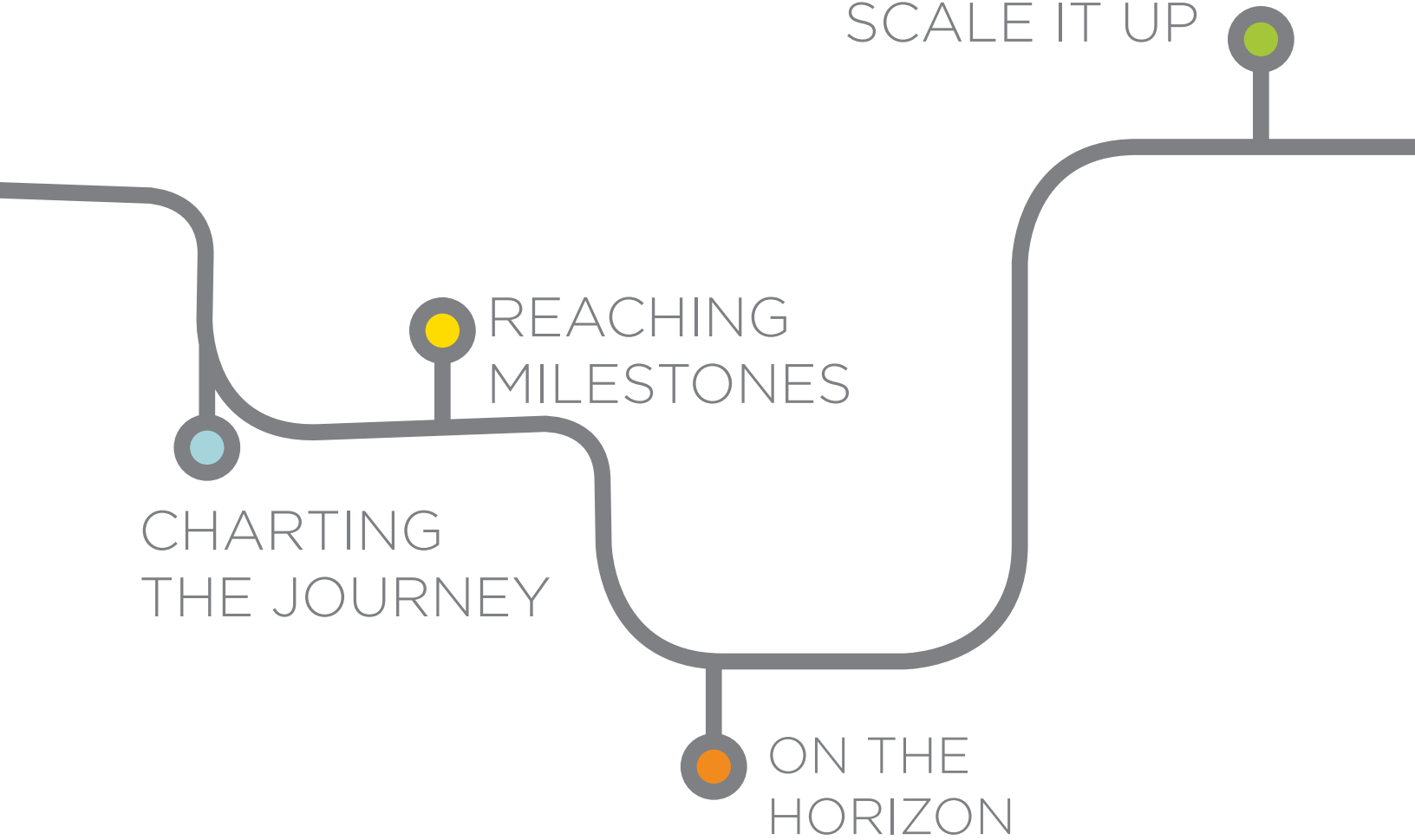


ROADMAP

SCALE IT UP



TO
**GREEN GOVERNMENT
BUILDINGS**



ACKNOWLEDGEMENT

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TABLE OF CONTENTS

CHARTING YOUR JOURNEY

1) EMBARK	2
A) WHY GREEN BUILDING?	2
i. Benefits of Green Buildings	2
ii. What is LEED?	3
iii. Green Building and Sustainability Initiatives	8
B) ROADMAP INTRODUCTION	10
i. Roadmap Overview	10
ii. What is the Content?	11
iii. Join the Conversation	12
C) SET GOALS	14
i. Benchmarking Green Building Performance	14
ii. LEED as a Compass	15
iii. Green Building and Public Policy	17
2) BUILD CAPACITY	21
A) TRAINING AND PROFESSIONAL CREDENTIALS	21
i. Training the Team	21
ii. Staff Green Building Experts and LEED Professionals	24
iii. Occupant Behavior	26
3) LAY THE GROUNDWORK	28
A) PRE-PROJECT BUDGET PLANNING	28
i. Budgeting for LEED Projects	28
ii. Budgeting Methodology	31
iii. Energy Life-Cycle Cost Analysis	34
iv. Utility Incentive and Rebate Programs	35
B) PRE-PROJECT TEAM PLANNING	36
i. Establishing a Project Team	36
ii. Request for Proposal Process	37

REACHING MILESTONES

4) IMPLEMENT LEED	40
A) IMPLEMENT LEED OVERVIEW	40
i. LEED Tools	40
ii. LEED Project Management	46
B) GREEN BUILDING DESIGN AND CONSTRUCTION	50
i. Design Phase	50
ii. Construction Phase	52
iii. LEED for Tenant Improvements and Interiors	54
C) GREEN BUILDING OPERATIONS AND MAINTENANCE	57
i. Project Preparation	58
ii. Project Implementation	63
iii. Recertification	69

ON THE HORIZON

5) GREEN PORTFOLIO MANAGEMENT	71
i. Centralized Program Administration	71
ii. The Building Life Cycle	73
iii. Reporting to Stakeholders	76
iv. Reporting Building Emissions	77

SCALE IT UP

6) BEYOND GREEN GOVERNMENT BUILDINGS	79
i. LEED For Homes and LEED for Neighborhood Development	79
ii. Private Sector Programs and Incentives	81
iii. Green Building Codes	83
7) CELEBRATE - REFUEL - ACCELERATE	87
i. Continuous Program Improvement	87

APPENDIX A	89
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Fine-Tuning High Performance: an Overview of New and Existing Building Commissioning for LEED Project Managers



ROADMAP TO GREEN GOVERNMENT BUILDINGS



“We shape our buildings; thereafter they shape us”

— Winston Churchill

“As the largest consumer of energy in the U.S. economy, the federal government can and should lead by example when it comes to creating innovative ways to reduce greenhouse gas emissions, increase energy efficiency, conserve water, reduce waste, and use environmentally responsible products and technologies.”

— President Barack Obama

“...we have a unique opportunity to provide leadership to develop truly sustainable urban centers based on culturally and economically appropriate local actions...”

—The United Nations Environment Programme (UNEP)
Green Cities Declaration

CHARTING YOUR JOURNEY

1) EMBARK

The government sector is leading by example at the forefront of the green building revolution. Public facilities designed, built and operated using green building principles are important to environmental health and fiscal responsibility at the local, state and federal levels. Visible public projects that highlight the beauty and value of green building also raise awareness, inspire the broader implementation of sustainable building practices and encourage the private sector to build green.

Roadmap to Green Government Buildings is a guide for government professionals implementing green building programs and initiatives. It includes details on setting sustainability goals, developing action plans and implementing strategies. **The primary audiences for the *Roadmap* are government-sector building managers and capital project managers,** as well as those involved in the delivery of capital improvement projects, major building retrofits, tenant improvements, or leasing space for government workers. In addition, staff responsible for managing and operating publicly owned buildings will find information and resources on how to green existing facilities.

A) WHY GREEN BUILDING?

i. Benefits of Green Buildings

Green facilities save tax-payer dollars, reduce resource consumption and greenhouse gases, and create demand for local green products and services. Governments that reduce the environmental impact of construction, operations and maintenance of publicly funded facilities save tax-payer dollars each year because green buildings operate more efficiently, using less energy, water and fossil fuels. Green building features

such as daylighting, high-quality indoor air and the use of less-toxic materials help to improve occupant health, increase worker productivity and reduce absenteeism. Governments that green facilities are also supporting the local market for green building products and services, while setting an example on how to build and operate sustainable buildings across their jurisdictions.

In comparison to the average commercial building¹:

- Green buildings use 26% less energy
- Green buildings have 13% lower maintenance costs
- Green buildings have 27% higher occupant satisfaction
- Green buildings have 33% less greenhouse gas emissions

Why Build Green in the Public Sector?

- **Lead by Example.** Promote local market transformation by using best practices in construction, operation and maintenance of government owned or leased buildings.
- **Reduce Operations and Maintenance Costs Over the Life of a Building.** Energy and water efficient design paired with green operations practices reduce operations and maintenance costs over the entire life of the building.
- **Extend Infrastructure Capacity.** Green buildings lessen the demands on infrastructure through waste and stormwater management efforts.
- **Reduce Staff-related Overhead and Relocation Costs.** Improved indoor air quality, natural light and flexible design can contribute positively to staff satisfaction and productivity, reduce absenteeism, improve employee retention and reduce the costs associated with employee relocation.

ii. What is LEED?

In 2000, the U.S. Green Building Council (USGBC) established the LEED® green building rating system as a way to define and measure green buildings. LEED is an internationally recognized green building certification

system, providing third-party verification that measures how well a building or community performs across the metrics that matter most:

- Impact on the land
- Energy savings
- Water efficiency
- CO₂ emissions reduction
- Improved indoor environmental quality
- Stewardship of resources

LEED provides building owners and operators a concise framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions. It was developed through a broad-based consensus process that included non-profit organizations, government agencies, architects, engineers, developers, builders, product manufacturers and other industry leaders. LEED has grown from one rating system for new construction to a suite of rating systems that address the complete lifecycle of buildings.

GREEN BUILDING DESIGN & CONSTRUCTION	LEED FOR NEW CONSTRUCTION
	LEED FOR CORE & SHELL
	LEED FOR SCHOOLS
	LEED FOR HEALTHCARE
	LEED FOR RETAIL: NEW CONSTRUCTION
GREEN INTERIOR DESIGN & CONSTRUCTION	LEED FOR COMMERCIAL INTERIORS
	LEED FOR RETAIL: COMMERCIAL INTERIORS
GREEN BUILDING OPERATIONS & MAINTENANCE	LEED FOR EXISTING BUILDINGS: OPERATIONS AND MAINTENANCE
GREEN HOMES DESIGN & CONSTRUCTION	LEED FOR HOMES
GREEN NEIGHBORHOOD DEVELOPMENT	LEED FOR NEIGHBORHOOD DEVELOPMENT

Based on established sustainable building practices and emerging concepts, the performance-based LEED ratings systems are comprehensive in scope. Points are awarded on a 100-point scale, and credits are weighted to reflect their potential environmental impacts. A project must satisfy specific prerequisites and earn a minimum number of points to be certified. Different levels of certification are granted based on the total number of earned credits. The four progressive levels of certification are: Certified, Silver, Gold and Platinum. Since building and planning technologies are constantly evolving, LEED is updated and revised through a consensus-based process to stay current with market innovations.

Green Building Certification Institute (GBCI)

Established in 2008, GBCI is the institution that grants both LEED project certification and professional credentials recognizing excellence in green building performance and practice. GBCI administers project certification for commercial and institutional buildings and tenant spaces under USGBC's LEED rating systems and also manages the professional credentialing program including the LEED Green Associate and LEED AP credentials.

Once the LEED credits are implemented and the energy-efficiency and performance requirements met, the final step for LEED certification is submitting the project certification documentation using the Web-based LEED Online system. The Green Building Certification Institute (GBCI) reviews the application and provides feedback. If all requirements are met, GBCI awards a LEED certification to the building.

Achieving LEED certification demonstrates the success of a government's green building program. The third-party certification process promotes accountability and greater attention to sustainability issues among contractors, subcontractors, owners and building occupants. LEED-certified buildings engage and educate a broad spectrum of stakeholders, drive behavioral changes, generate market demand for sustainable products and services and create local green jobs.

LEED CREDIT CATEGORIES



Sustainable Sites (SS) prerequisites and credits promote responsible, innovative, and practical site maintenance strategies that are sensitive to plants, wildlife, water, and air quality. These credits also mitigate some of the negative effects buildings have on the local and regional environment. Environmentally sensitive site maintenance practices reduce site operations and maintenance costs while creating and maintaining outdoor spaces that are attractive and healthy for both building occupants and local flora and fauna.



Water Efficiency (WE) prerequisites and credits encourage the use of strategies and technologies that reduce the amount of potable water consumed in facilities. Many water conservation strategies are no-cost; others provide rapid payback. Some, such as biological wastewater treatment systems and graywater plumbing systems, require more substantial investments and are cost-effective only under certain building and site conditions.



Energy and Atmosphere (EA) prerequisites and credits address the reduction of energy consumption through a performance-based approach that allows owners and managers to tailor energy reduction measures to their buildings. Improving the energy performance of facilities lowers operating costs, reduces pollution, and enhances occupant comfort. Many energy efficiency measures have a rapid payback because of the rising cost of energy.



Materials and Resources (MR) prerequisites and credits set the foundation for developing, implementing, and documenting policies and practices that support effective waste management and responsible procurement. The MR credit category focuses on two main issues: the environmental impact of materials brought into the facility and the minimization of landfill and incinerator disposal for materials taken out of the facility.



Indoor Environmental Quality (IEQ) prerequisites and credits address concerns relating to indoor air quality; occupant's health, safety, and comfort; air change effectiveness; and air contaminant management. The IEQ credit category encourages improvements to ventilation, indoor CO₂ levels, daylighting and lighting quality, and thermal comfort - all of which have the potential to impact occupant health and performance.



Innovation & Design/Innovation & Operations (ID/IO) credits recognize projects for innovative and exemplary technologies, methods, project planning, and project execution.



Regional Priority (RP) credits address environmental concerns that are local priorities for each region of the country, as identified by USGBC's regional councils, chapters, and affiliates. A project that earns a regional priority credit will earn one bonus point in addition to any points already awarded for that credit. Up to four extra points can be earned in this way.

iii. Green Building and Sustainability Initiatives

A green building program compliments broader sustainability initiatives.

The numerous benefits of green facilities enable a green building program to contribute to other programs aimed at resource efficiency, environmental health and sustainable development. At the same time, the success of a green building program depends on drawing from and coordinating the existing expertise of other departments and programs. The LEED rating systems have been designed with this synergy in mind. To the extent possible, performance goals and metrics should be aligned between the green building standard being used and complementary sustainability programs. (See [Set Goals](#) and [Green Portfolio Management](#) for more details.)

Related programs include:

- Community health
- Economic development
- Energy and water management
- Environmentally preferable purchasing
- Infrastructure development
- Public open space planning
- Smart growth
- Urban forests and tree protection
- Neighborhood planning
- Social justice
- Climate change and carbon neutrality
- Transportation planning
- Waste management

Green Building and Climate Change

Green building strategies can significantly decrease the climate footprint of buildings through reduced energy and water use, reduced embodied-energy of construction materials and transportation-related savings. A green building initiative can be a significant component of a state's or locality's plan to reduce greenhouse gas emissions. Government entities or agencies may be aligned with voluntary agreements, such as the U.S. Conference of Mayor's Climate Protection Initiative, which includes a commitment to green building. For more information, go to: usmayors.org/climateprotection/revised/.

Important Fact:

Buildings account for 39% of the CO₂ emissions per year, more than either the transportation (33%) or the industrial fields (29%).

B) ROADMAP INTRODUCTION

i. Roadmap Overview

With 30% of all LEED projects owned or occupied by a government entity, the *Roadmap to Green Government Buildings* was produced to help these building projects find success and to aid those who are just beginning their efforts to advance government green building. It was designed to support green building programs and initiatives based on LEED and suggests strategies for implementing such practices within the framework of a typical government entity.

The *Roadmap* provides peer-developed resources created by various experts across the country who are currently implementing green building programs in their jurisdictions. These experts have generously shared their time and experience to ensure the lessons learned and best practices are made available to others. Many of the resources highlighted can be easily adapted to fit the needs and goals of a variety of jurisdictions and government entities.

ii. What is the Content?

The *Roadmap* outlines important steps, highlights key issues and notes available resources to assist government officials and staff in designing,

building, leasing and operating publicly funded green buildings. It is a portal to more detailed information and relevant resources that are catalogued on the *Roadmap's* web site. Many of the resources were created by governments for internal use and are shared here to help others put these best practices into action.

Each topic discussed in the *Roadmap* is divided into the following sections:

- **Getting Started.** Provides key concepts and first steps, highlighting the most common starting points when developing a public green building program.
- **Next Steps.** Provides additional information for those considering more advanced applications of green building or who may be looking for solutions to challenges. It highlights areas to advance a government's initiatives and, in some cases, includes **Steps to Expansion**—a section outlining ideas that green building initiatives can include over time.
- **Information Boxes and Case Studies.** Provides important information and showcases specific examples of how government entities from across the U.S. are achieving the concepts highlighted in the text.
- **Resources.** Provides links to important resources, many of which have been created by federal, state and local governments.

iii. Join the Conversation

1. Overview

The USGBC community is transforming the way buildings are designed, constructed and operated

Roadmap to Green Government Buildings

Resources Web Site [usgbc.org/govroadmapresources](https://www.usgbc.org/govroadmapresources)

USGBC has compiled green building-related resources created by state, regional and local governments. The web site is designed to be used in conjunction with the *Roadmap*. The types of resources available include:

- Sample LEED checklist, adapted to assign responsible parties and project phases to each credit pursued
- Energy Lifecycle Cost Analysis worksheet
- Model flowchart for green building policy compliance
- Guide to maximizing utility grants and rebates
- Project management checklists

to conserve resources and create healthier places to live, work, learn and play. Headquartered in Washington, D.C., USGBC leads a diverse constituency of builders and environmentalists, corporations and non-profit organizations, elected officials, concerned citizens, teachers and students. The USGBC community comprises 79 local chapters, with 16,000 member companies and organizations.

USGBC is first and foremost a membership organization. Its core function is to create forums for dialogue and innovation to advance leadership in the way that buildings and communities are designed, built and operated. National member companies, organizations and institutions form the diverse community that help shape the future of LEED development, green building education and other USGBC programs. USGBC chapters and affiliates are the ‘front doors’ to the green building movement, encouraging individuals from across the country to get involved and address issues at the local level. Additional government resources, education and opportunities to participate in peer-to-peer forums are continually being developed to address the most urgent challenges in government green building.

2. Getting Started

- Create a free, site-user account at: usgbc.org/youraccount. As a registered site user, one can subscribe to newsletters and mailing lists, connect to a chapter and membership account, purchase publications and register for education courses.
- Review the USGBC government resources page at: usgbc.org/government. One will find helpful tools, fact sheets, events focused on LEED, and green building policy and programs. Use the site to share experiences and discuss lessons learned among the government community.
- Determine if an agency or department is a USGBC national member by searching the membership directory at: usgbc.org/directories. If a member, identify the primary contact to connect to the account. If not, review the member benefits at: usgbc.org/membership. For federal, state and local governments,

annual USGBC membership dues may be recouped in discounts, especially if an institution expects to have several employees pursue the LEED Accredited Professional credential or plans to register and/or certify more than one LEED project a year.

- Locate the local USGBC chapter at: usgbc.org/chapters. USGBC has more than 79 local chapters, affiliates and organizing groups across the country. All USGBC chapters are independent 501(c)3 non-profit organizations. Most chapters hold monthly meetings and events for members in addition to conducting LEED workshops and organizing local outreach and advocacy programs.

3. Next steps

Join the conversation by becoming active in USGBC. Start by seeking solutions to challenges through the government peer-to-peer community. Expand green building knowledge by attending chapter or membership events. Share experiences and ideas in forums and help USGBC work to identify and disseminate the best practices in government green building.

Sharing Experiences to Evolve Best Practices

Roadmap to Green Government Buildings is the result of government officials and staff sharing experiences. To contribute to the development of these best practices, connect to the ongoing dialogue at: usgbc.org/government.

C) SET GOALS

LEED is an effective tool for setting goals and tracking progress. To measure a green building's performance, one must benchmark current building performance data and implement processes and procedures to monitor and verify progress.

i. Benchmarking Green Building Performance

1. Overview

Green building initiatives should include clear performance benchmarks to identify levels of green building achievement for both capital improvement projects and facilities management efforts. Using a benchmarking tool will enable the organization to determine whether goals are being met and to measure the exact benefits being delivered. This provides elected officials with the means to compare the initiative's success to other like programs within their organization or the larger public sector.

2. Getting Started

The first step in green building benchmarking is to choose a referenced standard. LEED is the most commonly used green building program within the public sector. Convene an internal working group to discuss what is needed and research/review the available options. The working group may include staff members from such departments as capital improvements, procurement, building maintenance and operations, and sustainability or resource conservation. The group should prepare a recommendation on the standard to use.

3. Next Steps

Once the standard has been chosen, it is important to ensure key stakeholders are educated and trained on the benchmarking tool.

4. Resources

For more information on the LEED rating systems, visit [usgbc.org/leed](https://www.usgbc.org/leed).

ii. LEED as a Compass

1. Overview

LEED is recognized as the leading standard to design, construct, operate and maintain green buildings; it can help governments chart a course toward creating a green building portfolio. There are nearly one million buildings in the U.S. that are owned, occupied or managed by governments. Ownership is spread across hundreds of federal and state agencies and departments as well as local government entities. These building portfolios are diverse, including facilities with a variety of purposes, attributes and management structures. LEED provides a framework to develop and implement an organization-wide green building program. The rating systems can be used to set goals, guide discussions, identify strategies and implement solutions. Many LEED credits can be applied to government-wide policies and practices, integrated into design, construction and operation standards and used to set portfolio-wide performance benchmarks—helping to institutionalize sustainability.

Seeking LEED certification for one building will inform future efforts. The experience gained from a pilot project will identify gaps and potential barriers and will pinpoint discrepancies between green best practices and current efforts and highlight when these efforts are in sync. Integrating LEED design, construction and operations standards into a government entity's construction documents and RFP/Qs will also help to streamline future projects. (See [Pre-project Team Planning](#) for more details.)

Portfolio-wide best practices addressed in LEED include:

- Operations and maintenance practices
- Selection of housekeeping, waste management, landscaping, and pest management providers
- Alternative transportation strategies
- Environmentally preferable purchasing of durable and disposable good
- Indoor environmental quality strategies
- Recycling programs
- Staff initiatives to conserve energy and water and reduce waste

2. Getting Started

Government agencies will more than likely seek LEED certification under: LEED for New Construction, LEED for Existing Buildings: Operations & Maintenance or LEED for Commercial Interiors.

LEED for New Construction and Major Renovations (LEED for New Construction)

LEED for New Construction and Major Renovation certification is designed to guide and distinguish high-performance commercial and institutional projects. It certifies the design and construction activities of both new buildings and major renovations to existing buildings (affecting over 50 percent of the building). If the renovation scope does not involve significant design and construction activities, such as envelope modifications or total interior reconstruction, LEED for Existing Buildings: Operation & Maintenance certification will be the more appropriate rating system.

LEED for Existing Buildings: Operations and Maintenance (LEED for Existing Buildings: O&M)

LEED for Existing Buildings: Operations and Maintenance certification provides a benchmark to measure operations, improvements and maintenance. It presents the greatest opportunity for the government sector to cut energy and water consumption, save money and reach the ultimate goal of green government buildings. The LEED for Existing Buildings: O&M rating system can be applied to both existing buildings seeking LEED certification for the first time and to projects previously certified under LEED for New Construction, Schools or Core & Shell. It is the only LEED rating system through which projects are eligible to recertify.

LEED for Commercial Interiors

LEED for Commercial Interiors certification covers tenant spaces in buildings where the tenants do not have control over whole building systems and operations. It is a benchmark for the tenant improvement market that allows tenants and designers to make sustainable choices.

LEED Evolution

The LEED program incorporates new discoveries from the building sciences and lessons learned from evaluating actual building performance over time. The 2009 version of LEED for New Construction, for example, instituted several changes, including the weighting of credits based on environmental and human health concerns and requiring buildings to earn a certain number of credits in the Environmental and Atmosphere (EA) category and to report energy and water usage data. Such changes ensure the LEED rating systems showcase the most innovative technologies, techniques, and materials, thus setting the highest standards for building green.

USGBC and its expert committees work to ensure not only a building's ongoing performance, but ways to make continuous improvements in that performance. In future versions of LEED, USGBC proposes a number of solutions to ensure building performance through improvements to the rating system and additional requirements for performance data after certification. The future versions of LEED will further the linkages between the design and construction phase and operation and maintenance phase.

Learn more LEED at: usgbc.org/leed

LEED is supported by a full complement of education and guidance, from understanding the standards and process to optimizing specific green strategies. See [Build Capacity](#) for more information.

iii. Green Building and Public Policy

1. Overview

Use the LEED rating systems to develop green building public policy initiatives. Public policy is most effective if it clearly outlines what is required. LEED provides the framework to create such concise policies and programs. Many public-sector entities use the rating systems to define green building performance standards—government agencies in 45 states have implemented LEED-based green building policies and initiatives. Policies can:

- Stipulate a level of LEED certification for all government buildings over a certain square footage or cost
- Require LEED be used to guide design, construction and operations
- Mandate that certain LEED credits be pursued

2. Getting Started

The reasons LEED is a useful public policy tool are outlined below. Many LEED rating systems can complement existing state and local green building policies and initiatives.

- LEED is transparent and reduces technical and administrative uncertainties.
- LEED saves time and resources by providing a comprehensive set of tools for application and use.
- LEED provides a consistent tool for quantifying and benchmarking green building program outcomes.
- Third-party certification through GBCI avoids the need to establish local certification bodies.
- LEED is revised regularly to continually improve performance thresholds and to stay current with changes in building technologies and markets.
- Government entities can participate in and influence the development of LEED through membership in USGBC.

LEED Public Policy Initiatives

Public-sector LEED initiatives, including legislation, executive orders, resolutions, ordinances, policies and incentives, are found in 14 federal agencies, 45 state governments, 58 counties, 384 cities and towns, and numerous public school jurisdictions and institutions of higher education across the United States. For an updated list of initiatives and to review USGBC's government resources, go to: [usgbc.org/government](https://www.usgbc.org/government).

As noted earlier, most government buildings will use the LEED for New Construction, LEED for Existing Buildings: O&M or LEED for Commercial Interiors rating systems to guide green building efforts, but governments may look to the other rating systems (see the list in [What is LEED?](#)) to develop policy-based standards to encourage green building in the private sector. (See [Beyond Green Government Buildings](#) for more information.)

3. Next Steps

When referencing LEED in policy, use the following language to avoid the need to revise the policy every time LEED is updated.

“...must apply for certification at no less than a *[insert the desired LEED level here]* level under the U.S. Green Building Council’s most applicable current LEED rating system, or apply for a comparable rating under no less than an equivalent green building rating system, so long as a third party provides such a rating.”

4. Steps to Expansion

For a green building program to be successful, it is important for legislators and government officials to clearly communicate benefits and challenges. Make sure to: Set Goals. Know the many benefits of green facilities and describe these benefits within the context of broader legislative or organizational goals. Select a target performance level.

- **Secure Funding.** Secure adequate initial funding in order to reap the long-term payback and benefits of green buildings.
- **Educate.** Ensure that planning, design and construction personnel are trained on the green building design and construction process. Ensure facilities managers and occupants are trained on the green building’s features and how to operate and use the facility in order to maximize its full potential.

5. Resources

Resources are available to support the adoption of green building policies, programs and codes, including USGBC’s searchable database of LEED public policy initiatives. For more information, go to:

[usgbc.org/govroadmapresources](https://www.usgbc.org/govroadmapresources).

Managing Green Building Standards Compliance

New York State Office of General Services

Understanding updated building standards can be challenging for government staff and officials who are unfamiliar with the process. To ensure compliance, the New York State Office of General Services created a flowchart that outlines architectural and engineering requirements and actions to take if the criteria are not met. This simple tool could be adapted for a variety of green building standards and LEED requirements. For more information, go to: [usgbc.org/govroadmapresources](https://www.usgbc.org/govroadmapresources).

2) BUILD CAPACITY

Governments often begin implementation of a green building program or initiative through a pilot project, relying on outside consultants for project planning and delivery. Governments should approach this initial project with the goal of building internal capacity by educating staff and identifying, early in the process, the green building policies and practices that can be adopted organization wide. In doing so, future projects can save money by using fewer consultants and benefit from the green policies and practices that, as a result of the pilot project, were institutionalized in the organization's building, construction and operations standards.

A) TRAINING AND ACCREDITATION

i. Training the Team

1. Overview

Training staff will cut project costs, ensure efficient project delivery and drive the green jobs market. Green building knowledge is critical to ensuring that staff can communicate effectively with architects, engineers, contractors and consultants. Training is available through a variety of sources, including online courses, community college and university extension classes and programs offered by local organizations. USGBC offers a variety of green building educational resources for many levels, including Webinars, podcasts, videos and publications as well as in-person workshops and online courses delivered by expert LEED faculty and qualified third-party providers. For more information, go to: [usgbc.org/courses](https://www.usgbc.org/courses).

2. Getting Started

Evaluate educational needs and goals by first deciding how many staff need training and at what level and determining any time and cost constraints. Be sure to note specific issues or building types that need to be addressed. Use the Education Development Services' free assessment tool to help identify how the agency can assess its professional development needs. For those seeking to be LEED APs (see details below), ensure the budget can accommodate continuing education requirements.

3. Next Steps

Learn more about Education Development Services and the training schedule at: usgbc.org/education.

Search USGBC's course catalog (usgbc.org/courses), E-Learning and webinar subscriptions (usgbc.org/webinars) and the publications that support the LEED rating systems (usgbc.org/publications).

For those pursuing LEED professional credentials, follow the "4 Steps to Passing Your LEED Exam" at: usgbc.org/DisplayPage.aspx?CMSPageID=2011.

4. Steps to Expansion

An agency's human resources department or the local chamber of commerce may have resources available to support green building education and training. Explore options to share resources with local utilities, state energy offices or the regional EPA office. Local USGBC chapters and chapters of other building-industry professional organizations are excellent partners for developing or co-sponsoring training programs.

Green Building Training and Networking Event

Upstate New York Chapter of USGBC

The Upstate New York Chapter of USGBC offers trainings for contractors and minority and women-owned businesses. Classes and workshops are four hours and taught by a Dormitory Authority of the State of New York employee. After the class, students attend a networking event that introduces small business subcontractors to general contractors. The networking event has proven to be a successful incentive for subcontractors to attend the trainings.

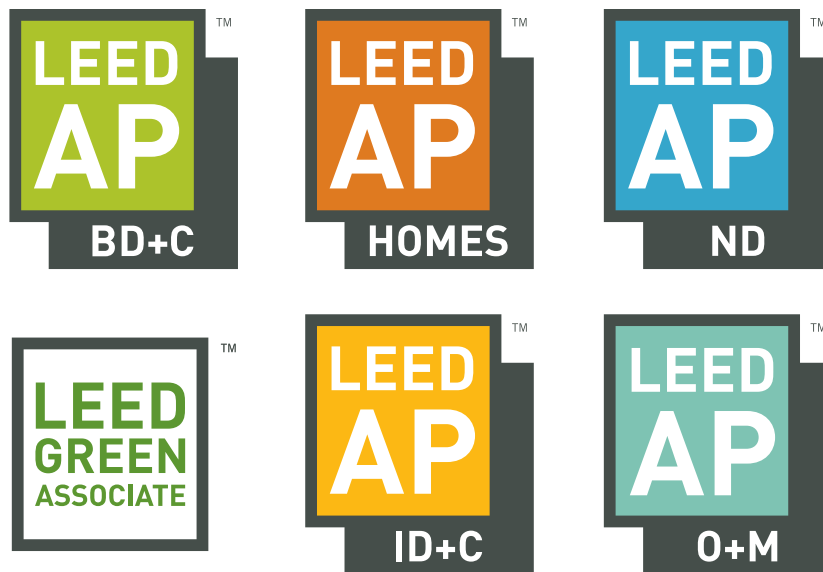
LEED PROFESSIONAL CREDENTIAL PROGRAM

The LEED professional credentials distinguish those building professionals with the knowledge and skills to successfully steward the green building and LEED certification process. LEED Professionals play a central role in developing integrated approaches to design, planning, construction and operations for green buildings and the resulting government-wide improvements. Independently managed by GBCI to ensure balanced and objective development, the LEED Professional Credential Program offers two types of professional credentials:

- **LEED Green Associate.** The LEED Green Associate credential attests to basic knowledge and skill in understanding and supporting green design, construction and operations. The LEED Green Associate is ideal for those seeking a fundamental understanding of green building principles and the LEED rating system.
- **LEED AP with specialty.** The LEED AP with specialty credential signifies an advanced understanding and in-depth knowledge of green building practices and specialization in a particular LEED rating system. The LEED AP specialties are: Building Design & Construction, Interior Design & Construction, Operations & Maintenance, Homes and Neighborhood Development.

The LEED Professional Credential Program is grounded in the pursuit of excellence and continual improvement, ensuring that LEED professionals have the latest knowledge and understanding of green building practices. LEED professionals are trained to approach buildings with LEED’s holistic systems-level thinking and can provide powerful insight into maximizing efficiencies.

GBCI manages the professional credential program and has adopted credential maintenance requirements, which include continuing education, to ensure that LEED professionals stay current in their knowledge of best building practices, design, standards and technology.



ii. Staff Green Building Experts and LEED APs

1. Overview

An on-staff LEED expert can anticipate challenges and develop internal green building best practices. Green building projects can incur added costs due to the extra time and effort it takes for teams to learn new technologies and practices, while experienced project teams are able to achieve LEED certification without significant added cost. Having at least one LEED AP on staff who is involved in all LEED projects allows a green building program to benefit from past project knowledge, ensuring future projects are cost effective and successful.

2. Getting Started

On-staff LEED experts may be the green building program administrator, project manager or facility manager. The expert may not be directly involved in every aspect of a green building project, but they should be aware of the status and results of each project and should serve as a resource to support all green building projects, especially project teams having difficulty with a particular technology, strategy or documentation issue. The on-staff LEED expert should compile lessons learned and identify best practices that can be applied across the government entity's building portfolio.

3. Next Steps

Depending on the size and the extent of its green building initiatives, government entities may employ more than one on-staff LEED expert. In some cases, an agency may decide to form a green building committee or coordinating group to oversee all aspects of developing and managing green government facilities. Such a committee or group should be charged with compiling the lessons learned and sharing these lessons, and the subsequent solutions, throughout the government entity. A comprehensive list of green building resources should also be compiled and disseminated.

Green Building Committee

New York State Office of General Services

The New York State Office of General Services' Design and Construction Group provides design, contracting and construction management for 35 state agencies. Twenty-five LEED Accredited Professionals in the group form a Green Building Committee, which includes the directors of both the design and construction divisions.

4. Steps to Expansion

GBCI's Credential Maintenance Program is designed to expand the knowledge and experience base of LEED professionals and facilitate continuing professional development. All LEED credentials must be maintained on a two-year cycle through the accumulation of continuing education hours; therefore, government entities with a large number of LEED APs on staff should develop a training plan and secure the budget to support these continuing education needs.

5. Resources

Resources are available to support ongoing education and specialization for in-house LEED experts, including the needed CEUs for the Credential Maintenance Program, at: usgbc.org/courses. Government agencies, such as the U.S. Department of Energy, offer free online trainings on green building-related issues. For more information, go to: usgbc.org/govroadmapresources.

To download GBCI's *Credential Maintenance Program Guide*, go to: gbci.org/main-nav/professional-credentials/resources.aspx.

The Energy Efficiency and Sustainable Buildings Group

Massachusetts Division of Capital Asset Management

The Massachusetts Division of Capital Asset Management convenes the Energy Efficiency and Sustainable Buildings Group, known as E-Team. The E-Team serves as a group of internal consultants to help primary project manager with green building projects. The team provides in-house support for meeting LEED-related goals and tracking and reporting progress. The team develops strategies for energy and water conservation and identifies additional funding sources when necessary, such as grants and utility incentives. The E-Team also determines when to bring in external, pre-approved consultants with specific expertise, such as renewable energy and energy modeling. For more information, go to: usgbc.org/govroadmapresources.

iii. Occupant Behavior

1. Overview

A successful green building initiative and a key component of building in-house capacity includes educating the occupants of green buildings on the sustainable features of the facility. Many green building features will not function effectively if occupants are not trained on how the building works and why certain strategies are being used. Building occupants who are actively engaged in green building performance are the best ambassadors to others in the organization and the general public.

2. Getting Started

Education can start with letters to all occupants providing information on the institution's sustainability goals and policies, an explanation of LEED and information about the building's green features. Electronic newsletters and monthly tips are also useful. Agencies or departments should hold meetings to help staff stay informed and to solicit feedback about the building's day-to-day use. Installing signage is another way to educate occupants about the different green features and how they work and can be included in public areas of buildings to educate visitors as well.

Occupant behavior will impact the following green building functional areas:

- Energy use impacted by behavior with lighting, operable windows, shading devices, computer usage, and personal appliances
- Water use impacted by habits and behavior with faucets, dual flush toilets, and dishwashers
- Waste reduction through appropriate recycling and waste reduction practices
- Low-toxic interiors, maintained only with green cleaning products

3. Next Steps

Ongoing education programs can focus on the building's actual energy-efficiency performance. Building managers can hold competitions between tenant groups, floors, and/or different buildings to see who can lower energy consumption the most. Such contests are motivational and can help to meet more rigorous energy-efficiency performance goals.

4. Resources

Resources and examples on how to engage and educate staff, including USGBC's *Green Office Guide*, can be found at: [usgbc.org/govroadmapresources](https://www.usgbc.org/govroadmapresources).

3) LAY THE GROUNDWORK

There are two important early activities that are needed to ensure a successful green building: pre-project budgeting and team planning.

A) PRE-PROJECT BUDGET PLANNING

i. Budgeting for LEED Projects

1. Overview

A LEED project does not have to cost more than a conventional building project. Careful pre-project budgeting and planning are critical and are informed by the integrated design process. Green building projects use this approach to engage key professionals early in the process. By welcoming many voices at the table, including architects, engineers, facilities managers and contractors, project teams work collaboratively to establish sustainability goals and expectations. The process also helps to identify potential problems and inefficiencies and to address them quickly and cost effectively. As a result, green buildings can be built for the same cost—and in some cases, for even lower costs—than conventional buildings.

2. Getting Started

The process to design and construct a green building or to implement sustainable operations and maintenance best practices requires upfront investment of time and money that will be offset by the long-term benefits of an energy-efficient green building. (See [Why Green Building?](#) for more details.) It is important to be aware of the costs and benefits of these investments prior to project development. It should be noted that many green building practices, such as commissioning and energy modeling that were once considered project add-ons, are becoming standard practice for many government projects. Members of the National Association of State Facilities Administrators identified the following additional considerations for a green building project budget:

- **Additional Hard Costs.** On average, green buildings add zero to four percent to a standard construction budget. The additional

costs vary depending on the availability of qualified goods and services, the sustainability goals pursued and technologies utilized, and how well the green building design and construction process has been executed.

- **LEED Consultant and Coordinator Costs.** Green building professionals help manage the LEED process and prepare/submit the LEED documentation to GBCI. Agencies with LEED-experienced staff may complete a portion or all of the required LEED documentation in-house, helping to control costs and avoid the need to hire consultants.
- **Additional Engineering Costs.** Engineering costs, such as building energy modeling or computational fluid dynamics used to determine natural ventilation or displacement systems, may be required.
- **Building Commissioning.** Commissioning is the process that verifies all building systems perform as intended to ensure energy-cost savings are realized. The process will require hiring a commissioning agent and implementing a monitoring system. See Appendix A for more information on commissioning.
- **Third-party Verification.** Using a green building rating system, such as LEED, ensures buildings are designed, constructed, operated and maintained as intended. There are cost implications for using such rating systems. LEED certification fees are based on the rating system and the project's square footage. They are typically a fraction of one percent of the project budget. For current LEED certification costs, go to: gbci.org.

3. Next Steps

Develop a comprehensive communications strategy to ensure decision makers, budget and finance departments and constituents understand the rationale for building green and its long-term value.

The communications strategy should:

- Detail the benefits of green buildings and highlight how the sustainability features will help the agency meet its goals to

decrease energy and water usage and reduce greenhouse gas emissions.

- Explain the actual green building costs. Many may believe that the new sustainability features will increase a project's overall costs, so it is important to correct such misconceptions by clearly demonstrating how many of the features will lower operating costs over time.
- Describe how the return on investment is calculated.

Supporting Green Building Initiatives

General Services Administration Report

In an assessment of 12 sustainably designed buildings in the U.S., the General Services Administration (GSA) reported that these buildings used 26% less energy, lowered maintenance costs by 13%, and had 33% fewer CO₂ emissions when compared to national averages. As America's largest public real estate organization, the GSA also conducted an extensive occupant-satisfaction survey of their green buildings and reported 27% higher occupant satisfaction than the national average.

CASE STUDY

SAN JOSE ADOBE SYSTEMS HEADQUARTERS

After achieving a LEED for Existing Buildings Platinum certification for its San Jose headquarters, Adobe Systems Incorporated reported significant increases in energy efficiency and a reduction of the company's environmental footprint, while achieving a 121% return on investment.

Key metrics:

- 35% reduction in electricity use per occupant
- 41% reduction in natural gas use per occupant
- 22% reduction in domestic water use
- 76% reduction in landscape irrigation water use
- 90% of solid waste recycled or composted
- 16% reduction in CO₂ emissions
- 121% return on investment

ii. Budgeting Methodology

1. Overview

Identify the project's green building features and services early in the process. *Costing Green: A Comprehensive Cost Database and Budgeting Methodology* by Davis Langdon is a widely cited study on the cost of green buildings. It identifies the major factors that contribute to cost differences between green and non-green buildings. The study concludes that LEED projects are most cost-effective when sustainability goals and green features are discussed early in the project development phase and treated as a program issue, rather than an added requirement.

Since some green building features and practices have no additional cost, and many features will have a payback period of less than five years, one of the first project budgeting tasks should include identifying green features that fall under these two categories.

2. Getting Started

Establish the desired level of green building performance and develop a budget that accurately reflects it, accounting for all the innovative features and products to be included and the preferred procurement and project delivery method.

Many government entities have green building policies in place that stipulate the type of projects (often based on cost or square footage) that must be LEED certified and at what level, so be aware of such policies.

Common examples include:

- Buildings over 10,000 square feet
- Projects of \$2 million or greater
- Projects that are 50% or greater publicly funded

3. Next Steps

There are several ways to offset additional funding needs for green government buildings. Some governments have established revolving and/or permanent funds to provide low-interest or no-interest loans. The use of these funds is often earmarked for water- or energy-efficiency upgrades. The savings from the upgrades are used to pay

back the initial investment over time. Another approach includes the use of energy life-cycle cost analysis, incentives and energy performance contracts. See details below.

4. Resources

For examples of government green building policies that use the LEED rating system as a guide, go to: usgbc.org/government.

For a list of publications that provide additional information and methodologies on the cost and benefits of LEED, go to: usgbc.org/govroadmapresources.

CASE STUDY

GREEN PERFORMANCE CONTRACTING STATE OF COLORADO CAPITOL COMPLEX, DENVER, CO

The State of Colorado has developed a LEED for Existing Buildings Energy Performance Contracting (EPC) Program. The Governor's Energy Office (GEO) performs a feasibility study with the support of the Office of the State Architect and the agency's Energy Manager to determine how a facility's performance compares with other buildings of similar type, size and occupancy. If the study concludes that the building will benefit from energy upgrades, the agency is referred to GEO's list of pre-approved Energy Service Companies (ESCO). The ESCO oversees the implementation of energy-savings improvements, provides the funding and guarantees the energy savings over a fixed period of time, generally 15 years. The process is conducted with no added cost to tax payers.

The program was piloted for the Capitol Complex and includes six buildings that will be submitted for LEED for Existing Buildings: O&M certification. The program will expand to university and college campuses in the coming years. LEED for Existing Buildings: O&M certification projects have helped the state cut the utility bills for these building by over 30%.

The Capitol Complex has implemented the following green project measures:

- Installation of multiple utility meters per building to identify over consumption
- Purchase and installation of ENERGY STAR appliances
- Periodic, ongoing commissioning and evaluations
- Installation of manual light switches for rooms (rather than on a breaker)
- Training of building staff to reinforce sustainable behaviors, such as recycling and water reduction

PAID-FROM-SAVINGS FINANCING STRATEGY

Leveraging utility cost savings to pay for comprehensive green building retrofits

The paid-from-savings approach is a financing strategy to green existing buildings. It leverages the savings generated from building system upgrades to pay for a comprehensive greening project within a defined pay-back period. Paid-from-savings projects can use a variety of financing methods, including:

- Self-financing
- Tax-exempt lease-purchase agreements for qualifying entities
- Power purchase agreements for renewable energy projects
- Performance contracts for larger projects
- Equipment finance agreements
- Commercial loans or bond financing for qualifying entities
- Grants and rebates

Cost-saving green measures can vary regarding installation costs and pay-back periods. They include such items as:

- Replacing the boiler
- Replacing the chiller
- Upgrading lighting systems
- Installing a building automation systems
- Replacing water fixtures

Owners can achieve their desired return on investment (ROI) and lessen the overall project pay-back period by “bundling” the longer pay-back measures with the quicker pay-pack measures to create a project with a shorter overall pay-back period and a higher ROI.

Energy Savings Performance Contracting

Many governments use Energy Savings Performance Contracts (ESPC) to finance and deliver building upgrades. Under an ESPC, an agreement is made with an Energy Service Company (ESCO). An ESCO is a business that develops, installs, and, if needed, arranges financing for projects designed to improve the energy efficiency and maintenance costs for facilities over a seven to 20-year period. ESCOs generally act as project developers and assume the technical and performance risk associated with the project – guaranteeing performance and savings. Services are included in the project’s cost and are repaid through the cost savings generated. Rules and restrictions regarding the use of performance contracting for public buildings vary, so check the state’s energy office for details.



USGBC's Paid-From-Savings Guide to Green Existing Buildings provides detailed information on how to aggregate green improvement measures to optimize project economics and achieve LEED for Existing Buildings: Operations & Maintenance certification.

The guide includes information on performance contracting, sample RFP/Q language, project assessment tools, and profiles of successful paid-from-savings projects. [usgbc.org/paidfromsavings](https://www.usgbc.org/paidfromsavings)

iii. Energy Life-Cycle Cost Analysis

1. Overview

Energy life-cycle cost analysis (ELCCA) helps building owners and designers select energy-efficient design alternatives at the lowest overall cost. Life-cycle costing considers both the initial cost and the cost of ownership over time. For example, a more energy-efficient pump may cost more to buy than a conventional pump, but the energy cost savings over the pump’s useful life more than covers the initial cost premium. Life-cycle cost analysis can be used to evaluate all types of green features to demonstrate that an initial cost may be justified and offset by performance and continual cost savings. Make sure to frame all conversations about initial costs of a green building feature in the context of the overall payback.

2. Getting Started

ELCCA can be included in the bidding process. For example, the RFP/Q can stipulate that decisions will not be made solely on initial costs, so each bid must include ELCCA to help determine the most cost-effective alternative. Life-cycle cost is typically evaluated over a twenty-year period, but some government entities use a forty-year timeframe for certain types of equipment.

It is also possible to use funds dedicated to value engineering—the systematic process of refining a design by maximizing function and minimizing cost—for cost benefit analysis and the comparison of various green features. The analysis provides important financial information to aid in prioritizing the green building features to pursue. ELCCA is also a useful tool to evaluate opportunities to upgrade existing building systems.

3. Next Steps

For more information on ELCCA, go to: [usgbc.org/govroadmapresources](https://www.usgbc.org/govroadmapresources), which includes the State of Washington’s *LEED Project Implementation Guide for State Project Managers*. The guide provides more information on ELCCA, including guidelines, spreadsheets and details on how to select an ELCCA analyst to prepare a work plan and complete the energy-use simulation and cost analysis.

iv. Utility Incentive and Rebate Programs

1. Overview

Thoroughly research and assess the incentives, rebates and technical assistance that are available to offset green building costs. The state energy office and local energy or water utilities are the most common sources. Local government and privately owned utilities may also have programs to encourage energy and water efficiency. Some jurisdictions have specific incentives for LEED projects. The federal government also offers grants to increase the energy efficiency of existing buildings. Agencies may also want to contact the Alliance to Save Energy, which administers several programs. If incentives are not available in the jurisdiction, contact the state energy office or legislators and recommend a program be established.

2. Getting Started

In the pre-project planning phase, the project team should determine what incentives are available and applicable to the project and contact the responsible staff.

3. Next Steps

Establish a relationship with the utility and energy office representatives early in the project, so budgets can accurately reflect incentives and rebates.

Maximizing Utility Incentives

Massachusetts Division of Capital Asset Management

To assist project teams in identifying utility companies that offer incentives, the Massachusetts Division of Capital Asset Management created a list, with detailed contact information, of all such utilities to help promote early contact. To see the Massachusetts Utility Rebate flowchart and other state examples, go to: [usgbc.org/govroadmapresources](https://www.usgbc.org/govroadmapresources).

B) PRE-PROJECT TEAM PLANNING

i. Establishing a Project Team

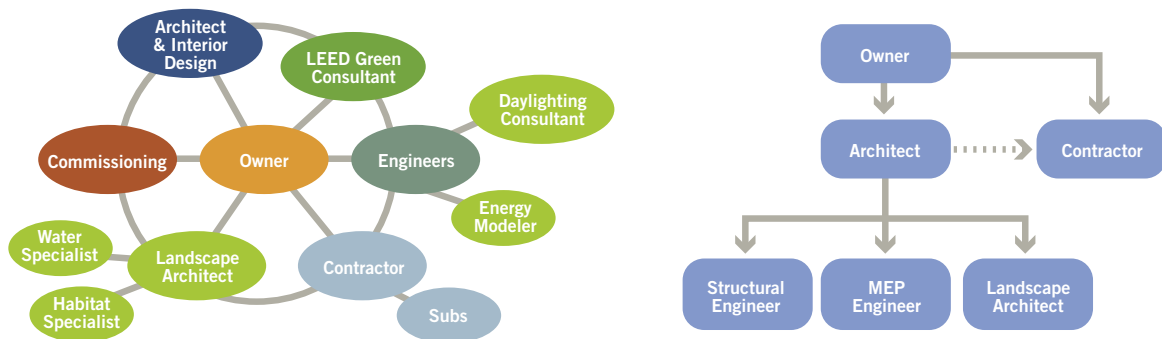
1. Overview

Successful project teams integrate the efforts of various professional disciplines from inception through the project's completion. The development of an integrated design team is essential to all green building projects and promotes cooperation between disciplines, generates synergies between building elements and harmonizes the project planning process. The approach brings the professional disciplines together, including architects, engineers, facilities managers, and contractors, early in the process to work collaboratively and to ensure sustainability and energy-efficiency performance goals are central to the project design, rather than add-on requirements.

2. Getting Started

An integrated design team, illustrated on the left of the graphic below, works to meet the owner's needs and requirements by including design and construction team members early on in the project process, as opposed to the linear traditional project process featured on the right.

Integrated Design Process VERSUS Traditional Design Process



Source: How-To guide to LEED Certification for New Mexico Buildings.

The integrated design team must work to incorporate LEED activities and fulfill obligations during each project development phase. Green building project teams will typically hold a charrette or LEED goal-setting meeting to kick-off the process.

When managing integrated teams in the delivery of a green government building, it is important to establish an ongoing system to evaluate progress, identify barriers and determine the steps needed to achieve the green building goals. Meetings at the beginning and at the end of each design and construction phase are helpful and create a systematic way to discuss milestones, remind team members about key LEED initiatives and ensure LEED documentation requirements are met.

3. Next Steps

The LEED project coordinator plays an integral role in the coordination, communication and development of LEED certification requirements; therefore, it is important to make this selection early. LEED coordinators are often consultants who manage the LEED process, including organizing and reviewing the LEED documentation before submitting it to GBCI. LEED coordinators can also help with project goal setting, conduct design charrettes, provide team training and coordinate the delivery of incentives.

As more government agencies gain LEED experience, the role may shift from a consultancy to in-house staff, helping to lower costs. Such a shift will depend on staff availability and experience. See [Build Capacity](#) for more details.

ii. Request for Proposal Process

1. Overview

Project goals, requirements and standards should be clearly outlined in the Request for Proposal or Qualifications (RFP/Q) to ensure that qualified LEED professionals respond. A project's RFP/Q should clearly state the requirements for consultants, including specific LEED experience and training and specify that these requirements will be included in the scoring criteria for consultant selection. If the desired LEED certification level for the project has been determined, it should also be clearly stated in the RFP/Q.

2. Getting Started

The RFP/Q should require that critical consultants have LEED project experience. Additionally, including a LEED AP on the project team can streamline the process and expedite documentation and administration, helping to reduce costs. (See [Staff Green Building Experts and LEED APs](#) for more details)

3. Next Steps

In addition to updating standard RFP/Qs to include criteria for selecting LEED professionals, agencies should consider incorporating LEED requirements and green building goals into master contract documents

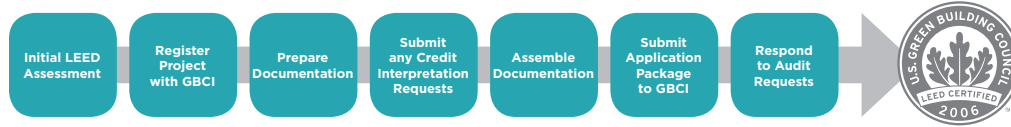
Most LEED rating systems award one Innovation credit for including LEED Accredited Professionals as a principal member of the project team.

and specifications. Such efforts help to improve the quality and accuracy of bids for green building contracts.

4. Resources

To identify local LEED APs, go to the searchable database on the GBCI Web site (gbc.org). For more information on how to prepare a green building RFP/Q and write green building specific contracts and solicitations, including the American Institute of Architects' Green RFP Template, go to: usgbc.org/govroadmapresources.

LEED CERTIFICATION PROCESS



GBCI manages the LEED certification process and the basics steps are outlined in the graphic below. Once it has been decided to seek LEED certification, the project needs to be registered with GBCI. This should occur as early in the project process as possible to gain access to the supporting tools. The most important tool is LEED Online—the online system used to manage the LEED process, including organizing and tracking all LEED documentation, performing calculations and communicating with the GBCI certification reviewers. As the project progresses, the team will prepare and submit the LEED application. Once the project is complete, GBCI will review the final application and award the appropriate level of certification. There are several points throughout the process when the project team and GBCI review team will correspond with questions and clarifications.

Registration Fees

The registration fees allow access to LEED Online. It is a flat fee based on the rating system.

Certification Fees

The LEED certification fees cover the costs for GBCI to review the LEED application. It is based on the rating system and the project's square footage. The fee is paid when the project team submits documentation to GBCI for review.

Complete details of the certification process, including timelines, fee schedules and policies, can be found at: gbci.org/main-nav/building-certification.



REACHING MILESTONES

4) IMPLEMENT LEED

The best practices highlighted in this chapter pertain specifically to project management and the LEED certification application process. The case studies showcase successful government strategies that can be modified to meet other jurisdiction's needs. The process and techniques necessary to design and construct, retrofit, or operate a LEED building are not addressed.

The chapter is designed for government professionals who will coordinate the execution, documentation, and verification of performance goals, and includes tips for tracking the successful completion of the LEED process. While consultants and contractors are often responsible for executing and documenting specific tasks, it is important that the project or facility manager coordinating the project understands the overall process and the potential situations where they may need or want to intervene.

LEED project registration provides the team access to LEED Online to aid in project management. Many government entities have created additional tools and best practices to make LEED project management more effective and efficient. These tools are referenced in the resource sections and case studies.

A) IMPLEMENT LEED OVERVIEW

i. LEED Tools

1. Overview

Take advantage of the core tools that support implementation of a LEED rating system. Two core tools assist project teams during the assessment, design, construction and certification process: LEED Project Checklist and LEED Online.

The LEED Project Checklist helps project teams identify individual measures within the rating system and their applicability to the project. The checklist can be used to designate credits that are definitely, potentially, or unlikely to be achieved. It can also be used as a tool for project management. Government entities can customize the checklist to track organization-specific initiatives and goals.

LEED Online provides a Web-based central platform to manage and track LEED documentation. The system can accommodate multiple users, making project management more efficient.

2. Getting Started

Use the LEED Project Checklist to Determine Credits to Pursue.

The LEED Project Checklist provides the team with a shared menu of options to decide sustainability goals, select LEED credits and assign responsibilities. It can also be adapted and used to ensure that all federal, state, local and internal green requirements and standards are accounted for within the chosen credits.

To begin, the team identifies all the feasible “Yes” points. These “Yes” points should be the “low-hanging fruit” and are the easy or obvious points to pursue. The team should then designate the “Maybe” points or points that could be feasible, but may need further analysis. Finally, points that are identified as not feasible can be designated as such and taken off the table for subsequent strategy discussions. Throughout the project, the team should try to maintain all the “Yes” points and convert as many of the “Maybe” points to “Yes” as possible. This strategy can help the project earn as many points as possible by keeping some of the “Maybe” points in play to ensure that opportunities are not being missed.

The LEED Project Checklist can be customized to include a list of innovation credits that the team may wish to pursue. These are credits awarded for exemplary or innovative performance or practices that go beyond the existing LEED credits. Teams are encouraged to identify new, unique approaches for improving sustainability. Innovation credits must be sufficiently documented, submitted for evaluation, and approved during the LEED certification review process in order to receive credit points. For a list of innovation credit examples, go to: [usgbc.org/ShowFile.aspx?DocumentID=3569](https://www.usgbc.org/ShowFile.aspx?DocumentID=3569).



LEED 2009 for Existing Buildings: Operations & Maintenance Project Checklist

Project Name

Date

Sustainable Sites			Possible Points: 26
O	O	O	
Y	N	?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1 LEED Certified Design and Construction 4
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2 Building Exterior and Hardscape Management Plan 1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3 Integrated Pest Mgmt, Erosion Control, and Landscape Mgmt Plan 1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4 Alternative Commuting Transportation 3 to 15
		<input type="checkbox"/>	Reduce by 10% 3
		<input type="checkbox"/>	Reduce by 13.75% 4
		<input type="checkbox"/>	Reduce by 17.5% 5
		<input type="checkbox"/>	Reduce by 21.25% 6
		<input type="checkbox"/>	Reduce by 25% 7
		<input type="checkbox"/>	Reduce by 31.25% 8
		<input type="checkbox"/>	Reduce by 37.5% 9
		<input type="checkbox"/>	Reduce by 43.75% 10
		<input type="checkbox"/>	Reduce by 50% 11
		<input type="checkbox"/>	Reduce by 56.25% 12
		<input type="checkbox"/>	Reduce by 62.5% 13
		<input type="checkbox"/>	Reduce by 68.75% 14
		<input type="checkbox"/>	Reduce by 75% 15
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 5 Site Development—Protect or Restore Open Habitat 1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 6 Stormwater Quantity Control 1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 7.1 Heat Island Reduction—Non-Roof 1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 7.2 Heat Island Reduction—Roof 1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 8 Light Pollution Reduction 1
Water Efficiency			Possible Points: 14
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 1 Minimum Indoor Plumbing Fixture and Fitting Efficiency
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1 Water Performance Measurement 1 to 2
		<input type="checkbox"/>	Whole building metering 1
		<input type="checkbox"/>	Submetering 2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2 Additional Indoor Plumbing Fixture and Fitting Efficiency 1 to 5

Know Federal, State and Local Green Building Standards

In addition to understanding LEED standards, it is important to know the federal, state and local green building standards that will impact the project. USGBC maintains a searchable database of such standards at: usgbc.org/government. There may be additional requirements for energy efficiency, CO2 reduction or sustainable design, within executive orders, statewide and agency goals and existing code requirements and regulations. The project manager should know these, as well as any voluntary initiatives that the agency might be supporting, such as the U.S. Conference of Mayors' Climate Protection Initiative, which includes a commitment to green building. For more information, go to: usmayors.org/climateprotection/revise/.

3. Next Steps

Use the LEED Project Checklist and LEED Online to Manage the Process. Use the dynamic LEED Project Checklist within LEED Online throughout the implementation phase to manage the process, assign responsibilities, track progress, assist with decision making, guide documentation efforts and track changes. Many government agencies have also adapted the checklist to ensure compliance with federal, state and/or local sustainability initiatives. As the project progresses, changes to the checklist may be helpful in tracking credits that are actively being pursued or the adding of new credits. The evolving list can also serve as an agenda for project team discussions to ensure that the pursued credits are tracked throughout the implementation stage and that responsibilities are clearly assigned and completed on time.

To streamline the process and assure all requirements are met, keep a log of LEED submittals and collect the required back-up as the team proceeds through the process.

Manage Documentation with LEED Online. LEED Online is the primary resource for managing the documentation process. Through LEED Online, project teams manage project details, complete documentation requirements for prerequisites and credits, upload supporting files, submit applications for review, receive reviewer feedback and earn LEED certification. LEED Online provides a common space where project team members can work together to document compliance with the LEED rating system. All LEED projects must use this system.

A LEED project administrator is identified as a part of the LEED management process and is the person who administers LEED Online and assigns permissions for team members to use it. In many cases, a government professional will be considered a team member with access to LEED Online. In some cases, the government professional may serve as the project administrator.

FEATURES OF LEED ONLINE

Team Administration

The “Project Administrator,” typically the LEED project manager, is the person on who registers the project in LEED Online and has full control of the project account. As project team members are assigned responsibilities to shepherd specific prerequisites and credits through the implementation process, the administrator “invites” them to participate and “assigns” roles. Project team members will be granted varying degrees of account access.

Project Organization

Any user who is a team member on more than one registered LEED project is able to sort, view, and group projects according to a number of project traits, including location, design and management firm.

Support for Certification and Timeline

The LEED Online system explains all the steps in the review and certification process and highlights steps completed. The system also displays specific dates associated with each phase and step. During a LEED review, if any minor clarifications are needed, the online system allows the reviewer to contact the project team through the system.

Data Linkages and User Alerts

Some data, such as a building’s gross floor area or full-time equivalent (FTE) occupancy, are required in the documentation for several LEED credits. LEED Online automatically populates fields in all appropriate forms after the data is initially entered, saving time and helping to ensure project-wide consistency. If needed, an override option is available. The LEED Online system will alert users when required data is missing, providing a chance to correct the error before submitting the certification application.

4. Steps to Expansion

Lessons learned from the implementation process should be captured and compiled into a set of principles or case studies that project or facilities managers can share with others and refer to when managing future projects. The information may include recommendations related to the organization’s culture, strategic goals, policy mandates and specific building types that are being addressed.

CASE STUDY

GOALS AND POLICIES

DORMITORY AUTHORITY OF THE STATE OF NEW YORK (DASNY)

DASNY promotes sustainable design and construction by encouraging the implementation of green features in all building projects, regardless of size or complexity. Starting in January 2009, all new projects, additions, and significant renovations require LEED Silver certification. To help meet the goal, DASNY developed a sustainability policy that:

- Encourages creativity and pursuit of additional strategies, even if they require cooperative decision-making with the owner
- Supports reaching beyond LEED Silver for projects able to achieve LEED Gold or LEED Platinum level certification
- Requires submission of documentation to USGBC for a third-party rating review
- Discourages “point chasing” or “buying points” that are ill-suited, but forced into the design

If the team has done all it can and the building does not achieve LEED Silver certification, the policy does not penalize. DASNY believes a project is a success in that some green features were implemented, thus increasing the building’s energy-efficiency performance, improving occupant health and productivity, and increasing the owner’s bottom line.

5. Resources

Government-adapted LEED Project Checklists and goal-setting criteria, including the State of New York’s expanded checklist to help manage LEED for Existing Building: O&M certification projects, can be found at: [usgbc.org/govroadmapresources](https://www.usgbc.org/govroadmapresources).

ii. LEED Project Management

1. Overview

Project managers will have additional responsibilities related to LEED certification, including ensuring the building satisfies the performance criteria and the documentation requirements are met.

LEED-related responsibilities include:

- Incorporate sustainability goals and LEED requirements from the inception of the project. This includes budgeting considerations,

assembling a qualified project team and planning for reporting requirements.

- Establish an integrated team process, since many of the necessary technologies and strategies require cooperation between different disciplines and stakeholders.
- Ensure that the products and procedures are properly documented.

2. Getting Started

The following is an outline of the fundamental steps for all LEED projects. The steps are discussed in further detail in [Lay the Groundwork](#) and the sections below entitled [Green Building Design and Construction](#) and [Green Building Operations and Maintenance](#).

Step 1: Understanding LEED Opportunities and Minimum Requirements

- Determine if the project is a candidate for LEED, select the applicable rating system, and identify mandatory performance goals.

Step 2: Project Preparation

- Form a project team with key stakeholders.
- Ensure team members are familiar with the LEED rating system.

Step 3: LEED Preliminary Certification Assessment

- Conduct a preliminary LEED Certification Assessment to determine if the building can meet the given LEED prerequisites.
- Hold a LEED goal-setting meeting for project kick-off.

Streamlining LEED Project Management

State of Washington General Administration

As part of the training module for project managers working on green building projects, the State of Washington General Administration office created a *LEED Project Implementation Guide* that follows the phases of a new green construction project. The guide and supplemental checklist allows project managers with little LEED experience to keep green building projects on track. For more information, go to: usgbc.org/govroadmapresources.

LEED Certification is a Starting Point for Ongoing Green Building Performance

Achieving LEED certification is a milestone in the life of a green building, but it is just the beginning. Maintaining green building performance over time—energy and water efficiency in particular—requires ongoing monitoring and operations best practices, and a plan to implement new and improved features when they are introduced to the market.

The LEED rating systems encourage this sustained attention to performance through such measures as requiring all projects registered under LEED 2009 and beyond to report whole-building energy and water usage data for five years after certification. Design and construction projects should implement Measurement and Verification (M&V) plans and prepare a course of action to seek LEED for Existing Buildings: O&M certification after one full year of normal occupancy. LEED for Existing Buildings: O&M certification projects should implement ongoing commissioning and prepare a plan for recertification. All LEED projects can be enrolled in USGBC's Building Performance Partnership, an initiative that engages green building owners in optimizing ongoing building performance and compiles performance data on the world's population of LEED buildings. Go to: usgbc.org/bpp for more details.

For more information on the important role that ongoing performance plays in developing and maintaining green buildings, see the [LEED as a Compass](#) and [Green Portfolio Management](#) sections as well as [Appendix A](#). For details on LEED minimum program requirements, including requirement #6 on reporting whole-building energy and water usage, go to: usgbc.org/ShowFile.aspx?DocumentID=6473.

3. Resources

Government-created resources to improve green building project management, including the State of New Mexico's *How-To Guide to LEED Certification for New Mexico Buildings*, can be found at: usgbc.org/govroadmapresources.

B) GREEN BUILDING DESIGN AND CONSTRUCTION

LEED certification of a new building provides assurance that the design and construction of a new facility will meet green performance standards and maintain those standards over time. The LEED referenced standards, project checklist and LEED Online tools will guide the design process from the earliest phase of schematic design through the development of construction documents and the commissioning process. The best practices outlined here pertain to project management and applying for LEED certification. The case studies highlight successful government strategies that can be modified to meet other jurisdiction's needs.

Design and Construction Projects—an overview of LEED project stages and related tasks.

- **Pre-design**—Gather information on owner's project requirements, collect data on stakeholders' needs and establish preliminary project goals.
- **Schematic Design**—Explore several design options and alternatives, with the intent of establishing agreed-upon project layout and scope-of-work.
- **Design Development**—Begin the process of spatial refinement and incorporation of the first design of a project's energy systems.
- **Construction Documents**—Carry the design into the level of details for all spaces and systems and materials so that construction can begin.
- **Construction**—Work closely with all contractors and subcontractors to insure that LEED credits will be met.
- **Substantial Completion**—Official recognition by applicable building authority or local building department that a building conforms to applicable building and safety codes.
- **LEED Documentation and Certification Review**—Manage and update documentation throughout all project phases. Initiate the certification review process in LEED Online.
- **Ongoing Building Performance**—Monitor and manage building performance to sustain green building attributes. Report energy

and water usage to USGBC. Create a plan to pursue LEED for Existing Buildings: Operations & Maintenance when eligible.

i. Design Phase

1. Overview

During the design phase, use the collaborative team process to identify and establish effective strategies to meet sustainability goals. Also known as the integrated design approach, the process brings all project team members together early in the design phase to work collaboratively to identify sustainability goals and to determine the strategies and processes to meet those goals.

2. Getting Started

The LEED coordinator and the project manager must ensure that during the design phase the team has outlined sustainability goals and that the corresponding LEED standards are being met by the proposed project design. The project manager is also responsible for scheduling an initial workshop, or series of meetings, to discuss the design. The workshop, often called an eco-charrette or LEED goal-setting meeting, is usually facilitated by the LEED coordinator.

3. Next Steps

Key stakeholders should participate in the eco-charrette to ensure collaboration on the strategies needed to meet LEED standards. Stakeholders include owners, architects, engineers, contractors, financing staff, facilities management, the commissioning agent and, if applicable, utility incentive representatives. In many cases, procurement staff and building occupants are included to solicit their opinions and unique perspectives.

Implementing an integrated, systems-oriented approach to green project design, development and operations can yield synergies and improve the overall performance of a building over time. The initial LEED assessment will bring the project team together to evaluate and articulate the project's goals and the certification level sought.

CASE STUDY

COMMISSIONING NEW CONSTRUCTION AND EXISTING BUILDINGS STATE OF WASHINGTON GENERAL ADMINISTRATION

For more than a decade, the State of Washington General Administration has had a building commissioning program for new construction and existing buildings. Building commissioning is a systematic and documented process of ensuring that the owner's operational needs are met, building systems perform efficiently and building operators are properly trained. Commissioning of new construction ensures that building systems will operate as designed under a wide range of conditions and can help identify any malfunctions while the equipment is still under warranty. Commissioning of existing buildings, or retro-commissioning, returns systems to their top performance and helps identify and prioritize needed improvements.

Washington's General Administration has 15 case studies of commissioning success stories posted on their Web site. Each project generates thousands of dollars in annual energy savings and often identifies important safety or indoor air quality deficiencies. A 2005 revision to the state's code requires all buildings over 5,000 square feet that receive capital funds to be LEED Silver certified. Recognizing the value of commissioning, the General Administration pursues the Enhanced Commissioning credit on every LEED project, which involves a commissioning agent in building design and operator training as well as the fundamental commissioning tasks.

See [Appendix A](#) for more information on commissioning. The State of Washington's building commissioning case studies can be found at: usgbc.org/govroadmapresources.

ii. Construction Phase

1. Overview

During the construction phase, LEED requirements must be reviewed and reinforced regularly with all contractors and subcontractors.

Contractors and subcontractors will need to know the unique specifications or practices required to achieve the LEED credits, so make sure they are aware of the goals and any special needs. Make sure that the contractor's participation in the LEED documentation and certification process is included in the Contract Documents.

2. Getting Started

The construction contractor should be included on the project team and participate in the integrated design process to ensure a clear understanding of the LEED credits being pursued and their implication on the construction process. The project manager and LEED coordinator must communicate consistently and effectively with the general contractor and subcontractors throughout the construction phase and identify any LEED-specific training needs. LEED requirements should be reinforced at all regularly scheduled site meetings and additional meetings should be held to ensure all contractors are familiar with the specifications and documentation needed.

3. Next Steps

During the construction of a green building, a project manager must enforce quality assurance so that specifications are carried out and documented correctly. They should pay particular attention to construction site procedures, such as protection of building air ducts, construction waste management and erosion control, to ensure proper implementation and documentation.

LEED Training for Contractors

State of Washington General Administration

The State of Washington General Administration provides a training course for contractors working on state green building projects. The course defines the role of contractors in documenting achievement of LEED credits and provides checklists and forms to help them stay organized and on track. All members of the project team are invited to attend the training to foster coordination and minimize the time and expense associated with managing documentation.

4. Resources

Resources to improve LEED coordination and communication during the construction process, including Seattle Public Utilities' *Guide for Contractors* that includes checklists for construction waste management and indoor air quality protection, can be found at: [usgbc.org/govroadmapresources](https://www.usgbc.org/govroadmapresources).

CASE STUDY

CONSTRUCTION WASTE MANAGEMENT THE NEW MEXICO VILLAGRA BUILDING, SANTA FE, NM

Why Focus on Construction and Demolition Waste

Construction and demolition waste comprises approximately 25% of landfill content nationwide. Construction waste management trims project costs, contributes to a reduction in greenhouse gases, and helps the local economy by creating jobs related to salvaging and recycling construction waste.

An effective construction waste management program requires planning with the general contractor and should be outlined in the bid documents and construction specifications. Project managers should be familiar with state and local ordinances concerning construction waste, as well as debris recycling options before the project is underway. For this reason, it is helpful if government agencies outline the minimum requirements for construction waste recycling and track all construction projects.

The historic Villagra Building in Santa Fe is a LEED for Commercial Interiors Gold project that underwent a major interior renovation. To earn the Construction Waste Management credits, the project recycled or diverted 82% of demolition and construction waste (equal to 192 tons) from the landfill. The construction company prepared an estimated waste plan to anticipate the waste stream and generated the source list for recycling and diversion. Materials were returned to the manufacturers whenever possible, offered to site workers or donated to charity. The project sourced recycled content building materials, and local and regional materials were selected to reduce transportation impacts.

The Villagra Building case study and the State of New Mexico's *How to Guide to LEED Certification* can be found at: usgbc.org/govroadmapresources.

iii. Tenant Improvements and Interiors

1. Overview

LEED for Commercial Interiors certification is an excellent tool for greening government interiors projects. Some government projects may have scopes that address only the interior space, making LEED for New Construction or LEED for Existing Buildings: O&M certifications not applicable. LEED for Commercial Interiors recognizes that tenants often have limited control of their rented spaces; therefore, it empowers tenants to focus solely on ways to maximize the sustainability potential of their workspaces.

2. Getting Started

The first step is to determine if the LEED for Commercial Interiors rating system is applicable. Deciding factors include:

- The tenant is leasing space and has no control over any portion of the building.
- The tenant is leasing the whole building, but has no control over the shell and systems of the building.
- The tenant is leasing space, but is able to convince the landlord to upgrade some building features, such as restrooms and HVAC.
- The tenant does not have control or budget for modifying shell and major systems.

If the tenant is the owner or has control and the budget to modify the shell and systems, LEED for New Construction is likely to be the applicable rating system. (If an existing building that is not in need of a major renovation, then LEED for Existing Buildings: O&M certification may be the required rating system to use.) If it is determined that LEED for Commercial Interiors applies, the design team should begin planning for LEED certification early in the design process.

3. Next Steps

If a tenant moves into a building that is already LEED certified, wherein many of the building systems and site location already address LEED strategies, the baseline for achieving LEED for Commercial Interiors credits can be elevated to meet higher levels of certification. Whether or not the building has met LEED certification does not eliminate the possibility of achieving LEED for Commercial Interiors certification.

One LEED for Commercial Interiors design strategy involves maximizing use of natural daylighting through space planning and provides the opportunity for improved lighting design and implementing strategies that result in significant energy savings.

Another high-impact green strategy within the LEED for Commercial Interiors rating system is to safeguard indoor air quality through specifying green finish materials, including carpet and low-VOC paint. Designers and tenants are able to select from a wide range of green materials that meet a variety of budgets, functional needs and aesthetic

requirements. As more and more consumers demand quality products that are environmentally responsible, the design and construction industry continues to introduce products and materials that are innovative and cost effective. As a result, new green products have become more readily available through local suppliers.

4. Resources

Resources on how to implement green strategies for tenant improvements and interiors, including the City of Seattle's fact sheets on how to green interiors, can be found at:

usgbc.org/govroadmapresources.

CASE STUDY

LEED FOR COMMERCIAL INTERIORS CERTIFICATION

RONALD V. DELLUMS FEDERAL BUILDING, OAKLAND, CA

The opening of the Ronald V. Dellums Federal Building in 1994 helped revitalize Oakland's civic center and downtown shopping district. The City of Oakland donated the land as part of an economic development program, and the GSA worked closely with the local community to create a central landmark that now anchors a dynamic and popular open urban mall.

The building underwent a substantial renovation of its ninth floor, currently occupied by the Social Security Administration, and received LEED for Commercial Interiors certification in September 2008.

The project achieved several credits under the Indoor Environmental Quality category and used a host of low-emitting building materials, including adhesives and sealants, paints, carpet systems and furniture. Controllable lighting, thermal comfort compliance and monitoring added credits in the category, as did a construction indoor air quality management plan during construction and before occupancy. The project managed to divert more than 50% of its construction waste from a landfill, earning two credits in the Materials and Resources category. Additional points were gained by optimizing energy performance and enhanced commissioning to ensure the building functioned as intended. Three credits were relatively easy to achieve, given the project's location in an urban center: site selection, development density and community connectivity, and access to public transportation. Another credit for long-term tenant commitment was achievable given the nature of the tenant as a government agency.

INTEGRATING GREEN BUILDING PRACTICES INTO TRADITIONAL PROCESSES

USGBC Integration Guides are concise resources for integrating green building practices and decision-making into traditional real estate processes. Written by expert green building practitioners and reviewed by GBCI for technical accuracy, integration guides contain tested strategies for phasing-in green building practices and achieving LEED certification.

Find more information at: [usgbc.org/publications](https://www.usgbc.org/publications).



The *Green Operations guide: Integrating LEED Into Commercial Property Management* was developed to assist multi-tenant office owners and managers, as well as their service providers, in reducing the environmental impact associated with commercial real estate operations.

The information in this guide has been developed to assist building owners and managers in greening their operations to meet LEED EB: O&M standards. This guide also includes sample policies, practices and examples, as well as an online repository of usable worksheets and checklists that project teams can alter for LEED EB: O&M certification submittals within LEED Online. These templates were reviewed by GBCI.



The *Green Office Guide: Integrating LEED Into Your Leasing Process* provides tools and ideas that will help integrate green decision-making throughout the leasing process. Geared mainly towards office tenants and brokers, and to a lesser extent, attorneys, the new guide provides specific tools that help teams navigate the nuances of successful execution. Tools incorporated into the guide include site selection questionnaires, sample RFP language, criteria for qualifying professionals, and sample lease provisions with extensive drafting notes.

C) GREEN BUILDING OPERATIONS AND MAINTENANCE

The LEED for Existing Buildings: Operations & Maintenance rating system is a set of performance standards for the sustainable ongoing operations, maintenance and retrofit of buildings that are not undergoing major renovations. It addresses high-performance building systems, operations and maintenance best practices and sustainable policies. The rating system can be applied to both existing buildings seeking LEED certification for the first time and to projects previously certified under LEED for New Construction, Schools, or Core & Shell. It is the only LEED rating system through which projects are able to recertify. The best practices included here pertain to project management and applying for LEED certification. The case studies highlight successful government strategies that can be modified to meet other jurisdiction's needs.

The section is based on two USGBC resources for greening existing buildings:

- Green Existing Schools: Project Management Guide ([usgbc.org/k12toolkit](https://www.usgbc.org/k12toolkit))
- Green Operations Guide: Integrating LEED into Your Operations and Maintenance Process ([usgbc.org/publications](https://www.usgbc.org/publications))

i. Project Preparation

1. Overview:

Implementing LEED for Existing Buildings: Operations & Maintenance certification is an incremental and step-by-step process. Greening operations may involve organization-wide decisions about policies, practices and service providers; therefore, project preparation will involve review of such measures and an assessment of the building portfolio prior to convening the project team and developing an implementation plan to achieve individual building certification.

2. Getting Started:

Conduct an assessment of current policies and practices and analyze the difference between current policies/practices and the LEED

standards. This process is often referred to as a gap analysis. Some government entities perform the gap analysis during the course of a pilot project, while others will perform an organization-wide analysis first and implement changes at the macro level, laying the foundation to seek building-specific LEED certifications at a later time.

Identify the stakeholders, including staff, who will be responsible for implementing the organization-wide policy and procedure changes, and those who will manage the building-specific efforts, including the capital improvements.

Determine the buildings that are the best candidates for LEED for Existing Buildings: O&M certification through an initial assessment of energy-efficiency performance. Benchmarking energy use with the ENERGY STAR Portfolio Manager tool is a common first step. A minimum score of 69 (out of 100) is a prerequisite for LEED certification. Some governments have used their highest performing buildings as pilots for certification. Others select a low-performing building that offers the best potential for cost-effective upgrades. In addition to the ability to meet LEED energy-efficiency performance prerequisites, governments will want to consider:

- Buildings that receive the most visitors or have high visibility with the public.
- Buildings scheduled for major maintenance upgrades and capital improvements.
- Buildings with management staff and occupants who will be most supportive of implementing green operations and maintenance policies and practices.

CASE STUDY

GREENING AN EXISTING BUILDING PORTFOLIO CALIFORNIA DEPARTMENT OF GENERAL SERVICES

The California Department of General Services (DGS) is required to attain LEED for Existing Buildings: Operations and Maintenance certification for all state-occupied buildings larger than 50,000 square feet. DGS has approached this goal in phases, starting with the fundamental energy-saving strategies of benchmarking the energy use of all facilities in ENERGY STAR Portfolio Manager and retro-commissioning each building with assistance from utility company incentives. As a result, DGS has identified buildings that are performing well and those needing significant energy efficiency retrofits.

Starting with the high-performance buildings, DGS began to assess each building using the LEED for Existing Buildings: O&M certification criteria for energy and water use, site management, purchasing and waste removal, and indoor environmental quality. This stage of data collection and analysis required engaging building managers and occupants. DGS used the opportunity to educate stakeholders and identify “green champions”, individuals in various departments or agencies who wanted to lead greening efforts out of interest or passion for sustainability. If an agency has tenants in various buildings, DGS identifies a champion in each building or on each floor.

Working with the building manager and green champions, DGS implements a pre-performance period to identify any additional improvements needed to achieve LEED for Existing Buildings: O&M certification. By the time of the performance period documented for LEED certification, building occupants and management are fully engaged in the process and DGS knows what level of certification they can achieve. As of July 2010, California DGS has over 20 existing buildings certified and nearly 40 more in process. After starting with state buildings within the capital complex, DGS will add university facilities and college campuses, followed by other government buildings. The phased approach helps develop the process, build capacity among staff and building managers, and makes the green building program more efficient and cost effective as it expands.

What is ENERGY STAR?

ENERGY STAR is a joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE). The ENERGY STAR Portfolio Manager is an online energy management tool that allows building managers to:

- Track and assess energy and water consumption for a single building, groups of buildings, or an entire building portfolio.
- Compare a building's energy performance to similar buildings nationwide.
- Calculate a building's greenhouse gas emissions.
- Track and compare energy cost-saving strategies for a specific project or for an entire building portfolio.

For more information, go to: energystar.gov/benchmark.

3. Next Steps:

When the project has been selected, form a project team consisting of a core group of stakeholders from the on-site facilities staff, the organization's building management office, and any consultants or contractors who are engaged in the project. It is critical that the team have a basic understanding of the LEED rating system and at least one LEED expert be on the team to manage the certification process. (See [Build Capacity](#) and [Pre-Project Team Planning](#) for more details.)

Conduct a preliminary technical assessment to determine if a building can meet all the prerequisites for LEED for Existing Buildings: O&M certification, not just the energy-efficiency requirements determined by the ENERGY STAR Portfolio Manager. Armed with this information, the project team can set goals and determine potential credits using the [LEED Project Checklist](#).

Figure 2.3 – Preliminary Technical Assessment Tasks

Responsible Department	LEED Prerequisite	Tasks/Responsibilities
Facility Operations		
Energy Management	EAp1	Energy Efficiency Best Management Practices— Planning, Documentation, and Opportunity Assessment Conduct the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Level I walk-through audit.
	EAp2	Minimum Energy Efficiency Performance Establish ENERGY STAR Portfolio Manager Account and determine facility's energy performance rating (must be at least 69 at time of application).
HVAC Shop	EAp1	Energy Efficiency Best Management Practices— Planning, Documentation, and Opportunity Assessment Report availability of system documentation (system narrative, sequence of operations, and PM program).
	EAp3	Fundamental Refrigerant Management Report refrigerants in use in base building systems, potential for conversion to non CFC-based refrigerants, and potential for system retrofit (if containing CFC-based refrigerants).
	IEQp1	Minimum Indoor Air Quality Performance Measure outside air ventilation rates (must be capable of at least 10 CFM/person at time of application).
Electric Shop	MRp1	Sustainable Purchasing Policy Assess and provide input to environmentally preferable purchasing (EPP) policy regarding mercury in lamps.
	EAp1	Energy Efficiency Best Management Practices— Planning, Documentation, Opportunity Assessment Assist with measurement of energy use breakdown and conduct ASHRAE Level I audit.
Plumbing Shop	WEp1	Minimum Indoor Plumbing Fixture and Fitting Efficiency Determine age of fixtures.If prior to 1994, inventory existing fixture types and provide report.
Carpenter Shop	MRp1	Sustainable Purchasing Policy Assess and provide input to EPP policy regarding facility alterations and additions.
	MRp2	Solid Waste Management Policy Provide assessment of capability for recycling waste from facility alterations at the school site.
Planning Section	MRp1	Sustainable Purchasing Policy Assess and provide input to EPP policy regarding facility alterations and additions.
	MRp2	Solid Waste Management Policy Provide assessment of capability for recycling waste from facility alterations at the school site.
Custodial Services	MRp2	Solid Waste Management Policy Provide assessment of capability for recycling ongoing consumables at the school site.
	IEQp3	Green Cleaning Policy Provide assessment of capability to develop a green cleaning policy.
School		
	MRp1	Sustainable Purchasing Policy Assess and provide input to EPP policy regarding furniture and equipment (durable goods).
	MRp2	Solid Waste Management Policy Provide assessment of capability for recycling ongoing consumables.
	IEQp2	Environmental Tobacco Smoke (ETS) Control Provide copy of ETS Control Policy.
Purchasing Department		
	MRp1	Sustainable Purchasing Policy Assess and provide input to EPP policy regarding ongoing consumables, furniture and equipment (durable goods), facility alteration materials, and mercury containing lamps.

CASE STUDY

ONGOING COMMISSIONING FBI REGIONAL HEADQUARTERS, CHICAGO, IL

The FBI Regional Headquarters in Chicago was the first LEED for Existing Buildings: Operations & Maintenance Platinum certification. An important goal for the project team was to increase the building's ENERGY STAR rating to lower utility costs. The team achieved an ENERGY STAR rating of 95 (out of 100) by developing and implementing a building commissioning plan that included investigation and analysis, coupled with ongoing observation and reporting of energy usage. The ongoing commissioning process identified several temperature sensors within the building that were reporting higher than actual temperatures. By recalibrating the temperature sensors, the team removed unnecessary strain from the HVAC system, increasing overall efficiency and lowering utility expenses. Go to [Appendix A](#) for more information about the value of ongoing commissioning.

ii Project Implementation

USGBC's *Green Existing Schools Project Management Guide* and *Green Operations Guide: Integrating LEED into Your Operations and Maintenance Process* provide additional details, including tools to conduct a gap analysis and an economic assessment.

1. Overview:

A full gap analysis will determine the investment, staff hours, building upgrades and policy or procedure changes needed to achieve the performance goals. Additionally, a project economics assessment will support the project by estimating costs and identify potential cost-savings streams.

2. Getting Started:

Conduct a full building-level gap analysis to assess the difference between current performance and the goals identified on the LEED Project Checklist. Identify and assign responsibilities to members of the project team for implementation and documentation of credits.

Conduct a project economics assessment to estimate costs and identify savings streams for each project measure. The assessment will help identify ways to offset initial costs with incentives, rebates and financing options. (See [Pre-Project Budget Planning](#) for more details.) The economics assessment should include one-time costs, annual costs and annual savings for each performance measure, allowing for a calculation of an overall return-on-investment for the project. The example below details a LEED for Existing Buildings: O&M certification project that used the paid-from-savings financing approach. For more details, see USGBC’s *Paid-from-Savings Guide to Greening Existing Buildings: Executive Summary*.)

Green Performance Measures for Existing Buildings (LEED prerequisite/credit)	Capital Budget Costs	Operating Budget		
		Onetime Costs	Annual Costs	Annual Savings
High Performance Building Systems				
Plant Native Plants & Groundcover (SSc5)		\$8,250		\$400
Install Water Efficient Fixtures (WEp1, WEc2)	\$22,000			\$2,190
Install Energy Efficiency Improvements (EAp2, EAc1)	\$505,473			\$70,375
Test & Balance O/A Intakes (IEQp1)		\$21,250		
O&M Best Practices				
Occupant Commuting Survey (SSc4)		\$0	\$0	
Develop Landscape Plan & Training (SSc3)		\$2,500		
Conduct ASHRAE Level II Audit (EAc2.1)		\$17,000		
Implement Low/No-cost Improvements and On-going Cx (EAc2.2, EAc2.3)		\$18,500	\$1,500	\$8,500
Conduct Waste Stream Audit (MRc6)		\$6,250		
Conduct IAQ Audit (IEQc1.1)		\$8,750		
LEED Assessment & Documentation Services		\$25,500		
Sustainable Policies				
Develop Sustainable Purchasing Policy/Program (MRp1)		\$3,750	\$2,250	\$0
Develop Recycling Policy/Program (MRp2, MRc7)		\$6,750	\$1,000	\$2,680
Establish ETS Control Policy (IEQp2)		\$0	\$0	
Totals:	\$527,473	\$118,500	\$4,750	\$84,145
	Total Cost: \$645,973		Net Savings: \$79,395	
ROI:	12.3%			
PAYBACK:	8.1 Years			

3. Next Steps:

LEED for Existing Buildings: O&M certification requires that some aspects of sustainable operations performance are verified and monitored over a performance period of at least three months and no more than 24 months. It is important; therefore, to identify activities early in the process that must be completed prior to or within the performance period and those that are performance-period independent. Set a target date to apply for LEED certification and work backwards from that date to create an implementation timeline that reflects the needed performance periods.

For example, benchmarking in ENERGY STAR Portfolio Manager requires at least 12 months of consecutive utility data. If the project includes energy systems upgrades, those would need to have been completed 12 months prior to submitting for certification in order for the ENERGY STAR score to reflect the full impact of those upgrades. Some green operations and maintenance practices, such as conducting a commuter survey, can occur at any point within the performance period. Additionally, some sustainable policies and procedures, such as a no-smoking perimeter or a building hardscape management plan, may have been in place for many years and only need to be verified and monitored during the performance period.

Prerequisite/Credit		Performance Periods								LEED Certification Application	
		Pts	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 5	Qtr 6	Qtr 7	Qtr 8	
1 Green Grounds											
SSc2	Building Exterior and Hardscape Management Plan	1									
SSc3	Integrated Pest Management, Erosion Control, and Landscape Management Plan	1									
2 Alternative Commuting											
SSc4	Alternative Commuting Transportation	8						◆			
3 Water Efficiency											
WEp1	Minimum Indoor Plumbing Fixture and Fitting Efficiency				◆					(Performance period N/A)	
WEc2	Additional Indoor Plumbing Fixture and Fitting Efficiency	3			◆					(Performance period N/A)	
4 Energy Efficiency Best Management Practices											
EAp1	Energy Efficiency Best Management Practices—Planning, Documentation, and Opportunity Assessment		◆								
EAc2.1	Existing Building Commissioning—Investigation and Analysis	2	◆								
EAc2.2	Existing Building Commissioning—Implementation	2		◆							
5 Energy Performance											
EAp2	Minimum Energy Efficiency Performance										
EAc1	Optimize Energy Efficiency Performance	9									
EAc6	Emissions Reduction Reporting	1							◆		
Implementation and continuing performance			◆	One-time activity or event				Remainder of Performance Period			

The gap analysis will identify necessary improvements as well as any information gaps that might affect the performance period. Make sure to schedule data collection for the project’s LEED goals within the defined performance period. Use a pre-performance period to implement changes in policy or practice that may not be possible to execute within a tightly defined time frame. It may be helpful to take preliminary measurements of some performance metrics that rely primarily on occupant behavior, such as commuting or recycling. If performance is low, time will be available to implement additional education or engagement campaigns.

**CASE
STUDY****WASTE STREAM ANALYSIS AND REDUCTION
THE COLUMBIA CENTER, SAN DIEGO, CA**

To fully understand and analyze waste production patterns at the Columbia Center, a multi-tenant office building in San Diego, the project team instituted operational as well as educational measures to encourage recycling. The measures have allowed the project team to identify areas of improvement within the recycling program and implement revisions to correct deficiencies. For example, during an initial audit of the building's waste stream, the project team noticed that many tenants were unaware of the comingled recycling program, which collects mixed recyclables in one container. As a result, Columbia Center held a trash and recycling workshop to educate tenants about what can and cannot be recycled, and how recyclables are to be collected.

Building operations generate large amounts of waste in various forms. Some of these materials are recyclable, others are not. The first step in setting waste management goals is to identify the largest and most expensive waste streams generated by the building operations. Significant cost savings can be achieved with reductions in waste and increasing recycling.

A waste stream audit will reveal areas where the building is performing well and where improvements are needed. Specific waste streams, such as toxic waste, can be targeted for individual waste reduction efforts. Most owners reduce waste by focusing on increasing overall levels of recycling. Basic steps to establishing a recycling program:

- Involve janitorial staff and find a recycling program leader
- Identify the waste to recycle
- Implement a simple, clearly recognizable collection system
- Educate building tenants and promote recycling programs

CASE STUDY

GREEN HOUSEKEEPING

STATE OF COLORADO CAPITOL COMPLEX, DENVER, CO

The Colorado State Capitol Complex achieved LEED for Existing Buildings: O&M certification by implementing a high-performance green cleaning program in order to maintain a clean working environment while minimizing the building occupants' exposure to harmful chemicals. Critical elements of the program include the use of cleaning products that meet the Green Seal Standard GS-37, products with low VOC levels whenever applicable, and products with high, post-consumer recycled content. Raising awareness and instilling a sense of responsibility and pride among employees and maintenance contractors is critical to success. To convert to the new housekeeping system, the State of Colorado provided training for the existing cleaning contractor on the use of green cleaning products. As a result, the state has been able to keep the cost of cleaning down as well as gain support from the cleaning and maintenance staffs for the state's sustainability goals.

What is Green Cleaning?

USGBC defines green cleaning as the use of cleaning products and practices that have lower environmental impacts and more positive indoor air quality impacts than conventional products and practices. Green cleaning policies and practices represent a significant portion of the Indoor Environmental Quality credit category of the LEED for Existing Buildings: O&M rating system. Green cleaning practices can help to reduce building occupants' risk of exposure to potentially hazardous contaminants and improve the indoor environment, while keeping building interiors clean and attractive.

Key elements of a green cleaning policy:

- Purchase cleaning products and equipment that meet LEED indoor environmental quality criteria
- Establish standard operating procedures for green cleaning and maintenance
- Develop guidelines to ensure safe handling of cleaning chemicals
- Develop staffing and training requirements
- Provide a system to encourage occupant feedback to evaluate new technologies, procedures, and processes

iii. Recertification

1. Overview:

LEED certified buildings can be recertified as frequently as every year and periodic recertification is a requirement for many LEED buildings. Building performance is dynamic and achieving sustainability goals through LEED requires ongoing management and periodic reassessment of performance. Establishing a plan that includes ongoing performance monitoring, documentation and training will make the LEED recertification process efficient and cost effective.

At the time the *Roadmap to Green Government Buildings* was published, the LEED recertification process was undergoing revision. Please search usgbc.org with keyword, “Recertification” for detailed instructions about registering and documenting a recertification project.

2. Getting Started:

The process of evaluating and documenting building systems, policies and performance to achieve LEED certification sets the foundation for maintaining and improving performance over time. Carrying these goals forward through ongoing and periodic facility performance assessments will ensure successful LEED recertification.

A successful recertification plan will include the following:

- **Maintain Original LEED Documentation.** Building owners should request copies of the LEED credit templates and supporting documentation that was reviewed for the original LEED certification. The documentation shows what goals were set and how they were achieved, providing a baseline for future operations.
- **Create an Ongoing Commissioning Plan.** Commissioning is the process of ensuring that the owner’s operational needs are met, building systems perform efficiently, and building operators are properly trained. Ongoing commissioning (also called continuous commissioning) should be implemented over the life of the building to recalibrate systems to reflect changes in use

or occupancy and to sustain the improvements and efficiencies that were gained when the building was first commissioned. (See [Appendix A](#) for information about ongoing commissioning.)

- **Conduct a Facility Performance Evaluation.** A facility performance evaluation (FPE) is a post-occupancy evaluation and includes a review of existing building commissioning efforts and ENERGY STAR benchmarking. There are a variety of ways to conduct an FPE, ranging from a quick-response survey of users soon after full occupancy to a broad evaluation that might resemble the gap analysis conducted in preparation for LEED for Existing Buildings: O&M certification. Read more about conducting an FPE in [The Building Life Cycle](#).

ON THE HORIZON

5) GREEN PORTFOLIO MANAGEMENT

Many government entities own multiple buildings and facilities, representing a diverse portfolio of building assets. While some buildings in the portfolio may not be candidates for LEED certification, a comprehensive approach to greening government buildings using LEED as a guide will ensure that goals and metrics for building performance are set consistently and that green initiatives will benefit from economies of scale.

i. Centralized Program Administration

1. Overview

Create a centralized approach to program administration from the start of the green building program to improve efficiency and avoid pitfalls. As buildings within the portfolio are designed, built, and operated with a green approach, a central method to program administration can help with coordination, tracking and reporting green building activities and accomplishments. Even if initial plans include certifying only one building, plan that other facilities may eventually seek LEED certification.

2. Getting Started

Develop a central program administration approach to establish a single point of contact for the green building initiative. Even if many are involved in the effort, such as capital project managers, facilities departments, resource conservation and other staff, there should be one person who is aware of all the organization's green building activities. The point person, often referred to as the program administration leader, will need to stay current on all green government building activities, including plans for new facilities, upgrades to existing facilities, facility performance evaluation efforts, conservation incentives and the public information plan.

The program administration leader should create a tool, such as a spreadsheet, to track all green building activities within the portfolio.

The information should include data on whether or not the building is pursuing LEED certification, the LEED project number, certification status and contacts for any consultants involved in green building efforts. Eventually, each project's LEED Scorecard (the final version of the LEED Project Checklist) should be collected as well as contact information on who prepared the LEED documentation package.

3. Next Steps

For large agencies with many green building projects, consider creating a centrally accessible database that many can access to retrieve the LEED information. Possible tools include an internal Web site or network files. The database also serves as a way to capture and store institutional memory. Only staff who need the information should be given access.

Create a naming convention when registering LEED projects. This is beneficial for institutions that may have a variety of departments or large staffs involved in registering and managing the LEED process. For example, have all projects use "City of X" or "State of X" as a prefix to make searching easier. Tracking information provided by USGBC is done in addition to an entity's own internal tracking efforts. Consider

CASE STUDY

GREENPRINT: A TOOL TO PROVIDE INFORMATION ON GREEN BUILDING PROJECTS SAN FRANCISCO, CA

GreenPRINT is a Web-based application for the City of San Francisco staff working on green building projects. The development of the tool was made possible with the support of U.S. EPA Region 9.

The tool serves the following needs:

- Provides information and resources for implementing the city's green building requirements
- Identifies city projects in all phases of design and construction
- Monitors the progress of projects and the LEED credits for which they are applying
- Evaluates green building projects based on calculated environmental and financial savings
- Reports on the status and effects of green buildings in the city with data on sponsoring city department, project location, certification level and environmental impact

adding fields to the centralized program administration tool to track the number of LEED APs on staff, including information on their individual departments and agencies. The information can be helpful in finding internal staff resources and in providing performance measures.

ii. The Building Life Cycle

1. Overview

The ultimate performance of a green building project relies on the abilities and behavior of the people that will occupy and operate it.

Utilize the clear and holistic performance metrics within LEED throughout the building lifecycle, to evaluate the ongoing performance of new buildings, take steps to green existing buildings and to implement broader organizational policies and procedures for ongoing operations. LEED is a compass to meet sustainability goals through green building.

2. Getting Started

Organizations using LEED for goal setting and measuring performance should evaluate how they track key building performance indicators and identify any needed improvements. The key performance indicators used in LEED include:

- Energy
- Water
- Waste
- Transportation
- Occupant experience and productivity

Building managers and occupants should be actively involved in green building initiatives. Building managers, in particular, have unique insight on how the building is actually used and on the behavior of occupants. They can shed light on operating costs, building controls, maintenance implications of different design strategies, storage needs, and effective metering and measurement strategies. In addition, building managers should be actively involved in identifying and addressing the training needs of all future building operations and maintenance staff. Ensure

the team responsible for implementing any new policies and procedures are fully informed of the associated goals and best practices so that they are prepared to ensure optimal building performance.

3. Next Steps

Building performance, especially energy and water usage, is dynamic and will vary with changes in occupancy, building use and environmental conditions, so it is important to monitor and benchmark ongoing performance. By doing so, government entities can identify inefficiency quickly and make the needed adjustments to systems or management. Monitoring performance can range in scale from analyzing building-level utility and water bills to the individual component or zone outputs from a building automation system. Benchmarking, or comparing performance to past usage data or to that of other similar buildings, allows owners to identify opportunities for improvement.

Conduct a facility performance evaluation (FPE) to assess current building conditions, performance and the success of green strategies used in new construction. A periodic evaluation can reveal details about the performance of specific technologies, materials and systems, in addition to assessing how well the building is meeting occupant needs. There are a variety of ways to conduct an FPE, ranging from a quick-response survey soon after full occupancy to a broad evaluation that might resemble the gap analysis conducted in preparation for LEED for Existing Buildings: O&M certification.

iii. Reporting to Stakeholders

1. Overview

Effectively communicating the success of green building projects will satisfy reporting requirements and raise the visibility and reputation of the government entity. Beyond mandated reporting requirements, there will be many stakeholders, both internal and external, who will want a report on the progress of the government's green building initiative.

CASE
STUDY

FACILITY PERFORMANCE EVALUATION MASSACHUSETTS DIVISION OF CAPITAL ASSET MANAGEMENT

The Massachusetts Division of Capital Asset Management (DCAM) is the primary agency responsible for managing state building construction and major renovation projects. For many years, DCAM has utilized post-occupancy evaluation (POE) to learn from completed projects and create a feedback loop for decision making on new projects. DCAM's original POE was used to gather O&M lessons learned primarily through occupant feedback on building usage. The goal was to apply these lessons to new projects. The current emphasis on sustainable design, energy efficiency and water conservation has strengthened the desire of the agency to include quantitative facility performance analysis to verify that the decisions being made are bringing operational and life cycle value to state facilities.

DCAM renamed the program Facility Performance Evaluation (FPE) to better reflect the goals of the analysis and expanded POE visits. The new evaluation criteria includes analysis of planned versus actual energy and water usage in addition to gaining insight on space planning, materials, operations and maintenance.

Read more about conducting facility performance evaluation, including case studies from Massachusetts and Washington detailed in the *NASFA/AIA Facility Performance Evaluation Guidance Document for Public Facilities*, at: nasfa.net.

What is a Facility Performance Evaluation?

A facility performance evaluation assists building owners with benchmarking current operations, determining goals for future operations and establishing a plan to achieve those goals. The process can include post-occupancy evaluation, existing building commissioning, and ENERGY STAR achievement. As such, a facility performance evaluation requires support from a team of people, including the facility manager, engineering technicians, janitorial staff, capital projects managers, building controls specialists, etc. Depending on the scope of the evaluation, data collection methods may include a building site assessment, reviewing building performance data, and a survey and/or interview of occupants and facility staff.

The performance evaluation may also dig deeper into specific systems and operational practices, such as a building's purchasing, housekeeping, grounds keeping, waste management, HVAC systems, electrical system, and plumbing. This is often done when an FPE is used to conduct a LEED for Existing Buildings: Operations & Maintenance gap analysis—comparing the current condition to the requirements in LEED. Together, the building's operational focus areas and the LEED prerequisites form the areas of focus or list of improvements to be made. These areas of focus can be mapped to specific LEED goals which, in turn, provide the team a clear set of improvements to evaluate.

An FPE can serve a secondary purpose by securing occupant and facility staff buy-in to make improvements. Training may also be provided for monitoring and verification of building systems, which is complementary to periodic building commissioning. Facility staff with advanced training will be able to offer innovative solutions for improving building performance beyond current standard practice, including messaging to building occupants on simple ways that they can reduce energy, water, and waste use in the building.

2. Getting Started

Use the performance data being tracked to prepare fact sheets and progress reports. Most stakeholders will be interested in the energy and water savings. This information can be reported using projected or actual numbers. Other statistics of interest include the number of LEED-certified projects and the corresponding square footage, how many LEED APs are on staff, the new sustainable policies and procedures implemented, or how much waste was diverted from the landfill through construction waste recycling efforts (a metric the building contractor should have easily available). Showcase all types of information and present it creatively using tables and graphics.

3. Next Steps

Elected officials and other stakeholders will want to know how they are doing compared to other cities or jurisdictions. USGBC tracks data by city and state in its LEED Project Directory. There are other programs that rate a city's sustainability level, including the Natural Resources Defense Council (NRDC) and SustainLane, a Web site dedicated to sustainability. Some resources include LEED project counts in the evaluation criteria.

4. Resources

Resources and examples of how to effectively communicate the results of a green building initiative and USGBC's LEED Project Directory, can be found at: [usgbc.org/govroadmapresources](https://www.usgbc.org/govroadmapresources).

iv. Reporting Building Emissions

1. Overview

Tracking and reporting greenhouse gas (GHG) emissions generated from the operation of buildings will help governments better understand the effectiveness of programs implemented to reduce emissions.

2. Getting Started

To analyze GHG emissions, governments must first select a third-party reporting protocol or standard to guide the process. Using a reporting protocol will ensure accurate information is collected and allows for national comparisons.

There are four steps to track and report a building's emissions:

1. Select a reporting protocol or program.
2. Identify the emission sources to be included in the inventory.
3. Collect building data, such as utility and energy consumption, and/or other data for the emissions sources identified.
4. Enter the data into an emissions calculator to quantify emissions and then report emissions following the selected protocol's or standard's guidelines.

3. Next Steps

One of the challenges in reporting a building's emissions is identifying and deciding what emissions to include. A high-density, urban office building that is 100% owned by the government is an example of a building with a simple emissions profile. Tracking emissions based solely on utility bills would capture most of this building's carbon emissions, making the ENERGY STAR Portfolio Manager an appropriate tool for calculating GHG emissions.

In contrast, a large public park would have a complex emissions profile. A maintenance facility in the park might have low emissions from its operations, but it is associated with emissions from a variety of other sources, including landscaping (irrigation, fertilizer and vehicle fuel), transportation of staff and visitors to the park, and the washing of maintenance equipment. The high-density office building would seem to emit more carbon, but, if all the above noted factors were included in the analysis of the public park's emissions, the park's profile will likely be higher. For the park, a holistic method, such as the World Resource Institute's Greenhouse Gas Reporting Protocol, would be warranted.

It is important to follow the steps outlined in the selected third-party reporting program. The protocols and programs are designed to help users through the step-by-step process and to ensure information is collected and analyzed accurately.

4. Resources

Resources and programs to report greenhouse gas emissions, including information on the National Park Service's Climate Leadership in Parks (CLIP) tool—a Microsoft Excel-based program to conduct an emission inventory and develop an action plan to reduce emissions—can be found at: [usgbc.org/govroadmapresources](https://www.usgbc.org/govroadmapresources).

SCALE IT UP

6) BEYOND GREEN GOVERNMENT BUILDINGS

The *Roadmap* focuses primarily on how government entities can build green facilities and implement sustainable policies and practices for buildings they own. Some government entities have implemented initiatives that include a broad range of tools, services and incentives that focus on ways to encourage the private sector to adopt green building best practices.

i. LEED for Homes and LEED for Neighborhood Development

1. Overview

The LEED for Homes and the LEED for Neighborhood Development rating systems provide tools to help governments promote sustainability beyond government-owned building portfolios. The LEED for Homes and LEED for Neighborhood Development rating systems are tools for identifying policy and code barriers to green residential and neighborhood design, for designing residential incentive programs, and for supporting staff education.

- **LEED for Homes** is a certification program for low- and mid-rise residential construction, including single-family homes, production homes, multifamily buildings and affordable housing projects. LEED for Homes emphasizes location efficiencies, energy and water savings, improved indoor air quality, and resident education and training. The program requires third party, on-site verification prior to certification using a local LEED for Homes Green Rater.
- **LEED for Neighborhood Development** is a certification program for mixed-use or single-use developments. It emphasizes smart growth, New Urbanism, and green buildings and infrastructure. For developments large and small, the program rewards location efficiencies, walkability, community interaction, mixed uses, and green design features.

2. Getting Started

Learn the basics of these two LEED rating systems, including the best practices the systems highlight, how they relate to other rating systems and how they can be used to better inform public policy and planning.

Key resources:

- USGBC's LEED for Homes and LEED for Neighborhood Development Web pages: [usgbc.org/homes](https://www.usgbc.org/homes) and [usgbc.org/neighborhoods](https://www.usgbc.org/neighborhoods)
- LEED for Homes and LEED for Neighborhood Development Project Profiles: [usgbc.org/resources](https://www.usgbc.org/resources)
- LEED Programs for Homes & Neighborhoods Fact Sheet: <http://www.usgbc.org/ShowFile.aspx?DocumentID=6609>
- LEED Program for Homes & Neighborhoods education courses available through USGBC: [usgbc.org/courses](https://www.usgbc.org/courses)

3. Next steps

Incorporate the standards and principles of the LEED for Homes and LEED for Neighborhood Development rating systems into government sustainability guidelines addressing the built environment and climate action plans. Reference LEED for Homes and LEED for Neighborhood Development principles, standards and best practices during local code and policy revisions to identify and eliminate potential barriers to sustainable development, such as codes that conflict with mixed-use zoning, higher density, integrated bicycle lanes or residential greywater systems.

Pursue LEED for Homes and/or LEED for Neighborhood Development certification for government-funded housing, development or public-private partnerships, and incorporate the principles of these rating systems in RFP/Qs for the development on publicly owned land. Use financial and other policy incentives to encourage private developers and homebuilders to follow LEED for Homes and LEED for Neighborhood Development principles.

ii. Private Sector Programs and Incentives

The following section contains excerpts from the USGBC/Sierra Club publication, *Green Buildings for Cool Cities: A Guide for Advancing Local Green Building Policies*. The guide is available at: [usgbc.org/government](https://www.usgbc.org/government).

1. Overview

Public-sector programs can encourage the private sector to adopt green building initiatives and programs. A government's commitment to green public buildings creates the credibility and experience needed to implement programs that encourage the private sector to build green. Such programs can include outreach and training, technical assistance and recognition, and structural and financial incentives.

2. Getting started

Start engaging the private sector in a green building program through community outreach and training programs. Outreach can include publications on green building geared towards developers, homeowners, building owners and managers. Information can be provided through Web sites, brochures and information kiosks. Case studies of local green building projects are a great way to spread the word about successful projects and can include government green building projects as well as those in the private sector.

An important part of an outreach program includes providing training for local building industry professionals. The training programs can be the same as those provided for government staff (even though these programs focused on publicly funded projects) or can be customized for a specific audience. Homeowners will want different information than builders or large-scale developers, so adjust accordingly. Educational programming can begin with basic introductory level classes, and, over time, begin to include more advanced training courses. Partner with local professional organizations, including USGBC chapters, to sponsor and promote programs.

3. Next steps

Once green building has been introduced to the local community through outreach and training, consider providing support through recognition and technical assistance. Developers and building owners can benefit from marketing assistance or public recognition of their green building initiatives and achievements. Governments can provide signage, awards, highlight projects on Web sites, and prepare press releases to help green builders gain recognition and support. This type of incentive is easily coordinated within existing outreach and education efforts.

Technical assistance services can include hotlines, walk-in information centers, by-appointment sessions and assistance with such tasks as design charrettes, LEED implementation and cost-benefit analysis. Providing such technical assistance also helps government representatives garner insight into the perspectives of the private-sector green building community. Many green building questions will relate to different technologies and products, including local availability and how these strategies will meet local code requirements. Other questions will relate to financing and funding challenges. Technical assistance staff can also help connect projects with funding sources, including grants and incentives available from local, state and federal entities.

CASE STUDY

GREEN BUILDING TECHNICAL ASSISTANCE NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY

The New York State Energy Research and Development Authority (NYSERDA) supports a broad range of incentive and assistance programs for commercial and industrial buildings. For existing buildings, NYSERDA offers assistance with energy audits and incentive grants and a loan program to purchase energy-efficient technologies. The authority also supports green building in new construction through incentives and technical assistance for energy modeling, design charrette facilitation, commissioning and purchasing high-efficiency equipment.

4. Steps to Expansion

Simple modifications in zoning permissions and review processes can create strong incentives for developers and building owners. Structural incentives, such as density bonuses and expedited permitting, can be implemented at low or no cost to government authorities and will make building green an attractive option.

Financial incentives, such as tax credits and abatements, are highly successful means of encouraging developers to follow green building practices. Some jurisdictions will offer these incentives to builders within special development districts and many municipalities already use such methods to advance other policy agendas. Jurisdictions that charge fees for permit review or other permitting processes are offering reductions or waivers for developers or contractors who commit to verifiable green building practices. Green building grants and loan funds can be established to directly counter real and perceived cost barriers.

5. Resources

Resources on green building programs targeting the private sector, including USGBC's government resources page, a searchable database of green building policies, and fact sheets with succinct overviews of policy and incentive options, can be found at: [usgbc.org/govroadmapresources](https://www.usgbc.org/govroadmapresources).

iii. Green Building Codes

This section contains excerpts from USGBC's white paper, Greening the Codes: Building Codes Begin to Broaden their Charge to Include Human and Environmental Impacts of Buildings into their Health and Safety Mission. The white paper is available at: [usgbc.org/government](https://www.usgbc.org/government).

1. Overview

Implementing green building codes and using beyond-code green building rating systems provide the best-case scenarios for creating sustainable communities. Without stronger, more comprehensive green building codes, the majority of buildings will remain untouched and the benefits of sustainable building practices and policies will not be realized.

Jurisdictions engaged in sustainability planning should consider the many green building policy options available, including establishing green building codes and utilizing beyond-code rating systems. Green building codes and rating systems play distinct and complementary roles in the pursuit of sustainable buildings and communities. Establishing green building codes will set new standards and create the foundation from which jurisdictions can implement the higher standards set by the beyond-code rating systems.

In March of 2010, the International Code Council (ICC), the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), the U.S. Green Building Council (USGBC), the American Institute of Architects (AIA), the Illuminating Engineering Society of North America (IES), and ASTM International (ASTM) announced a partnership to launch the International Green Construction Code (IGCC). IGCC is the first comprehensive set of national model green building codes and standards, designed to be adoptable and enforceable by any jurisdiction. The code is both consistent and coordinated with the ICC Family of Codes used throughout the U.S. It relies on widely respected protocols and standards and includes the American National Standards Institute (ANSI)/ASHRAE/USGBC/IES Standard 189.1 as an optional path to compliance.

2. Getting Started

Safer, healthier and more environmentally responsible green building codes are at the heart of sustainability planning and will raise the standards for the entire community. Green building rating systems, such as LEED, set beyond-code benchmarks, enabling improved outcomes that exceed regulatory minimums.

The adoption of beyond-code rating systems for publicly-owned and publicly-funded buildings demonstrates leadership by example, sets a high bar for responsible stewardship of public funds, and drives demand for improved regulatory minimums – a role that mandatory green building codes and standards have been designed to fulfill. Incentives for the private sector to demonstrate leadership beyond code is also best benchmarked with beyond-code rating systems like LEED.

Commercial Buildings: In addition to adopting and implementing the 2007 national model commercial building energy code, known as Standard 90.1-2007, consider adopting the International Green Construction Code and its technically rigorous 189.1 compliance path – in whole or in part – as mandatory for all commercial buildings in the state.

Residential Buildings: In addition to adopting and implementing the 2009 International Energy Conservation Code, consider the use of a well-established local green homebuilding program.

3. Next Steps

An industry-accepted set of national green building codes and standards should not replace community participation and discussion when considering the adoption of codes, standards or rating systems. As a comprehensive green building code, the IGCC provides strong guidance, in normative language, for energy and water efficiency, indoor environmental quality and resources, construction practice, building operations, transportation and land use—each with provisions that may require localized consideration. Beyond consideration of the provisions themselves, the broadening of scope in the building codes may be the most important element in the evolution of building safety and of sustainability within the built environment.

Codes provide the means to reduce risks to an acceptable level, but cannot by themselves eliminate all potential hazards. Effective adoption and enforcement of building codes requires the diligence of building owners and operators, licensed professionals and the diverse stakeholders related to greener construction, along with the enforcement community. Proper design education, sound construction practices, effective code administration programs, beyond-code leadership programs and the important advancement of building science, are all factors in the success of green building codes.

CASE STUDY

CALGreen

STATE-WIDE GREEN BUILDING CODES

The State of California created the first, state-wide green building standards code that took effect in January of 2011. The code, called CALGreen, slashes water use by 20%, requires the reduction of construction waste by 50%, requires commissioning and cool roofs and cuts back on polluting materials in residential and commercial construction statewide.

Governor Schwarzenegger, who directed the California Building Standards Commission to work on the code adoption process, noted that “The code will help us meet our goals of curbing global warming and achieving 33 percent renewable energy by 2020 and promotes the development of more sustainable communities by reducing greenhouse gas emissions and improving energy efficiency in every new home, office building or public structure.” The California Air Resources Board has estimated that the mandatory portions of the new code will reduce greenhouse gas emissions by 3 million metric tons by 2020.

For more, see usgbc.org/News/PressReleaseDetails.aspx?ID=4367.

4. Resources

Information on adopting and implementing green building codes, including New York City’s Green Codes Task Force’s recommendations for the incremental greening of building codes, can be found at:

usgbc.org/govroadmapresources.

7) CELEBRATE – REFUEL – ACCELERATE

i. Continuous Program Improvement

1. Overview

A high-impact green building program develops over time and continually seeks ways to improve and address new challenges.

A process for continued improvement includes gathering lessons learned and creating a feedback loop to integrate this information into ongoing program development. Whether the program is completing its first LEED-certified building or taking steps towards centralized administration and reporting, continue to review the *Roadmap* to discover new ways to build the program's capacity.

2. Getting Started

A good first step is to celebrate the program's successes through a public relations campaign that highlights the impact and energy cost savings of the green buildings. Compile case studies and seek ways to disseminate them to key constituents. Make sure elected officials and the public are aware of what the program has achieved and the plans to ensure its continued success. Also evaluate partnerships and the effectiveness of the early efforts to engage the community in the process. Seek ways to build on the social and professional green building network that the program initiated and consider ways to better tap the expertise of its members.

3. Next Steps

Review the program goals to ensure they are still relevant; they may need to be expanded or retooled. Analyze benchmarks and performance targets to determine where additional efforts may be required. Consider what resources are needed to move the program to the next level, including new or ongoing training and education. Decide if the program successes have been fully leveraged. Also, determine, if any, the expertise that is missing from the current team and assess ways to address the gaps.

4. Steps to Expansion

Consider whether additional resources will be needed for continuous program improvement. Use the program's successes and the identified needs to justify additional funding requests. Decide how, and if, additional political support can be secured to expand current initiatives.

Roadmap to Green Government Buildings shares the tools, resources and best practices of government entities from across the U.S. At the heart of green building programs are dedicated officials and staff seeking to find proven, cost-effective ways for government to promote sustainability. Join this community on the Web at: [usgbc.org/government](https://www.usgbc.org/government) and explore ideas, find resources and share expertise. Together, we can achieve the goal of green buildings for everyone within a generation.

APPENDIX A

FINE-TUNING HIGH-PERFORMANCE: AN OVERVIEW OF NEW AND EXISTING BUILDING COMMISSIONING FOR LEED PROJECT MANAGERS

i. Introduction

Achieving sustainability goals through green building requires the evaluation and improvement of building performance over time. Utilizing high-performance systems and green strategies in design and construction is the first step. Implementing green operation and maintenance practices will set the groundwork to ensure continual high performance of these systems and strategies.

To know whether building systems are actually functioning as designed and that they actually meet their highest performance potential, building commissioning must be undertaken at several points during the life of the building. Commissioning is the systematic and documented process of ensuring that the owner's operational needs are met, building systems perform efficiently, and building operators are properly trained. LEED for New Construction certification requires fundamental commissioning as a prerequisite and awards points for enhanced commissioning, which involves a commissioning agent during building design and as part of operator training. LEED for Existing Buildings: Operations & Maintenance certification awards points for each of three complementary steps: retro-commissioning investigation and analysis, implementation of cost-effective improvements and creating an ongoing commissioning plan for periodic assessment and calibration of systems.

This appendix is intended to provide an easy-to-understand overview of the different commissioning processes as they pertain to a LEED project and to introduce relevant considerations for a project manager. For a more detailed technical description of the commissioning process, including a comprehensive resource library, see the Building Commissioning section of the Whole Building Design Guide, which is maintained by the National Institute of Building Sciences at: wbdg.org/project/buildingcomm.php. For a complete outline of the standards, considerations and implementation

of building commissioning as defined in LEED, refer to the LEED for New Construction and/or LEED for Existing Buildings: O&M reference guides at: [usgbc.org/publications](https://www.usgbc.org/publications).

ii. Enhanced Commissioning as Part of Design

1. Overview

The goal of building commissioning is to ensure that a facility operates as it was intended, meets the needs of the building owner and occupants, and that staff have the information they need to operate the facility effectively. To successfully commission a building, it is necessary to provide documentation and verification of the performance of all building equipment and systems.

Commissioning new buildings ensures integration and operability of major mechanical and electrical systems, especially for large projects with complicated designs. In addition to having a fully functional building upon completion, commissioning lowers energy and maintenance costs in the long term through more efficiently run systems and saves money since problems are fixed before the building is occupied. Commissioned buildings have proven to be safer and more comfortable for tenants and have avoided disputes or callbacks between the building owner and the contractors by verifying that all building systems function correctly.

2. Getting Started

To fully realize the benefits of commissioning, a commissioning agent should be engaged early in the design phase of a new construction project. The commissioning agent will conduct various quality assurance tasks and documentation activities at different milestones throughout design and construction process, from pre-design planning through design, construction, start-up and operations, to ensure that the building systems function as intended and that facility staff are trained on building operations.

The goal of the process is to track the owner's project requirements and ensure that decisions made by other team members are in line with the project requirements. At the end of construction, the building is tested

to verify that the owner's project requirements are met and building operators are provided with accurate operations and maintenance manuals. LEED defines this involvement of a commissioning agent from design through operations as "Enhanced Commissioning".

Commissioning is considered a separate service from design and construction, and an agent should be involved throughout the project. The agent should be an independent, objective authority that has significant design and hands-on experience with building systems. Depending on the size and complexity of the project, commissioning a facility may require the participation of the project manager, building owners, designers, contractors and operators. The commissioning agent leads the team through this process and is responsible for the quality of the project; therefore, the individual should have no other project duties or responsibilities in order to maintain an independent perspective.

The LEED rating system defines the criteria for choosing a commissioning agent. The guidance can be found within the LEED reference guides and summarized for new construction in the following document: [usgbc.org/ShowFile.aspx?DocumentID=1262](https://www.usgbc.org/ShowFile.aspx?DocumentID=1262).

3. Next Steps

Commissioning services should be secured early in the design phase to review the owner's project requirements to ensure project goals are met. For example, a goal may be "save 20% below energy code". The commissioning agent's job is to understand the technical tasks and requirements behind that 20% number to such a degree that they can test a particular piece of equipment at the end of construction and decide whether it is meeting the stated goal outlined in the owner's project requirements. The commissioning agent will help the design team determine how these requirements will be translated into "acceptance criteria" that are tested at the end of construction. The criteria should be in the project contract documents (drawings and specifications), so that the contractor understands what they are accountable for as part of the commissioning plan.

Depending on the owner's project requirements, commissioning can include security; fire, life, and safety systems; envelope; HVAC; lighting;

electrical power quality; and several others. Projects pursuing LEED certification are required to commission at least the following:

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

iii. Ongoing Facility Commissioning and Retro-Commissioning

1. Overview

Commissioning ensures that building systems are operated most efficiently and effectively, throughout the life of the building. Commissioning of new, high-performance buildings is becoming common practice. Retro-commissioning can yield significant improvements in efficiency and indoor environmental quality for existing buildings that were never commissioned. An ongoing commissioning plan (also called continuous commissioning) should be implemented over the life of both new and existing buildings to recalibrate systems according to changes in use or occupancy and to sustain improvements and efficiencies over time.

Properly executed commissioning can substantially reduce costs for maintenance, repairs and resource consumption, and improve the building's indoor environmental quality. Commissioning an existing building involves conducting a series of tests of the building systems and addressing any mechanical issues to ensure optimal building performance. "Retro-commissioning" applies to buildings that have never been commissioned and ensures the systems reach their optimal performance. "Ongoing commissioning" applies to buildings that have been commissioned in the past and ensures monitoring to improve ongoing performance.

2. Getting Started

Both retro-commissioning and ongoing commissioning involves a series of tests to identify areas that need to be improved. Existing building commissioning typically focuses on optimizing the performance of

existing energy-consuming equipment, such as HVAC systems and lighting. The existing building commissioning process may include an audit of the entire building, a study of past utility bills, interviews with facility personnel and functional testing of building systems.

Existing building commissioning involves three primary phases:

1. Investigation and Analysis
2. Implementation
3. Ongoing Commissioning

For a complete retro-commissioning project, most governments will need to hire a commissioning agent to perform the required tasks for the investigation and analysis phase. If it is possible to complete this phase within the organization, it is often advantageous to do so, in order to reduce costs and expand staff expertise. Depending on the findings of the investigation and the expertise of facility staff, implementation of the needed improvements or recalibrations may need to be contracted as well. The ongoing commissioning phase is a periodic reassessment based on the initial commissioning results and is typically performed in-house by properly trained facility staff.

Value of Commissioning

“Commissioning is one of the most cost-effective means of improving energy efficiency in commercial buildings.”

This quote is included in a 2004 study by Lawrence Berkley National Laboratory that compiled and synthesized building commissioning results from 224 buildings across 24 states. Specifically, the study cites:

- Even buildings designed for energy-efficiency show an additional energy savings of 10-15% after commissioning.
- Existing building retro-commissioning results had a median commissioning costs of .27/square feet, whole-building energy savings of 15%, and payback times of 0.7 years.
- Ongoing performance monitoring and diagnosis during routine operations are needed to sustain the efficiency gains from commissioning, preventing buildings from drifting to lower performance levels over time.

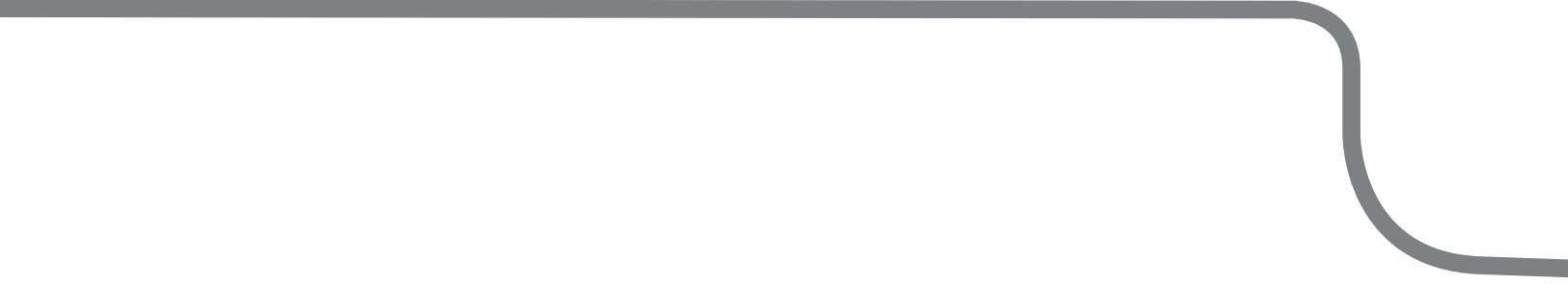
3. Next Steps

A typical approach to the Investigation and Analysis Phase includes:

1. Determine Internal Staff Capacity. Decide if staff can perform a building walkthrough assessment or if a consultant is needed. Governments with central facilities groups may already be tracking buildings' energy performance. If so, the individuals responsible for these tasks will have the knowledge and skills needed to perform the assessment.
2. Evaluate the Building's Documentation. At a minimum, the following is required:
 - Operating Plan
 - Systems Narrative (includes descriptions of heating, cooling, ventilation, lighting, and controls efforts)
 - Preventative Maintenance Plan
3. **Set Energy Efficiency Goals Using ENERGY STAR Portfolio Manager.** Portfolio Manager allows one to compare the energy performance of a building with similar local and national buildings. It also allows one to set energy goals using a tool called Target Finder. The tools, along with detailed instructions, can be found at: www.energystar.gov/benchmark.
4. **Budget for a Retro-commissioning Effort.** This process may be relatively inexpensive if internal staff has the ability to perform the building walkthrough assessment, the building's documentation is complete, and the building is performing close to the energy goals. If assistance is needed for some or all of these items, budget several thousand dollars to cover the Investigation and Analysis phase. The final budget will depend on the building's size, age and complexity.

After a building commissioning project is complete, develop an ongoing commissioning plan to systematically retest the commissioned building systems over time. LEED criteria states that the ongoing commissioning plan should be implemented on a cycle of no longer than 24 months (as specified in the most current LEED for Existing Buildings: O&M rating system). This means that within the span of two years, building systems

have been assessed for overall performance and, additionally, individual system components have undergone manual performance testing. Ongoing commissioning ensures that systems will be recalibrated regularly to reflect changes in the system or in occupant needs. The reevaluation of system settings and function also provides an opportunity to retrain building operators on procedures to ensure that systems are consistently running at their full potential efficiency.



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