once registered, the team receives information, tools, and communications that will help guide the certification process. All project activity, including registration and credit compliance documentation, is completed in LEED Online, a data collection portal through which the team uploads information about the project.

This site provides credit templates to be completed and signed by a specified member of the team.

Application Preparation

Each LEED credit and prerequisite has documentation requirements that must be completed as part of the application process. The project team selects the credits it has chosen to pursue and when the necessary documentation, including required information and calculations, has been assembled, the project team uploads the materials to LEED Online.

Submission

When the team is ready for its application to be reviewed, the project administrator submits the appropriate fee and documentation. For LEED BD+C and ID+C projects, the team can wait to submit documentation until the building project is complete, or the team can seek review of its design-related prerequisites and credits before completion, and then apply for construction-related credits after the project is finished. Fees are based on membership, size of the project, and rating system used.

Application Review

Whether the design and construction credits are submitted together or separately, each credit undergoes one preliminary review. The certification reviewer may request additional information or clarification. The team then submits final documentation. After the final review, a team may appeal any adverse decisions on individual credits for an additional fee.

Certification

Certification is the final step in the LEED review process. Once the final application review is complete, the project team can either accept or appeal the final decision. LEED-certified projects receive formal certificates of recognition, a plaque, and tips for marketing the achievement. Projects may be included in USGBC's online LEED Project Directory of registered and certified projects.

Project Credit Interpretation Rulings (CIRs) and LEED Interpretations

The LEED rating systems are intended to be flexible, voluntary tools to improve the performance of buildings and promote market transformation. At times a project team may want clarification, further guidance, or additional ways to comply with the rating system's requirements. Project teams therefore have several options in engaging with USGBC and GBCI during the certification submittal process.

Project credit interpretation rulings (Project CIRs), administered by GBCI, allow teams to obtain technical guidance on how LEED requirements pertain to their projects. Project CIRs do not guarantee credit award; the project applicant must still demonstrate and document achievement during the LEED certification application process. The ruling remains confidential and generally applies only to the one project.

LEED Interpretations, however, are precedent setting; project teams are required to adhere to all LEED Interpretations posted before their registration date. These are posted publicly in the online Addenda database.

LEED Professional Credentials

There are three levels of LEED Accreditation:

1. LEED Green Associate
2. LEED AP with Specialty
3. LEED Fellow

Other LEED Certificates:

LEED for Homes Green Rater
Green Classroom Professional

LEED Professional Certificates™ certify the skills and knowledge of LEED implementation required to provide verification services on LEED projects.

Credential Maintenance Program (CMP)

LEED Green Associate	15 hours biannually, 3 hours LEED Specific
LEED AP with Specialty	30 hours biannually, 6 hours LEED Specific

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