

# ROADMAP to Sustainable Government Buildings

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SUSTAINABILITY GOALS

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PRE-PROJECT PLANNING

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## ACKNOWLEDGEMENT

The Roadmap to Sustainable Government Buildings was created through the joint efforts of the U.S. Green Building Council (USGBC) and the National Association of State Facilities Administrators (NASFA). We extend our deepest gratitude to all of our Roadmap committee members who participated in the development of this publication, for their tireless volunteer efforts and constant support of USGBC's mission. Ongoing development of the Roadmap has been made possible through the efforts of many dedicated volunteers, staff members, and other members of the USGBC community.

## DISCLAIMER

The Roadmap to Sustainable Government Buildings is a collection of information created by experts from various states across the country that are currently implementing green building programs based on LEED. These leaders generously shared their time and expertise to make these resources available. The opinions expressed in the Roadmap do not reflect the official position of the U.S. Green Building Council or the National Association of State Facilities Administrators and do not set any precedent to be upheld during a LEED certification review. Hyperlinks to online resources may be validated periodically. However, USGBC and NASFA do not offer any guarantee of currency or accuracy of any resources included in the Roadmap. The USGBC and NASFA are not responsible for offensive or illegal content displayed on outside web pages. The USGBC and NASFA are not responsible for any damage or loss, which results from following the advice in this publication or in the referenced appendices, annexes, or web pages.

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# The ROADMAP

to Sustainable Government Buildings guides government staff and officials in the development of a green building program based on the U.S. Green Building Council's LEED rating system.

## CHARTING YOUR JOURNEY

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### BUILD CAPACITY

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### SET THE GROUNDWORK

PRE-PROJECT PLANNING support for early stages of project planning, including budgeting, contracting, procurement, and compliance.

## REACHING MILESTONES

### IMPLEMENT LEED

Resources for project management of NEW CONSTRUCTION and EXISTING BUILDINGS projects.

## ON THE HORIZON

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PROGRAM ADMINISTRATION and GREEN BUILDING PROGRAM guidance for increasing the scope and scale of a green building program and suggested resources for satisfying reporting requirements.

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## Green Facility Benefits

Green facilities save taxpayer dollars, support local economies, and help reduce resource consumption.

Motivated by growing public interest in sustainability, many government entities are taking the lead to green their facilities by incorporating energy and resource-efficient principles into public works and facilities management- producing benefits for building owners as well as the public.

Governments that reduce the environmental impact of construction, operations, and maintenance also save taxpayers money and improve public health. Green facilities can save millions of tax-payer dollars each year because they operate more efficiently and use less water, fossil fuels, and materials. Safer materials, natural daylight, and improved air quality improves worker performance and reduces absenteeism. Governments that green their facilities are also supporting the local market for green building products and services and setting an example for sustainable building across their jurisdiction.

Achieving LEED certification demonstrates the success of a green building program. To date, there is over five billion square feet of construction space that utilizes the LEED system. The certification process promotes accountability and greater attention to sustainability issues among contractors, building owners, and building occupants. LEED certified buildings engage and educate a broad spectrum of stakeholders, drive behavioral changes, and create market demand for sustainable products, services, green jobs, and local industry professionals.

### 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.
- Save money. Over the life of the building, lower operations and maintenance costs will produce significant savings.
- Reduce environmental impact. Use of sustainable materials and efficient systems reduce waste and decrease resource consumption.
- Save energy. Green construction and operations reduce the buildings carbon footprint.
- Create healthy work spaces. Improved air quality and increased natural light improve occupant health.
- Serve the public good. Building and operating green buildings promotes responsible use of taxpayer dollars and improves markets for environmentally friendly products and practices.



# Green Building and Sustainability Initiatives

A Green Building Program helps energize broader sustainability initiatives.

Green building programs thrive when they are aligned with the objectives of other government initiatives. The numerous benefits of green facilities enable a green building program to make a significant contribution to existing programs aimed at resource efficiency, environmental health, and sustainable development.

At the same time, the success of a green building program often depends on drawing from and coordinating the existing expertise of other departments and programs. Related programs include:

- Community Health
- Economic Development
- Energy Management
- Environmentally Preferable Purchasing
- Infrastructure Development
- Public Open Space Planning
- Smart Growth
- Transportation Planning
- Waste Management

In partnership with more than 20 local governments, non-profit organizations, government agencies, and utilities, the USGBC has helped to create a website that provides guidance on mobilizing existing resources and establishing new government initiatives for sustainable development. The Playbook for Green Buildings + Neighborhoods is a collection of strategies, success stories, and resources to advance green building, neighborhoods, and infrastructure. Visit: [www.greenplaybook.org](http://www.greenplaybook.org).



# Green Building and Public Policy

The LEED rating system is an effective centerpiece of a green building policy or initiative.

Currently, a large number of public sector entities rely on the LEED Rating System as the defining standard for green building performance. LEED-based green building policies and initiatives are found in 44 states across the US. These policies take many forms- adopting LEED outright and stipulating a level of certification, requiring that LEED be used as a guideline, or mandating that certain credits be met within LEED or in addition to a level of LEED certification.

LEED complements existing local green building rating schemes and adds the following aspects, which make LEED a particularly useful tool in public policy:

- 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 tool for quantifying and benchmarking green building program outcomes.
- Third-party certification through the Green Building Certification Institute avoids the need to establish local certification bodies.
- LEED is revised every two years to continually improve performance thresholds in pace with changes in building technologies and markets.
- Government entities can participate in and influence the development of LEED through membership with the US Green Building Council.

## LEED 2009 and Beyond

USGBC members are currently voting on a suite of changes to several LEED Rating Systems, which are collectively called LEED 2009. LEED 2009 has several key enhancements that will make LEED more effective and easier to use:

- Predictable 2-year development cycle for new LEED versions
- Alignment of credit requirements across rating systems for different building types
- Weighted point scale to maximize environmental benefit
- Regional credits to promote local environmental priorities

Projects registered under current versions of LEED will have the option to upgrade to LEED 2009, but are not required to do so. For more information and to view draft scorecards, please visit [www.usgbc.org/leedv3](http://www.usgbc.org/leedv3).

## LEED Initiatives in Public Policy

Public sector LEED initiatives including legislation, executive orders, resolutions, ordinances, policies, and incentives are found in:

- 44 states
- 112 cities
- 32 counties
- 28 towns
- 31 state governments
- 12 federal agencies
- 15 public school jurisdictions
- 39 institutions of higher education across the United States.

# Green Building and Public Policy

As of 12/1/2008. For a full list visit: [www.usgbc.org/government](http://www.usgbc.org/government)

 **Green Light** When referencing LEED in policy, governments should consider using 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 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.”

## Note to Elected and Appointed Officials

For a green building program to be successful, it is important for legislators and agency heads to be able to clearly communicate benefits and challenges. There are several sections of the Roadmap that are particularly relevant for elected and appointed officials:

- Set Goals – Know the multiple benefits of green facilities to place a green building program within the context of broader legislative or organizational goals and to select a target performance level
- Secure Adequate Funding – It is critical to secure adequate initial funding in order to reap the long-term payback and benefits of green building elements
- Communicate with Occupants – Orientation of building users and operators assures that the full potential benefits and performance of a green building will be realized

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

Green Design Compliance Flowchart  
New York State Office of General Services  
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

Green Design Table for Small Projects  
New York State Office of General Services  
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

# Roadmap Overview

The Roadmap provides resources and information to governments working to implement green building programs.

The Roadmap is designed to support government staff and officials for development of a green building program based on LEED. The Roadmap suggests strategies for developing a green building program within a typical agency framework and provides resources to guide the process.

The Roadmap has three main objectives:

The Roadmap provides a general overview of a wide range of topics to support green building design, construction, and operation including:

- Project management
- Budgeting
- Staff training
- Green practices (for example, construction waste management and commissioning)

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 expertise to make these resources available to others. The resources have been created by individual green building programs, but can be adapted to fit the needs and goals of others:

- Worksheets
- Checklists
- Reference guides
- Best practices

The Roadmap serves as a forum for programs to share experiences and contribute to the development of a set of best practices. The Roadmap is an opportunity for both established programs and newly developed programs to share ideas, challenges, and successes. The Roadmap will develop as more agencies share their success stories. Please visit [www.usgbc.org/government](http://www.usgbc.org/government) to find new information and share your experiences.

The Roadmap helps navigate through various green building strategies and resources by highlighting helpful tips, shared success stories, and traffic lights. Roadmap traffic lights call attention to some of the most common barriers, cautions, and go-ahead strategies. The Roadmap traffic lights include:

 **Red Lights** highlight the most common barriers to look out for when developing a green building program.

 **Yellow Lights** highlight areas of caution and potential setbacks that need careful consideration.

 **Green Lights** highlight the most helpful actions, or best practices, and provide tips to help advance your program.



## Sharing Experiences to Evolve Best Practices

The Roadmap serves as a forum for government green building programs to share experiences and contribute to developing best practices.

Many high performance building design and operation standards are outlined as part of new laws, policies, and executive orders. To comply with performance standards and achieve broader sustainability goals, governments must continue to refine existing practices, and adopt new technologies and strategies.

The Roadmap is intended to provide government staff and officials with information about actions that others have taken to develop a green building program so that successful strategies can be adapted to other jurisdictions. The Roadmap also provides support for evaluating costs and benefits of green building projects, working with contractors, complying with policies, and reporting outcomes.

### SHARING SUCCESS STORIES:

#### Managing Green Building Standards Compliance

Understanding updated building standards can be challenging for government staff and officials who are unfamiliar with the process. To make sense out of the legalese, New York State Office of General Services created a compliance 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. [See Green Building and Public Policy](#).

# What is the LEED Green Building Rating System?

A LEED certification is a nationally-recognized, verifiable way to label a building as “green”.

The LEED Green Building Rating System is a third-party certification and the nationally-accepted benchmark for the design, construction, and operation of high performance green buildings. Developed by the U.S. Green Building Council in 2000 through a consensus-based process, LEED serves as a certification tool for buildings of all types and sizes.

The LEED rating system is based on established sustainable building practices and emerging concepts. It is a performance-based system where credits are earned for satisfying environmental requirements for building design, construction, operations, and maintenance. The system is designed to be comprehensive in scope and take into account all aspects of sustainable buildings. Different levels of green building certification are awarded based on the total credits earned. Since building technology and operations are constantly evolving, LEED Rating Systems are updated periodically to stay current with market innovations.

The LEED rating system is organized into five environmental categories for which a project earns points towards certification: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, and Indoor Environmental Quality. An additional Innovation category addresses sustainable building expertise, innovative design features, and measures not covered under the five environmental categories.

LEED is a point-based system. Projects earn points for satisfying specific green building criteria outlined in prerequisites and credit categories. The number of points that the project earns determines the level of LEED Certification the project achieves. The four progressive levels are: Certified, Silver, Gold and Platinum.

**Yellow Light** Using LEED as a guideline without certifying the project is not a guarantee that the building will perform to LEED standards. While it is a better practice to incorporate sustainable design principles than to do nothing, choosing not to pursue third-party certification may lead to “greenwashing”.



## How Do I Select a LEED Rating System?

It's essential to select the appropriate LEED Green Building Rating Systems that applies to your project's building type and/or component.

Determining which rating system to use depends on whether the whole building or only specific building components are involved and whether the building space is new or existing. LEED certification is available for virtually any type of regularly-occupied building.

The LEED rating systems that apply to whole buildings include:

- **LEED for New Construction (LEED-NC)** this rating system is applicable to new commercial, institutional, and high-rise residential buildings design and construction or major renovations. It is designed to guide high-performance commercial and institutional projects.
- **LEED for Existing Buildings Operations & Maintenance (LEED-EBOM)** is applicable to existing buildings and includes criteria for maintenance, operations, and refurbishments. It provides a benchmark for building owners and operators to measure operations, improvements, and maintenance.

The LEED rating systems that apply to specific building components include:

- **LEED for Commercial Interiors (LEED-CI)** covers tenant spaces in the building where the tenants do not have control over whole building operations. It is a benchmark for the tenant improvement market that allows tenants and designers to make sustainable choices.
- **LEED for Core and Shell (LEED-CS)** covers a building's structure, envelope, and basic mechanical/electrical/plumbing systems. It is designed to aid designers, builders, developers, and new building owners in implementing sustainable core and shell construction.

The LEED for Neighborhood Development (LEED-ND) rating system is being developed to guide planning and infrastructure development decisions. Some LEED rating systems apply to special-use type buildings, such as LEED for Schools and LEED for Homes. Other rating systems are currently in development for retail establishments, healthcare, and laboratories, among others. For a complete list of LEED rating systems and more information on selecting a LEED Rating System, please visit [www.usgbc.org](http://www.usgbc.org).

 **Green Light** LEED is constantly evolving. Stay current with USGBC in your area of interest and in your local USGBC chapter. Visit [www.usgbc.org](http://www.usgbc.org) for the most up-to-date resources and to find your local chapter.

# How Do I Select a LEED Rating System?

New LEED version to launch, Spring 2009

USGBC members are currently voting on a suite of changes to several LEED Rating Systems, which are collectively called LEED 2009. LEED 2009 is the sum of several key enhancements:

- LEED Prerequisite/Credit Alignment and Harmonization
- Predictable Development Cycle
- Transparent Environmental/Human Impact Credit Weighting
- Regionalization

Projects registered under current versions of LEED will have the option to upgrade to LEED 2009, but are not required to do so. For more information and to view draft scorecards, please visit [www.usgbc.org/leedv3](http://www.usgbc.org/leedv3).



## What is a LEED Accredited Professional™?

LEED Accredited Professionals (LEED AP) are experienced building industry practitioners who have demonstrated their knowledge and capacity to facilitate the LEED certification process by completing an exam. The exam tests an individual's understanding of green building practices and principles, and familiarity with LEED requirements, resources, and processes. For more information visit: [www.gbci.org](http://www.gbci.org). See Consultant Selection for more information about finding and hiring a qualified LEED Accredited Professional for your project team.

# BUILD CAPACITY

## LEED TRAINING

### Training Overview

**STRATEGY:** Pursuing LEED Certification is an important learning experience for all project team members. Training courses in the implementation of LEED and the design and operation of sustainable buildings can help facilitate project activities.

USGBC offers many training opportunities, ranging from workshops to online courses, for all levels. There are no prerequisites required before attending the trainings, but some knowledge of LEED certification is suggested. Even those familiar with LEED and LEED Accredited Professionals have opportunities to expand their knowledge with advanced and specialized courses and workshops.

Courses are available through USGBC and the Education Provider Program for virtually any discipline related to green building. There are courses on everything from an introduction to green building and green building economics, to carbon reduction strategies, to technical skills needed to achieve LEED credits in new or existing building projects. Course availability changes frequently, so please visit [www.greenbuild365.org](http://www.greenbuild365.org) for a full course catalog. Courses are offered online and in workshop format.



## Training for Project Managers/Technical Support Staff

**STRATEGY:** In order to keep up with the evolving green building market, green buildings professionals can attend advanced level LEED training courses.

The advanced, 300-level courses are designed for professionals implementing and applying the LEED Rating System. These courses, offered throughout the country, use case studies, interactive exercises, and tools to help professionals apply new knowledge.

Education Provider Program courses complement USGBC workshops by developing a greater knowledge and understanding of green building theory, techniques, and trends beyond LEED education. These courses offer accurate and relevant information to green building industry professionals of all backgrounds.

### SHARING SUCCESS STORIES

#### Contractor Training Events

In the Upstate New York chapter of USGBC, trainings are available for contractors as well as minority and women-owned businesses. Classes and workshops are 4 hours and taught by a Dormitory Authority- State of New York employee. The training attendees later attend a networking event that introduces small business subcontractors to general contractors. This networking event has proven to be a successful incentive for subcontractors to attend the trainings.

# SET THE GROUNDWORK

## PRE-PROJECT PLANNING

### Consultant Selection

**STRATEGY:** Project goals, requirements, and standards should be clearly outlined in the request for proposal (RFP) and/or request for qualifications (RFQ) to ensure that qualified LEED professionals respond.

**Green Light** A project's request for proposal (RFP) or request for qualifications (RFQ) 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.

It is recommended that the RFP/RFQ requires consultants to have LEED knowledge or training, such as being a LEED Accredited Professional. If a desired LEED certification level has been determined in advance, as in the context of a policy requiring LEED Silver for all new construction, this goal should also be clearly stated in the RFP.

LEED Accredited Professionals (LEED AP) are experienced building industry practitioners who have demonstrated their knowledge and capacity to facilitate the LEED certification process by completing an exam. Choosing LEED professionals with appropriate experience is an important part of the certification process. In addition to being LEED AP, it is important that staff professionals understand the green building process and have had experience with LEED projects in the past. LEED professionals should have both LEED accreditation and LEED project experience.

**Green Light** A searchable database for locating LEED accredited professionals in your area can be found on the Green Building Certification Institute website [www.gbci.org](http://www.gbci.org). Although LEED APs may not be available in all markets, having a LEED AP familiar with the documentation requirements on your project team can expedite the administration process and reduce costs.

In addition to enhancing RFP/RFQ's for green building projects, governments are also incorporating LEED requirements and green building goals into master contract documents and specifications.<sup>1</sup> (See the California Sustainable Building Toolkit listed in the resources below). Both of these efforts help to improve the quality and accuracy of bids for green building contracts.

<sup>1</sup> LEED requirements and procedures are designated as Section 018113 "Sustainable Design Requirements" in Division 01 of the 2004 Master Specifications. Previously, LEED was included under section 01352 of the 1995 Master Specifications Basic Format.

# Consultant Selection

Most LEED rating systems award 1 Innovation credit for including LEED Accredited Professionals as a principal member of the project team.

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

### Project Advertisement Excerpts

Massachusetts Designer Selection Board

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

California Sustainable Building Toolkit

California Integrated Waste Management Board

<http://www.ciwmb.ca.gov/Greenbuilding/ToolKit.htm>

Writing the Green RFP: Sustainable Design Language for Consultant Requests

The American Institute of Architects

[http://info.aia.org/cote2\\_template.cfm?pagename=cote\\_rfps](http://info.aia.org/cote2_template.cfm?pagename=cote_rfps)



# Procurement Legislation and Rules

**STRATEGY:** Existing procurement legislation can guide the purchasing of high performance building products and services.

Government procurement is designed to protect taxpayer dollars and ensure a fair and open selection process. Procurement relating to design and construction is typically regulated by a hard bid process<sup>1</sup>, which ensures fairness and transparency, but may create a barrier to the integrated design process. Green building projects may not fit a hard bid process because the various architects, construction firms, and contractors must all work together as part of the integrated design process in order to apply all aspects of green design throughout the term of the project.

Some governments have recognized this issue and are working to modify procurement laws to allow for more collaboration during the selection process and for more collaboration between different parties (both associated and not associated with the project). Revisions to existing procurement laws also focus on supporting innovation, promoting new products that do not have competition due to the exclusive nature of the product (also called sole source procurement issues).

The project manager overseeing the development of a green building should take the following measures as early in the process as possible:

- Review the applicable procurement rules for the design and construction process.
- Identify any flexibility in the current procurement process and look for opportunities for collaboration and alternative methods that are still within its boundaries.
- If necessary, identify appropriate steps for eliminating obstacles or modifying procurement rules.

<sup>1</sup> Hard bid refers to a stipulated sum (non-negotiable) for a project cost that is offered by a contractor.

# Budgeting for LEED Projects

**STRATEGY:** Sustainable building projects, and particularly LEED projects, may require additional budgeting items. It is essential to have these additions in focus early in the budgeting process.

**Yellow Light** LEED projects may require budgeting for additional services that are not typically included in capital project budgets. It is important to be aware of the costs and benefit of these items prior to project development.

Some of these services may include:

- **LEED Consultant or LEED Coordinator** is a person tasked with preparation and submission of the LEED documentation to the Green Building Certification Institute (GBCI) for third-party verification. Government entities with experienced green building programs are able to complete part or all of LEED documentation and administration in-house, controlling costs and avoiding the need to task consultants. For those who do not have LEED accredited professionals on staff, it is essential to determine which consultant service offerings are inside and outside of basic services. Many of the requirements for LEED documentation are for typical calculations and drawings that are produced over the course of any project.
- **Additional engineering costs** may be incurred due to special studies relating to green building design options, such as: building energy modeling, or computational fluid dynamics used to determine natural ventilation or displacement systems.
- **Commissioning** is a process intended to verify that all building systems perform interactively in accordance with the owner's operational needs and in compliance with the design intent. This process usually involves hiring an outside commissioning agent.
- **Third-party verification**, such as LEED certification and verification costs. For current pricing visit USGBC's certification page. (<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1497>)
- **Supplemental construction costs** for green buildings can add zero to four percent<sup>1</sup> to a standard construction budget. The additional cost varies depending on the availability of qualified goods and services in different markets, the sustainability goals pursued and technologies utilized, and how well elements of the green building process have been integrated into standard procedures.

**Green Light** In addition to estimating the return on investment, explain the value proposition of green buildings by focusing on the benefits to the agency's goals. This could mean focusing on the benefits to the stakeholders, the long-term savings in energy and water consumption, or reduction of greenhouse gases. See [Green Facility Benefits](#).

<sup>1</sup> Visit <http://www.usgbc.org/research>. Based in part on Davis Langdon, Lisa Matthiessen, and Peter Morris study "Costing Green: A Comprehensive Cost Database and Costing Methodology," July 2004 ([http://www.usgbc.org/Docs/Resources/Cost\\_of\\_Green\\_Full.pdf](http://www.usgbc.org/Docs/Resources/Cost_of_Green_Full.pdf))

# Budgeting for LEED Projects

## Communicating the Value of Green Buildings

The value of a green building is best communicated in terms of the goals of the owner, occupants, and community that the building serves.

In an assessment of 12 sustainably designed buildings the United States General Services Administration (GSA) reported that the buildings use 26% less energy, have 13% lower maintenance costs, and have 33% fewer CO<sub>2</sub> emissions when compared to national averages. As America's largest public real estate organization, the GSA also conducted an extensive occupant satisfaction survey and was proud to report 27% higher occupant satisfaction than the national average.

After achieving a LEED for Existing Buildings Platinum certification for their San Jose headquarters, Adobe Systems Incorporated boasted huge increases in efficiency and a reduction of their environmental footprint while achieving a 121% return on investment (ROI). Their facility management firm, Cushman & Wakefield analyzed the ROI for each of the 64 energy conservation and related projects that were implemented. They now place an increased emphasis on energy conservation in all of their managed properties and have over 100 properties pursuing certification under the LEED Rating System.

### Key metrics for Adobe's LEED-EB Platinum Headquarters

- 35% reduction in electricity user per occupant
- 41% reduction in natural gas use per occupant
- 22% reduction in domestic water use
- 76% in landscape irrigation water use
- 90% of solid waste recycled or composted
- 16% reduction in CO<sub>2</sub> emissions
- 121% return on investment

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

Project Budgeting Worksheet and Instructions  
State of Washington General Administration  
<http://www.ga.wa.gov/Construction/3FormsRef.htm> (Under Project Managers)

Capital Outlay Budget Change Proposals  
California Department of Finance  
<http://www.dof.ca.gov/fisa/bag/SAM6000.htm#s6818>



# Budgeting Methodology and Setting Project Goals

**STRATEGY:** Sustainability goals should be established early in the project and fully integrated into the project costs.

One of the most widely used studies analyzing the cost of green buildings is *Costing Green: A Comprehensive Cost Database and Budgeting Methodology* by Davis Langdon. The study concludes that LEED projects are most cost-effective when sustainability goals and green features are discussed as early as possible during project development and are treated as a program issue, rather than an added requirement. The first project budgeting question should not be how much more will it cost to build green? But what must we do to achieve our sustainability goals?

A project's sustainability goals must be established early in the design process so that green features can be incorporated into the cost model. This can be accomplished by completing a LEED checklist at every program stage, starting at the project planning stage. Developing an approach for meeting the project goals and determining the associated costs is more effective than simply adding a flat premium to a budget, which won't accurately reflect the cost of the green features.

The following questions should be considered at each project phase:

- What are the team goals, expectations, and expertise?
- Are the specific goals incorporated as part of the project process?
- Does the budget align with the project and its goals?
- Is the project within budget during this phase of the project?

## SHARING SUCCESS STORIES

### Dormitory Authority-State of New York (DASNY) Goals and Policies

DASNY promotes sustainable design and construction by including sustainable opportunities in every project, regardless of its size or complexity. Starting in January 2009, all new projects, additions, and significant renovations require LEED Silver certification. To assist this goal, DASNY has developed a Sustainability policy that:

- Discourages “point chasing” or “buying points” that are ill-suited but forced into the design.
- Discourages “contingency points” that are used as a buffer in case some documentation for another point falls through.
- Encourages creativity and pursuit of additional strategies, even if they require cooperative decision-making with the Owner.
- Supports reaching beyond Silver for projects able to achieve Gold or Platinum level certification.
- Requires submission of documentation to USGBC for a third-party rating review.
- Does not penalize buildings that are not able to achieve LEED Silver if the team has done all it can and submitted a rating review. DASNY believes “The project is a success in that real solutions were explored in the design process. Some were

# Budgeting Methodology and Setting Project Goals

implemented and have improved building performance, health and productivity of occupants, and the Owner's bottom line. The project is a success because the team and Owner paid attention and worked to build the best building possible.”

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the ADDITIONAL RESOURCES section for a full description of the resources listed below.

Sustainable Building Goals for Laguna Honda Hospital  
California Integrated Waste Management Board  
<http://www.ciwmb.ca.gov/greenbuilding/Design/LagunaGoals.doc>



# The LEED Checklist

**STRATEGY:** A LEED Checklist can assist in ongoing management of certification requirements and ensuring all project team members understand individual responsibilities.

The LEED Checklist is a useful tool to help define sustainability goals and determine which points the team plans to pursue. To complete the first LEED Checklist, the team will identify all the feasible “Yes” points (1) and the “Maybe” points (2). Points that are identified as not feasible (3) will most likely not play a role in the project. Throughout the project, the team should try to maintain all the “yes” points and convert the “maybe” points to “yes.” This strategy earns the most points possible and achieves the highest level of sustainability as possible.

The LEED Checklist can help determine which existing LEED credits will be pursued, but additional credit points can be earned for sustainability efforts outside the rating system scope. Innovation credits are awarded for innovative performance that goes beyond the existing LEED credits, and teams are encouraged to identify new, unique approaches for improving sustainability. Innovation credits must be sufficiently documented, submitted for evaluation, and approved during a LEED Certification Review in order to receive credit points. For a list of innovation credit examples, visit <http://www.usgbc.org/ShowFile.aspx?DocumentID=3569>.

 **Green Light** Attempting all four possible LEED Innovation credits can help advance your score, and possibly bump your score to the next certification level.

LEED for New Construction Version 2.2 and LEED for Existing Buildings: Operations & Maintenance offer up to four points for innovation credits pertaining to exemplary performance of existing LEED credits and innovative performance.

In addition to understanding LEED standards, it is also important to understand individual federal, state and local standards. There may be additional requirements for energy efficiency, CO<sub>2</sub> reduction, or sustainable design, executive orders, statewide goals, agency goals, and existing code requirements and regulations. The project manager should understand these, as well as voluntary initiatives, such as the President’s Climate Commitment for college and university projects.

## SHARING SUCCESS STORIES

### On-Going LEED Checklist

The LEED Checklist can be used as an on-going tool for the project team for tracking and decision-making purposes. Many governments have adapted the checklist to their needs by adding columns to track task assignments, identify documentation needed, and manage the status of certain tasks. As the project progresses, changes to the adapted checklist may be helpful in tracking credits that are no longer being pursued or adding credits that will be pursued. The evolving checklist can be a discussion tool for the project team to ensure that

# The LEED Checklist

the pursued credits are tracked throughout the design and construction process. Because the design consultants develop the original checklist, this can be an important tool to pass to the engineers responsible for these credits and other project team members involved in the post-design stages.

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

### LEED Rating System Checklists

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=222>

### Massachusetts Sample Checklist for LEED-NC version 2.2

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

### California Sample Checklist for LEED-EB version 2.0

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

### New York Sample Checklist for LEED-EB

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

### New York Sample Checklist for LEED-EB version 2.0

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

### Washington State Submittal Forms

State of Washington General Administration

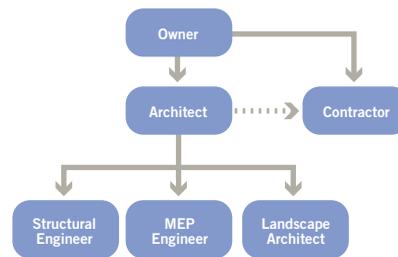
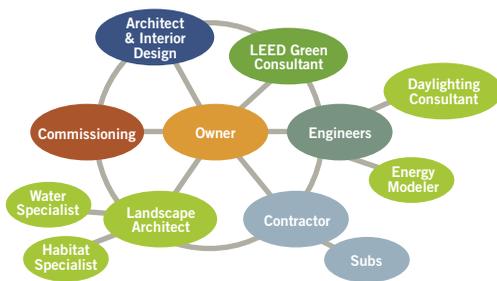
<http://www.ga.wa.gov/EAS/green/>

# Establishing a Project Team

**STRATEGY:** A successful project team incorporates all professional disciplines in streamlined planning and design from the project's inception through completion.

The development of an integrated design team is essential in all LEED projects. An integrated design team is one in which all the professional disciplines (architect, engineers, contractors) work together to achieve project goals as early as possible in the project process. In this approach, LEED is central to the design of the project rather than a separate requirement. Integrated design promotes cooperation between disciplines and harmonizes the project planning process.

An integrated design team, illustrated on the left, 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 step-wise traditional project process featured on the right.



## Integrated Design Process

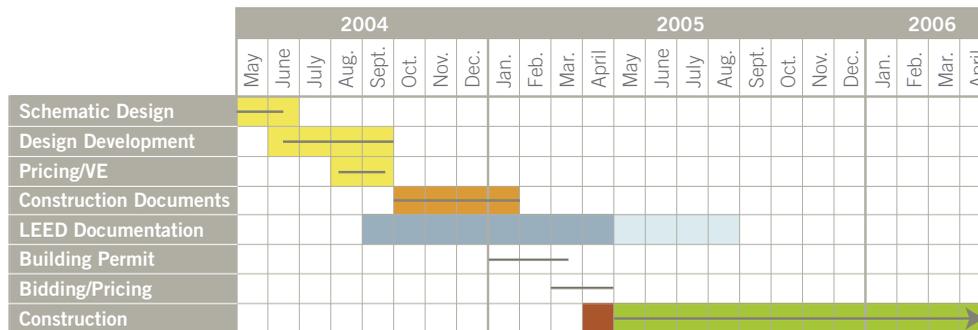
The integrated design team must work to incorporate LEED activities and fulfill obligations during each phase of project development. Below is an example LEED schedule developed using an excel spreadsheet to map project milestones and review dates. This simple tool helps to integrate LEED throughout the project phases and designate timeframes for specific team activities.

## Traditional Design Process<sup>1</sup>

<sup>1</sup> Graphics source: "How-to Guide to LEED Certification for New Mexico Buildings", New Mexico Department of Energy, Minerals, and Natural Resources. [http://www.usbcnm.org/docs/how\\_to\\_guide\\_to\\_leeed\\_certification\\_final\\_version.pdf](http://www.usbcnm.org/docs/how_to_guide_to_leeed_certification_final_version.pdf)

# Establishing a Project Team

## Example LEED New Construction Project Schedule<sup>2</sup>



**Notes:**

1. SD schedule assumes client acceptance of preliminary cost estimate and VE selections.
2. DD Phased Design Review Meeting dates are preliminary set for 6/21, 7/8, 7/19 with a 7/26 VE workshop.
3. Pricing/VE to start 15 August to be from 75% DD documents with CM input as to scope required.
4. CM GMP due in October.
5. Client review is included in each phase duration

- Project design team incorporates LEED requirements into project contract documents (drawings, specifications, invitation to Bidder's, General Conditions, Contracts, etc.)
- LEED AP confirms all required LEED documentation is included in the 100% CD set of drawings and specifications.
- The design team, consultants, contractors, and owner submit the preliminary LEED submittal drafts to LEED AP for review. The responsible parties corresponding to each LEED credit point must revise the LEED submittals per your CM/GC LEED coordinator's recommendations and submit final copies to LEED-Online for LEED documentation to the USGBC.
- LEED AP conducts LEED job-site kick-off meeting with Contractor to review required LEED submittals.
- Contractor submits all required LEED documentation to CM/GC LEED coordinator. CM/GC LEED coordinator follows up with all contractor(s) to confirm complete LEED submittal documentation.

## SHARING SUCCESS STORIES

### MA Division of Capital Asset Management – The Energy Team

In Massachusetts, The Energy Efficiency and Sustainable Buildings Group (a.k.a. the “Energy Team” acts as internal consultants to the primary Project Manager. The energy team provides in-house support for meeting LEED-related goals and tracking and reporting progress. The expert team develops strategies for energy and water conservation and identifies additional funding sources when necessary, such as grants and utility incentives. The energy team also determines when to bring in external, pre-approved consultants with specific expertise, such as renewable energy and energy modeling.

<sup>2</sup> This project schedule is based on a Construction Manager at Risk procurement method. The graphic is displayed here as an example only and is not a suggestion for an optimal project delivery. Graphics source: “How-to Guide to LEED Certification for New Mexico Buildings”, New Mexico Department of Energy, Minerals, and Natural Resources. <[http://www.usgbcnm.org/docs/how\\_to\\_guide\\_to\\_leed\\_certification\\_final\\_version.pdf](http://www.usgbcnm.org/docs/how_to_guide_to_leed_certification_final_version.pdf)>



## LEED Coordinators

**STRATEGY:** A LEED Coordinator plays an integral role in the coordination, communication, and development of certification requirements.

LEED Coordinators should be included as a sub-consultant (typically working for the design team) to review, manage, and process the LEED documentation. The LEED Coordinator requests that designers, contractors, and the owner complete the required LEED submittal templates for each attempted credit. In most cases, these teams will have a designated person who is responsible for gathering documentation and working with the LEED Coordinator. The role of the LEED coordinator is to review all the submittals, ensure that they are complete and accurate prior to submitting them to USGBC.

 **Green Light** As more architectural firms gain LEED experience, this role may shift from a sub-consultant to an in-house member of the design team. This may also provide a substantial cost savings, but depends on staff availability and level of expertise available.

### SHARING SUCCESS STORIES: Sharing LEED Documentation Responsibility

In Massachusetts, it is suggested that each project contractor designate a person to lead the collection of all their LEED documentation, since the site superintendent or construction manager's project manager will be too busy to handle this responsibility. It is also beneficial to encourage contractors or construction managers to educate sub-contractors regarding the LEED process, as some may be unfamiliar with documentation requirements. Sharing this responsibility throughout the duration of the project helps ensure proper documentation for LEED certification.



# Energy Life-Cycle Cost Analysis

**STRATEGY:** A step in planning for the design stage of a project is to conduct a computer-aided energy life-cycle cost analysis that compares design alternatives.

Energy life-cycle cost analysis (ELCCA) is a decision-making tool for building owners and designers.

It provides a means of comparing the present values of two or more design alternatives based on first costs in addition to the energy and maintenance costs that will be incurred over the useful life of the equipment. A computer model or spreadsheet is used to make the present value calculations. The alternative with the lowest life-cycle cost is the one that is most economical in the long run. ELCCA is particularly helpful in evaluating design alternatives that have a higher initial cost, but will cost less to operate and maintain over time. Life-cycle cost is typically evaluated over at least a twenty-year time frame, with some government entities using a forty-year time frame for certain types of equipment.

LEED for Existing Buildings: Operations & Maintenance awards one point for conducting an investigation and analysis of the building's major energy-using systems. Building owners can use an ELCCA tool to assess and document the costs and benefits of improvements to these systems.

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

Energy Life-Cycle Cost Analysis (ELCCA) Worksheet & Instructions  
State of Washington General Administration  
<http://www.ga.wa.gov/EAS/elcca/home.html>



# Utility Incentive Programs and Rebate Programs

**STRATEGY:** Offset the first cost of energy systems by maximizing the use of incentive and rebate programs.

Utility incentive programs and rebate programs provide money or technical assistance to encourage investment in energy efficient equipment and design.

In the pre-project planning phase, the project manager will determine what utilities (such as gas and electric) will service the project. The project manager should contact a representative or technical assistance vendor at the utilities to determine what rebates or incentives are available. Most utilities are helpful and will gladly participate in the creation of an energy efficient project.

 **Yellow Light** It is important to establish the relationship with your utility representative early in the project so that budgets can accurately reflect utility costs (since rebates are usually awarded later in the process).

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

Massachusetts Utility Rebate Flowchart  
State of Massachusetts  
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

Massachusetts Process for Utility Incentives  
State of Massachusetts Energy Efficiency and Sustainable Buildings Group  
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

Guide to Maximizing Utility Grants and Rebates  
State of Washington General Administration  
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

National Database of Incentive Programs  
Database of State Incentives for Renewables & Efficiency  
<http://www.dsireusa.org/>

## SHARING SUCCESS STORIES

### Massachusetts Makes Utility Information Easily Accessible

To assist the project manager and team in determining what utility companies are located in the project territory, Massachusetts Division of Capital Asset Management created a list of all utilities within the state, including contact information, address, phone numbers and websites. Maps highlighting each district accompany the contact sheets. These tools promote early contact with utilities by making the information accessible. Early contact is essential for establishing long-term relationships and identifying anticipated rebates.



# Energy Performance Contracts

**STRATEGY:** Leverage the operations budget to make facility improvements through an Energy Performance Contract.

An energy performance contract (EPC) enables users to use future utility cost savings to pay for facility improvements. EPC can be a useful stepping stone to green building certification for existing buildings because it allows building owners to conduct a comprehensive facilities audit, purchase more energy-efficient equipment, and perform other improvements without having to pay upfront costs. Instead, the equipment and services are purchased through payments made from savings on utility bills in the future. EPCs can be particularly advantageous for existing building projects that require substantial upgrades to comply with LEED standards. See: [Implement LEED- Existing Buildings](#). See [Implement LEED – Existing Buildings](#).

 **Yellow Light** Rules and restrictions regarding the use of EPC in public buildings vary widely from state to state. Project managers should review their state's enabling legislation for EPC when considering project funding sources.

## COMING SOON

### The Paid-From-Savings Guide to Greening Buildings

Green Performance Contracting (PC) uses the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) for Existing Buildings: Operations & Maintenance Rating System criteria to enhance the Energy Performance Contracting (EPC) process and move toward the goal of creating green buildings. USGBC's Paid-From-Savings Guide to Greening Buildings will include comprehensive guidance on how specific green building features can be integrated into an EPC project. The guide will be available in late 2009.

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

Status of EPC enabling legislation by state  
Oak Ridge National Laboratory  
<http://www.ornl.gov/info/esco/legislation/newesco.shtml>

# REACHING MILESTONES

## IMPLEMENT LEED

### NEW CONSTRUCTION

Project Management Overview  
Design Phase  
Commissioning  
Construction Phase  
Construction Waste Management

### EXISTING BUILDINGS

LEED for Existing Building: Operations  
& Maintenance  
Project Management Overview  
Building Selection & Implementation Strategies  
Waste Stream Auditing  
Existing Building Commissioning  
Energy Performance Contracts

# IMPLEMENT LEED

NEW CONSTRUCTION

## Project Management Overview

**STRATEGY:** Project managers for new construction have additional considerations when coordinating a LEED project, such as project goals, budget, and documentation.

There are several important elements of green design and construction that differ from a standard new construction project. For a building to satisfy the performance criteria and documentation requirements necessary for LEED certification, a project manager must:

- Be responsible for incorporating sustainability goals and LEED requirements from the inception of a new project. This includes budgeting considerations, assembling a qualified project team, and planning for reporting requirements.
- Establish an integrated design 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.

### SHARING SUCCESS STORIES

#### Streamlined LEED Project Management

As part of the training module for project managers working on green building projects, the State of Washington General Administration created a LEED project implementation guide that follows the phases of a new green construction project. The guide and supplemental checklist allows even project managers with little LEED experience to keep green building projects on track. See resources below for the link.

### Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

#### New Mexico How-To Guide to LEED Certification

[http://www.usgbcnm.org/docs/how\\_to\\_guide\\_to\\_leed\\_certification\\_final\\_version.pdf](http://www.usgbcnm.org/docs/how_to_guide_to_leed_certification_final_version.pdf)

#### LEED Project Implementation Guide for State Project Managers

State of Washington

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

#### Green Building Implementation Project Management Checklist

State of Washington

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>



## Design Phase

**STRATEGY:** During the design phase, it is crucial to establish effective strategies to meet sustainability goals through integrated design.

One of the key responsibilities of the LEED coordinator and the project manager during the design phase is to ensure that team sustainability goals and the corresponding LEED standards are being met by the proposed project design. The project manager is responsible for scheduling and budgeting a meeting, or series of meetings, to discuss the design. This meeting, often called an eco-charrette, is usually facilitated by the LEED coordinator. The meeting should include a variety of stakeholder participation, so that the team can collaborate on strategies to meet LEED standards and become familiar with the proposed building design.

 **Green Light** Engage verification parties early in the design process—such as the Commissioning Agent and Utility Incentive representative—as well as other key stakeholders.

 **Yellow Light** Be sure to consider how the occupants and operations and maintenance personnel of the new building will be affected by the green features. Include facilities staff in the eco-charrete and provide training for any new features that may be unfamiliar to staff.

### Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

#### Sample Eco-Charrette Agenda

State of Washington

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

# Commissioning

**STRATEGY:** Commissioning ensures that building systems are operated most efficiently and effectively, throughout the life of the building.

Commissioning a new building involves conducting activities throughout the entire process—from pre-design planning through design, construction, and acceptance. The commissioning authority reviews and tests building systems (including security, fire, life and safety, HVAC, lighting, electrical, etc.).

Commissioning may also involve training building operators and providing accurate operations and maintenance manuals so that the process can be continued in-house periodically by the building facility staff.

The goal of commissioning is to deliver a facility that operates as it was intended, meets the needs of the building owner and occupants, and is operated by trained facility staff. Commissioning new buildings helps assure integration and operability, especially for very large projects with complicated design. To successfully commission a building, it is necessary to provide documentation and verification of the performance of all building equipment and systems.

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.

Commissioning is considered a separate service and an agent should be involved throughout the project. This agent should be an independent, objective authority that has significant design and hands-on experience with building systems. Commissioning a facility requires the participation of the project manager, building owners, designers, contractors, and operators. The parties are responsible for various tasks involved in the commissioning process, depending on each project's size and complexity of systems and controls.

**Green Light** Commissioning services should be brought in during the early design phase to document the owner's energy-related project requirements. The commissioning authority needs to review both the owner's project requirements as well as the basis of design at various stages.

**LEED for New Construction Version 2.2 requires commissioning as an Energy & Atmosphere prerequisite, and a project can earn one additional point for enhanced commissioning.**

For more information on the LEED-NC version 2.2 required qualifications for a commissioning authority visit: <http://www.usgbc.org/ShowFile.aspx?DocumentID=1262>.”

# Commissioning

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the ADDITIONAL RESOURCES section for a full description of the resources listed below.

### **Building Commissioning Guidelines**

State of Washington, General Administration

<http://www.ga.wa.gov/EAS/bcx/>

### **Building Commissioning: An Overview**

Better Bricks

[http://www.ga.wa.gov/EAS/bcx/Cx\\_Overview.pdf](http://www.ga.wa.gov/EAS/bcx/Cx_Overview.pdf)

### **Building Commissioning Recommended Guidelines**

National Association of State Facilities Administrators

<http://www.nasfa.net/displaycommon.cfm?an=1&subarticlenbr=81>



# Construction Phase

**STRATEGY:** LEED requirements should be reviewed and reinforced regularly with all contractors during the construction phase.

During construction of a green building, a project manager must enforce quality assurance so that specifications are carried out and documented correctly. In a green building project, the owner will likely specify a few specific products (like paints and adhesives) that must be used and cannot be substituted. It also may be required that certain construction site procedures, like protection of building air ducts, construction waste management, and erosion control, must be implemented and documented as construction progresses.

It is recommended that the project manager or LEED consultant maintain consistent communication with the general contractor and subcontractors throughout the construction phase. LEED requirements should be reinforced at all regularly scheduled site meetings and additional meetings should be held to provide education so that all contractors are familiar with the specifications and documentation needs of the project.

**Green Light** Keeping a log of LEED submittals and collecting them as you go keeps teams organized, efficient, and aware of what requirements they have satisfied.

LEED for New Construction Version 2.2 awards up to two points for developing and implementing a Construction Indoor Air Quality (IAQ) Management Plan and up to four points for choosing low-emitting products and installation processes during the construction phase.

## SHARING SUCCESS STORIES

### LEED Training for Contractors

The State of Washington Department of General Administration provides a training course for contractors working on state 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.

Building to LEED for New Construction is a USGBC Education Provider Program course for contractors. The course is designed and delivered by the Associated General Contractors. For more information, visit: <http://www.greenbuild365.org/coursedetail.aspx?ID=90000230>.



# Construction Waste Management

**STRATEGY:** Construction waste requirements must be understood by the project manager and addressed as a part of an effective management plan for reducing, reusing, and recycling.

The efficient use of resources is a fundamental principle of sustainability. This means reducing, reusing, and recycling most, if not all materials on a project site is part of constructing a sustainable building.

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.

**Yellow Light** Investigate, understand, and access local options and requirements for waste management and include project contractors in creating a comprehensive construction waste management plan.

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. Recycling companies help divert materials back to manufacturers or to building reuse companies. Materials can also be reused off-site for other purposes or reused on site, which is referred to as a closed loop cycle because all waste fuels another process. Purchasing materials with recycled content also helps support the closed loop cycle.

Projects can achieve high landfill diversion rates during demolition and deconstruction due to the large quantities of concrete and steel, which are easily recyclable. Certain companies specialize in the reuse of building materials and some demolition contractors work with these companies or provide their own building material resale programs. Some large manufacturers of acoustical tile, carpet, and wall coverings also have programs to remove and reprocess excess materials.

## SHARING SUCCESS STORIES

### The New Mexico Villagra Building

The Villagra Building in Santa Fe, New Mexico is a LEED-CI Gold Certified Historic Preservation Project that underwent 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 what the waste stream would be and generated the source list for recycling and diversion. Materials were returned to the manufacturers whenever possible, offered to site workers, the Owner, or donated to charity. The project sourced recycled content

# Construction Waste Management

building materials, and local and regional materials were selected to reduce transportation impacts. All new doors and conference tables were made with Forest Stewardship Council certified wood. To see the full case study and other credit-level renovations, read the full case study at [http://www.usgbcnm.org/docs/how\\_to\\_guide\\_to\\_leed\\_certification\\_final\\_version.pdf](http://www.usgbcnm.org/docs/how_to_guide_to_leed_certification_final_version.pdf).

 **Green Light** Recovered materials can be donated to qualified 501(c)(3) charities, such as Habitat for Humanity, resulting in a tax benefit.

Waste generated during construction and demolition is greatly reduced by a well-executed recycling plan. There are a number of ways to manage the collection of materials on-site to fit the budget and goals of the project such as on-site storage, recycling, and reuse of materials. Co-mingling materials is a good way to collect recyclable materials, when working on a compact project site. Using separate on-site recycling containers for different materials can help increase diversion rates. Recycling also reduces costs and in some cases, a well-executed system of collection can actually generate revenue.

 **Yellow Light** Recyclable materials have different market values depending on the presence of local recycling facilities, reprocessing costs, and the availability of virgin materials.

## SHARING SUCCESS STORIES

### Diverting Landfill Waste in California

Construction and demolition (C&D) waste comprises approximately 25% of landfill content nationwide. However, some governments have successfully reduced that amount by nearly half. California, for example, has reduced its C&D wastes to 12% of landfill content, extending the lifetime of existing landfills and avoiding the need to expand or create new landfills.

According to the National Asphalt Pavement Association (NAPA) over 80% of asphalt removed from road and highway construction is recycled. In some paving processes, asphalt is ground off deteriorating roadways, sifted, remixed and reapplied as new pavement in one procedure.

LEED for New Construction Version 2.2 awards one point for 50% landfill diversion, an additional point for 75%, and a third point under Innovation in Design for 95%. Diverting 50% of waste from landfills should be the minimum goal of each LEED project's Waste Management Plan. Careful record-keeping is essential to earn points for this credit.

# Construction Waste Management

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the ADDITIONAL RESOURCES section for a full description of the resources listed below.

### List of Common Recyclable Materials and Recycled-Content Materials

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

### Construction Waste Management Guidelines

State of Washington, General Administration

<http://www.ga.wa.gov/EAS/CWM/guideline.html>

# IMPLEMENT LEED

## EXISTING BUILDINGS

# LEED for Existing Building: Operations & Maintenance

**STRATEGY:** LEED for Existing Buildings: Operations & Maintenance (O&M) is designed to help existing buildings achieve green building performance standards.

The LEED for Existing Building: Operations & Maintenance (EBOM) Rating System helps building owners and operators measure and maximize building performance and minimize environmental impact. LEED for Existing Buildings: O&M addresses whole building cleaning and maintenance issues, recycling programs, exterior maintenance programs, and system upgrades. It applies to both buildings seeking LEED certification for the first time and to those previously certified under LEED (LEED for Existing Buildings: O&M requires recertification every five years).

**LEED for Existing Buildings: O&M is composed of four basic types of credits:**

1. Performance – These requirements relate to how the building as a physical structure performs. Performance requirements include energy efficiency, water efficiency, outside air ventilation rates and other performance oriented attributes
2. Practice – These requirements relate to practices that are largely used by the building's operations and maintenance staff. They include some contractor practices used during minor construction, repairs and alterations.
3. Policies – These requirements, mainly found in the LEED rating system prerequisites, relate to overarching guidance that an organization has adopted to accomplish its purpose in a sustainable way.
4. Procurement – These requirements relate to the organization's sustainable purchasing activity.

# Project Management Overview

**STRATEGY:** LEED certification of an existing building is a measure of a continual cycle of assessing, planning, and implementing improvements to building performance.

In contrast to a new construction project, greening an existing building is often a gradual process. Achieving LEED for Existing Buildings: O&M certification is an ongoing process of improvement- a continual cycle of measuring, assessing, planning, and implementing. This process may involve one building or several buildings concurrently.

LEED for Existing Buildings: O&M certification review is based on policies and plans that have been developed in advance as well as performance data collected about the building over a performance period.

The role of the facilities manager or green building program administrator is to benchmark existing buildings against LEED standards and then to coordinate the actions necessary to bring buildings up to the desired or achievable level of green performance. Necessary actions may include upgrading facilities, purchasing equipment, developing policies, and adapting maintenance plans.

**Yellow Light** It may be helpful to hire a LEED coordinator to assist the facilities manager or program administrator in managing the LEED documentation.

## **SHARING SUCCESS STORIES: California LEED-EB Portfolio Strategy**

California's LEED for Existing Buildings portfolio goal was created to reduce energy use and consumption—but also to develop a consistent method for management and analysis of green building operations throughout the state. For example, green building goals for a capital building in Sacramento will be the same as those of a state agency building in San Diego.

Once a building achieves LEED for Existing Buildings: O&M certification, it is important that plans and policies are put in place to ensure continuous monitoring. This way, recertification every one to five years can be a simple matter of submitting in-house documentation. Recertification is also an opportunity to reassess the building's sustainability goals and identify any room for improvement.

# Project Management Overview

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

### California Sample Checklist for LEED-EB version 2.0

[Http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959](http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959)

### New York Sample Checklist for LEED-EB version 2.0

[Http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959](http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959)



# Building Selection & Implementation Strategies

**STRATEGY:** Developing a gap analysis—assessing the difference between the building’s current performance level and LEED standards—is the first step towards building performance improvement.

The first step in greening an existing building is conducting an audit of the building’s purchasing, housekeeping, grounds keeping, waste management, HVAC systems, electrical system, and plumbing and comparing the current state to the LEED requirements. This is often called a gap-analysis, which identifies which building systems operations and policies need to be revised to achieve certification.

A gap analysis identifies opportunities to improve building performance and provides evidence to support the need for changes in current policies or practices. For instance, a large gap between the building’s current energy performance and the LEED energy requirements may suggest that studying past utility bills and interviewing facility personnel may help identify inefficient or misused equipment.

**Yellow Light** During a gap analysis, it is common to uncover some facilities issues that may not have been properly addressed by staff. Thus it is important to focus on the proper training of operations and facilities staff to ensure that no-cost or low-cost efficiency measures are being executed consistently.

The facilities team must understand the building systems operation, the protocol for adjusting system settings, and the communication system for informing other facilities staff of changing conditions. Training should be provided for monitoring and verification of building systems, so that commissioning of the building can be periodically conducted. Properly trained staff will be able to offer innovative solutions for improving building performance beyond current strategies; this builds a sense of pride in contributing to the success of the building. Properly trained facilities staff can also message out to building occupants on simple ways that they can reduce energy, water, and waste use in the building.

## SHARING SUCCESS STORIES

### Cleaning Contractor Training

Raising awareness and instilling a sense of responsibility and pride among employees and maintenance contractors is a key element to success. After converting existing buildings to green systems, the State of Colorado trains the cleaning contractor on the use of sustainable cleaning products, reduced water and energy consumption, recycling, and basic operations of the new energy-efficient operating systems. The State has been able to keep the cost of cleaning down as well as gaining support for their sustainability commitment from maintenance staff.

Once a gap-analysis has been performed and opportunities have been identified at one or several buildings, the team can make an implementation plan for bringing buildings up to the LEED standards

# Building Selection & Implementation Strategies

and reflect their sustainability goals. The plan should first take advantage of low-cost operation and maintenance strategies for improvement and then investigate capital renewal cycles and incentive options to budget for equipment replacement.

## Several important questions to consider while forming an implementation plan:

- Which buildings have the most potential for achieving LEED performance targets and which will be most cost-effective?
- Which buildings' staff will be able to transition to new policies or practices easily?
- Which policies and practices can be implemented across multiple buildings and which need to be adapted for individual buildings?
- How do the results from the gap analysis compare to current priorities for maintenance and capital renewal?

## SHARING SUCCESS STORIES

### Governor-Led Efforts to Change Operation Hours of Capitol Complex

In August of 2008 The State of Utah, at the request of the Governor, implemented a new measure to reduce energy and costs by closing the capitol buildings one day a week, on Friday, and extending the hours Monday through Thursday. Surprisingly, the new weekly consumption, with four ten-hour days, was the same as the previous consumption for Monday through Thursday since the building had already been operating on a 10 hour per day schedule.

After a review of the facilities on Capitol Hill, the State Office Building was identified as the one building that could be completely closed on Fridays. Two other buildings (Senate and House buildings) were viewed to be partially open and the Capitol was to remain completely open to the public while many of the offices are closed. It turned out that because the State Office Building was much older and more inefficient than the others, closing it on Fridays saved 700 kWh per week. The Senate and House buildings combined only saved 400 kWh per week, since they are newer and more efficient buildings.

This measure helped identify the greatest opportunity for implementing energy efficiency measures on the complex—by targeting the State Office Building. The Capitol Preservation Board is now working on improving the efficiency of the building.

An important part of the audit process is benchmarking. Benchmarking energy use at the facility helps building managers prioritize their energy performance efforts, identify buildings in need of improvement, and report their success in meeting energy efficiency goals.

The Energy Star® Portfolio Manager is an online energy management tool that benchmarks energy performance and allows energy and water consumption to be tracked across one or more buildings. Building managers can also use the tool to monitor performance over time to identify strategic opportunities for energy and cost savings.

# Building Selection & Implementation Strategies

The tool allows you to rate your building's energy performance on a scale of 1-100 relative to similar buildings nationwide. For more information, visit the ENERGY STAR Portfolio Manager website: [http://www.energystar.gov/index.cfm?c=evaluate\\_performance.bus\\_portfoliomanager](http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager).

**LEED for Existing Buildings: O&M requires an ENERGY STAR score of 69, and projects can earn up to 12 points for optimizing energy performance.**

## SHARING SUCCESS STORIES

### Greening an Existing Building Portfolio

The California Department of General Services (DGS) approaches its existing building program goal in phases. Starting with improved sustainability of the state buildings within the capital complex, they will then add university facilities and college campuses, followed by other government buildings. The phased approach helps develop the process and make it more efficient and effective as it expands. DGS also encourages “green champions” to emerge. Green champions are individuals in various departments or agencies who want to lead greening efforts out of interest or passion for sustainability. Ideally these champions would be high level authorities, but if such an individual exist within an agency, DGS finds a champion in another department. If an agency has tenants in various buildings, DGS identifies a champion in each building, or on each floor.

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

### Module 1: Tasks 1-10; Setting up Management Policies and LEED Document Management

California Department of General Services

[http://www.documents.dgs.ca.gov/green/Module\\_1-tasks1-10.pps](http://www.documents.dgs.ca.gov/green/Module_1-tasks1-10.pps)

### Best Practice Manual: Better Building Management for a Better Tomorrow

California Department of General Services Building and Property Management Branch

<http://www.green.ca.gov/GreenBuildings/BBBTManual.htm>

### Sustainable Activities by the Building Occupant

<http://www.documents.dgs.ca.gov/green/SustainabilityActivitiesByOccupants.pps>

# Waste Stream Auditing

**STRATEGY:** A waste stream audit, or an analysis of the waste produced by the building occupants, can uncover opportunities for reducing the environmental impact of the building through landfill diversion.

A waste stream audit is the process by which the contents of the building waste stream are sorted and analyzed. By assessing the waste stream of a building, opportunities for source reduction, reuse, and recycling can be identified. Reduction, reuse, and recycling divert waste from landfills and incineration and reduce the negative environmental impacts of the facility.

An important first step in waste reduction is to understand waste production patterns in the building. A waste stream audit uncovers patterns of consumption and disposal of waste, which can suggest specific materials that can be diverted from the waste stream, or certain methods of collecting these materials before they are mingled with other waste.

The waste stream audit process involves sorting waste into categories and measuring waste (by volume or weight), recording metrics by material category, and evaluating whether each type of waste can be reduced and how. This information can be used to set reduction goals that will reduce disposal costs as well as improving the environmental performance of the building.

**LEED for Existing Buildings: O&M awards credit for analysis of the contents of both (1) waste disposed to landfill or incineration, and (2) waste diverted from disposal by recycling, reuse, or composting. An audit of both substreams quantifies the volume and types of diverted materials and the volume and types of materials that remain in the disposal waste stream.**

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

**U.S. EPA Waste Wise Program**  
[www.epa.gov/wastewise](http://www.epa.gov/wastewise)

**Waste Stream Audit: Six Steps to Dumpster Diving**  
California Department of General Services  
<http://www.documents.dgs.ca.gov/green/WasteStreamAudit.pps>

**Technical Specification for the Evaluation of Environmentally Preferable Janitorial Chemicals**  
State of California  
<http://www.ciwmb.ca.gov/greenbuilding/Specs/Janitorial/Janitorial.doc>



# Existing Building Commissioning

**STRATEGY:** Commissioning an existing building involves conducting a series of tests of the building systems and addressing any mechanical issues to ensure optimal building performance.

Existing building commissioning applies to both buildings that have never been commissioned—in order to restore them to optimal performance—and buildings that have been commissioned in the past—to monitor ongoing performance. Commissioning optimizes energy efficiency and water efficiency, thereby minimizing the building’s environmental impacts. Properly executed commissioning can substantially reduce costs for maintenance, repairs, and resource consumption, and improve the building’s indoor environmental quality—which enhances occupant productivity.

Existing building commissioning is a series of tests and documentation to identify areas that need to be improved in order to reach optimal building performance. 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.

Projects should consider using the original commissioning tests for all future recommissioning efforts, to ensure that the original results persist over time. This strategy offers a consistent baseline performance level to meet as the building systems age.

**LEED for Existing Buildings: O&M offers up to 6 credits for commissioning activities, and does not require a third party commissioning agent (building operations and maintenance staff can perform the process).**

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

### **Sample Building Operating Plan used for LEED-EB version 2.0**

Department of General Services Building and Property Management Branch

<http://www.documents.dgs.ca.gov/green/BuildingOpPlanSAMPLE.doc>

This document assists facilities that are in the process of retro-commissioning under the State of California’s Department of General Services Retro-Commissioning (RCx) Program. It provides information about the current operational needs and its contents are derived from existing building equipment manuals, previous commissioning reports, and documents submitted for LEED-EB certification.

# Energy Performance Contracts

**STRATEGY:** Leverage the operations budget to make facility improvements through an Energy Performance Contract.

An Energy Performance Contract (EPC) is a project financing agreement that uses future utility cost savings (or avoided costs) to pay for energy-saving equipment and improvements. Generally, a building owner makes an agreement with an Energy Service Company (ESCO) to install, lease, or purchase efficient technologies and services. These measures are implemented by the ESCO at no upfront cost to the building owner, and generate guaranteed savings over time. The building owner then shares a portion of the savings with the ESCO as payments for their investment and uses any remaining savings to budget for additional facility improvements.

**Yellow Light** Rules and restrictions regarding the use of EPC in public buildings vary widely from state to state. Project managers should review their state's enabling legislation for EPC when considering project funding sources.

**Some EPC projects may include:**

- Energy management systems
- Interior and exterior lighting
- Boiler replacement and repair of steam distribution systems
- High-efficiency HVAC systems

## SHARING SUCCESS STORIES

### Examples of Colorado's EPC Energy-Saving Measures

Colorado has developed a LEED for Existing Buildings Energy Performance Contracting Program. Through this 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 private funds for the long-term financing of the measures, and guarantees the energy savings over a fixed period of time, generally about 15 years. This process is conducted with no added cost to tax payers.

The program is currently piloted for the capitol complex, which includes six buildings that will each be submitted for LEED-EB:O&M certification. Next year eight buildings are planned and the program will expand to university and college campuses in the coming years. Thus far, the state has cut utility bills by over 30% for the current LEED for Existing Buildings projects.

# Energy Performance Contracts

## Examples of Colorado's EPC Energy-Saving Measures

Through Colorado's EPC Program, the ESCO companies have implemented the following measures in project buildings:

- 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, water reduction, etc.

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

### Status of EPC enabling legislation by state

Oak Ridge National Laboratory

<http://www.ornl.gov/info/esco/legislation/newesco.shtml>



# ON THE HORIZON

## SCALE IT UP

### PROGRAM ADMINISTRATION

Program Scope and Scale  
Staff LEED Experts  
Reporting to Stakeholders  
Facility Performance Evaluations and Tracking

### GREEN BUILDING PROGRAM

Celebrate – Refuel – Accelerate

# SCALE IT UP

## PROGRAM ADMINISTRATION

# Program Scope and Scale

**STRATEGY:** Expand your green building program with centralized program administration.

The ultimate goal of any green building program is make green practices into standard practices. To go beyond managing green building projects on a case-by-case basis, assign a staff-person to handle administration of the projects. This role may be an informal title attached to an existing position, or it may be a new position, like “Green Building Coordinator.”

Centralized administration supports the green building program in a variety of ways:

- 1) Incorporates green building requirements into master bid documents and specifications
- 2) Expands program scope by coordinating with other departments to make green building practices consistent throughout construction, renovation, maintenance, and operations
- 3) Keeps a central record of successful technologies, strategies, and consultants
- 4) Increases public and political support for green buildings by tracking and reporting success

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

State of Washington Leadership in Energy and Environmental Design (LEED) Quality Assurance Process Guidelines for State Agency/College and University Facilities  
State of Washington General Administration  
<http://www.ga.wa.gov/eas/green/LEEDGuide.doc>

Design Procedures Manual Submittal Requirements for LEED Projects  
New York State Office of General Services  
<http://www.ogs.state.ny.us/dnc/generalInfo/designmanual/09050GreenCleanBuildings.pdf>



## Staff LEED Expert

**STRATEGY:** An on-staff LEED expert can help you avoid project delays and develop green building best practices.

Green building projects can incur added costs due to the extra time and effort it takes for staff to learn new technologies and practices, while experienced project teams are able to achieve LEED certification with zero added cost.<sup>1</sup> Having at least one LEED expert on staff allows a green building program to benefit from past project knowledge, which can expedite the certification process.

The staff LEED expert may be the green building program administrator, project manager, or facility manager. This individual may not be involved in every green building project, but should be aware of the status and results of each project. The expert should also be available as a resource to support project progress if a project team is having difficulty with a particular technology, strategy, or practice.

 **Green Light** If the staff LEED expert has knowledge of every program project, he or she can compile lessons-learned and identify best practices that apply to your jurisdiction.

### SHARING BEST PRACTICES

The New York State Office of General Services Design & Construction Group  
The Design & Construction Group provides design, contracting, and construction management for some 35 state agencies. 25 LEED Accredited Professionals in the group form a Green Building Committee, which includes the Directors of both the Design and Construction Divisions.

<sup>1</sup> David Langdon, Lisa Matthiessen, and Peter Morris study "Costing Green: A Comprehensive Cost Database and Costing Methodology," July 2004 ([http://www.usgbc.org/Docs/Resources/Cost\\_of\\_Green\\_Full.pdf](http://www.usgbc.org/Docs/Resources/Cost_of_Green_Full.pdf))

# Reporting to Stakeholders

**STRATEGY:** Formal tracking and reporting requirements can be satisfied by keeping all LEED efforts well-documented and implementing a formal quality assurance process.

To fulfill tracking and reporting requirements, governments must implement a system for measuring and submitting key metrics to the proper authority. In addition to fulfilling reporting requirements, it may be useful to report key metrics on green building program accomplishments to the legislature, other government agencies, department heads, elected officials, community groups, and other stakeholders.

Key metrics reported to stakeholders could include:

- Number of LEED-AP staff involved in current projects
- Workload portfolio proportions of new and existing buildings
- Number of projects eligible to be certified and number of projects that will receive LEED certification
- Status on the effort to integrate green building requirements into specifications and contracts
- Status on efforts to quantify savings per project (e.g. energy, water, waste, carbon emissions, etc.)

For each LEED project in Washington State, the General Administration collects LEED submittals at every phase, including pre-design, design development, construction and post-construction. Projects are also required to submit the building's energy and water metering procedures. The General Administration uses this information to produce a comprehensive report to the Legislature. This information is also used as an in-house tool to identify projects that may require assistance, be good candidates for developing case studies, and share best practices for compilation of a database of green building strategies.

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

Washington State 2006 Green Building Report to the Legislature  
State of Washington General Administration  
<http://www.ga.wa.gov/eas/green/StateGreenBuildingReport-2006.pdf>

State of California Green Building- Fast Facts  
California Department of General Services  
[www.documents.dgs.ca.gov/dgs/pio/green/highlights.pdf](http://www.documents.dgs.ca.gov/dgs/pio/green/highlights.pdf)



# Facility Performance Evaluations and Tracking

**STRATEGY:** Once the building is occupied, ongoing evaluation, tracking and monitoring is necessary to evaluate building systems and educate building occupants. This ensures sustainable operations and maintenance.

Facility performance evaluations should be considered at the onset of the project, since a building's systems design and management will determine the evaluation criteria. The occupants of the building make a significant impact on the green goals for the building. For this reason, the project manager needs to work closely with the agency before, during, and after the completion of the project.

An effective tracking system is critical to the overall success of a green building. Tracking systems need to be implemented early in the design and development phase of the project. Post-occupancy evaluations should be conducted following the building completion and may be repeated on a periodic basis thereafter. This data will determine how the building is performing, whether the occupants are maximizing the building's potential, and whether additional operational systems need to be incorporated to achieve the overall goals of the project.

Project managers should meet with building occupants and staff to explain how a green building impacts their work environment. An educational workshop is an ideal way to communicate how the green building systems work, why they were installed, and what they (as users) can do to ensure the building operates as efficiently as possible. This will also make the user aware of the building's green design features that promote occupant health, productivity, and comfort. Staff, including cleaning and security staff, should also be included in the education process, since operations and maintenance of a green building requires specific care.

**Change is not Without Challenge-** It is essential to communicate the special features of sustainable buildings to all building occupants. Be honest and engage occupants in achieving the performance goals for the building. Provide a list of tips such as turning off lights and computers at the end of the work day. Set rules, such as no space heaters or additional fans. Be open to employee and staff ideas and suggestions.

## Resources

Governments that have experience with this topic have created templates, guides, and other resources to assist staff working on green building projects. These resources will provide more in-depth insight into this topic, and are shared here so that others may benefit from their example and adapt them to local conditions. Please see the [ADDITIONAL RESOURCES](#) section for a full description of the resources listed below.

California Facility Performance Evaluation (Formerly Post-Occupancy Evaluation) Plan  
State of California Department of General Services  
(<http://www.poe.dgs.ca.gov/The+Emerging+POE+Model/default.htm>)

# Facility Performance Evaluations and Tracking

Measured Performance Materials

New Buildings Institute

<http://www.newbuildings.org/measuredMeetingCurResP.php>

# SCALE IT UP

## GREEN BUILDING PROGRAM

# CELEBRATE – REFUEL – ACCELERATE

**STRATEGY:** A high-impact green building program develops over time to build on successes and address new challenges.

Whether your program is completing its first showcase LEED building or is taking steps towards centralized administration and reporting, continue to cycle through the stops on the Roadmap to Sustainable Government Buildings to gather more advice and ideas to take your program to the next level.

- **CELEBRATE**- share program successes; publicize results and impacts; engage the community; seek partnerships (See: [Program Administration](#))
- **REFUEL**- revisit sustainability goals; set benchmarks and targets; get more training and expertise (See: [Sustainability Goals](#); and [Build Capacity](#))
- **ACCELERATE**- attract funding and resources; support policy initiatives; link goals with compatible programs; streamline implementation (See: [Sustainability Goals](#); [Implement LEED](#); and [Program Administration](#))

The USGBC Government Sector will work to refine and update this information with the experiences from government green building programs across the country.

Share your experiences, comments, and questions by sending an email to: [leedgovernment@usgbc.org](mailto:leedgovernment@usgbc.org).



# ADDITIONAL RESOURCES

## Green Building and Public Policy

### Green Design Compliance Flowchart

New York State Office of General Services

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

A flowchart for determining what green elements projects must pursue to comply with New York's green building standards for public buildings.

### Green Design Table for Small Projects

New York State Office of General Services

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

A checklist to ensure that green design elements are integrated into small projects, which are not required to comply with New York's green building standards for public buildings. Based on LEED-NC version 2.2.

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## Consultant Selection

### Project Advertisement Excerpts

Massachusetts Designer Selection Board

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

Sample text from a Designer Selection Board advertisement seeking design services for a renovation project at a state university.

### California Sustainable Building Toolkit

<http://www.ciwmb.ca.gov/Greenbuilding/ToolKit.htm>

Includes:

#### San Jose RFQ for Architectural Applicants

<http://www.ciwmb.ca.gov/Greenbuilding/SampleDocs/SanJoseRFQ.pdf>

Sample request for qualifications for architectural consulting services.

#### Scoring Sheet for RFQ Applicants

<http://www.ciwmb.ca.gov/greenbuilding/Design/CAEECScoreing.xls>

Score card for evaluating contractor, architect, engineers and other project team members.

#### Sustainable Building Contract Language

<http://www.ciwmb.ca.gov/Greenbuilding/Design/Contract.htm>

Includes sample contract language for California state and local government.

### Green Project Specifications

<http://www.ciwmb.ca.gov/Greenbuilding/Specs/default.htm>

Includes sample specifications and links to sample specifications.

### Special Environmental Requirement Section 01350

<http://www.ciwmb.ca.gov/Greenbuilding/Specs/Section01350/>

Section 01350 contains specification language on environmental and public health considerations for building projects. This page has resources and links to more information.

### Modular Office Furniture Specification

<http://www.ciwmb.ca.gov/Greenbuilding/Specs/Furniture/>

Details and link to download full specification.

### Reference Specifications for Energy and Resource Efficiency

<http://www.eley.com/specs/index.htm>

Downloads and other information for reference specifications to insert into construction documents

### Writing the Green RFP: Sustainable Design Language for Consultant Requests

#### The American Institute of Architects

[http://info.aia.org/cote2\\_template.cfm?pagename=cote\\_rfps](http://info.aia.org/cote2_template.cfm?pagename=cote_rfps)

Guide for writing requests for proposals or qualifications from architects and other design professionals, as well as development, construction, and construction management services.

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## Budgeting for LEED Projects

### Project Budgeting Worksheet and Instructions

#### State of Washington General Administration

<http://www.ga.wa.gov/Construction/3FormsRef.htm> (Under Project Managers)

Sample budget for engineering and architectural services for a LEED certified project. All formulas and calculations have been built in, and the sample has instructions for use.

### Capital Outlay Budget Change Proposals

#### California Department of Finance

<http://www.dof.ca.gov/fisa/bag/SAM6000.htm#s6818>

Guidance for submission of budget changes.

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## Budgeting Methodology and Setting Project Goals

Sustainable Building Goals for Laguna Honda Hospital

California Integrated Waste Management Board

<http://www.ciwmb.ca.gov/greenbuilding/Design/LagunaGoals.doc>

Baseline goals for green measures in sustainable hospital design.

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## The LEED Checklist

LEED Rating System Checklists

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=222>

Checklists for all LEED rating system. Click on the rating system on the right to view.

Massachusetts Sample Checklist for LEED-NC version 2.2

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

An example of how to expand the LEED checklist for a new construction project. Based on LEED-NC version 2.2.

California Sample Checklist for LEED-EB version 2.0

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

An example of how to expand the LEED checklist for an existing buildings project. Based on LEED-EB version 2.0 .

New York Sample Checklist for LEED-EB version 2.0

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

An example of how to expand the LEED checklist for an existing buildings project. Based on LEED-EB version 2.0.

Washington State Submittal Forms

State of Washington General Administration

<http://www.ga.wa.gov/EAS/green/>

The state of Washington provides a sample submittal template and process for project reporting.

This process includes the submission of updated LEED Checklists at various stages of project development so that changes in credits can be tracked on an ongoing basis.

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## Energy Life Cycle Cost Analysis

Energy Life-Cycle Cost Analysis (ELCCA) Worksheet & Instructions

State of Washington General Administration

<http://www.ga.wa.gov/EAS/elcca/home.html>

The Energy Life Cycle Cost Analysis Worksheet provides a sample life cycle cost analysis template embedded with formulas, calculations, and instructions on how to use it.

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## Utility Incentive Programs and Rebate Programs

Massachusetts Utility Rebate Flowchart

State of Massachusetts

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

Flowchart illustrating Massachusetts utility rebates available at each phase of project development.

Massachusetts Process for Utility Incentives

State of Massachusetts Energy Efficiency and Sustainable Buildings Group

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

Guidance for maximizing receipt of utility incentives.

Guide to Maximizing Utility Grants and Rebates

State of Washington General Administration

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

Guidance for maximizing receipt of utility incentives.

National Database of Incentive Programs

Database of State Incentives for Renewables & Efficiency

<http://www.dsireusa.org/>

DSIRE is a comprehensive source of information on state, local, utility, and federal incentives that promote renewable energy, energy efficiency, and green building.

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## Energy Performance Contracts

Status of EPC enabling legislation by state

Oak Ridge National Laboratory

<http://www.ornl.gov/info/esco/legislation/newesco.shtml>

Interactive map with information on whether state and local government organizations are allowed to use performance contracting to acquire building upgrades and energy efficiency improvements for that state.

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## New Buildings: Project Management Overview

New Mexico How-To Guide to LEED Certification

[http://www.usgbcnm.org/docs/how\\_to\\_guide\\_to\\_leeed\\_certification\\_final\\_version.pdf](http://www.usgbcnm.org/docs/how_to_guide_to_leeed_certification_final_version.pdf)

Guidance for achieving points in the LEED for New Construction rating system based on a government LEED project in New Mexico

LEED Project Implementation Guide for State Project Managers

State of Washington

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

Guide following the phases of a new construction project and describing considerations for project managers specific to green building projects in the State of Washington. This guide is supplemented by the Green Building Implementation Project Management Checklist below.

Green Building Implementation Project Management Checklist

State of Washington

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

A checklist of action items for State Project Managers of LEED new construction projects at each stage of development.

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## New Buildings: Design Phase

Sample Eco-Charrette Agenda

State of Washington

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

A sample agenda template for an eco-charrette. The sample explains who an eco-charrette should include, approximate timing, and outlines group exercises.

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## New Buildings: Commissioning

### Building Commissioning Guidelines

State of Washington, General Administration

<http://www.ga.wa.gov/EAS/bcx/>

Guidelines for commissioning in the state of Washington, including contract requirements and lists project team roles for commissioning process.

### Building Commissioning Recommended Guidelines

National Association of State Facilities Administrators

<http://www.nasfa.net/displaycommon.cfm?an=1&subarticlenbr=81>

Guidelines document and highlight procedures that have been tried and proven in state government environments and are consistent with state consulting and procurement requirements. Includes tips on budgeting and planning for commissioning, as well as laying the foundation for improved building quality. Guidelines must be ordered from NASFA.

### Building Commissioning: An Overview

Better Bricks

[http://www.ga.wa.gov/EAS/bcx/Cx\\_Overview.pdf](http://www.ga.wa.gov/EAS/bcx/Cx_Overview.pdf)

An overview of the process of commissioning, the cost, and commissioning benefits.

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## New Buildings: Construction Waste Management

### List of Common Recyclable Materials and Recycled-Content Materials

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

A list of materials available for salvaging, reuse, and recycling.

### Construction Waste Management Guidelines

State of Washington, General Administration

<http://www.ga.wa.gov/EAS/CWM/guideline.html>

Guide to the benefits of construction waste management, prevention of waste, salvaging, reuse and recycling, designing a waste management plan, as well as a glossary of terms.

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## Existing Buildings: Project Management Overview

### California Sample Checklist for LEED-EB version 2.0

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

An example of how to expand the LEED checklist for an existing buildings project. Based on LEED-EB version 2.0.

### New York Sample Checklist for LEED-EB version 2.0

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1959>

An example of how to expand the LEED checklist for an existing buildings project. Based on LEED-EB version 2.0.

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## Existing Buildings: Building Selection & Implementation Strategies

### Module 1: Tasks 1-10; Setting up Management Policies and LEED Document Management

California Department of General Services

[http://www.documents.dgs.ca.gov/green/Module\\_1-tasks1-10.pps](http://www.documents.dgs.ca.gov/green/Module_1-tasks1-10.pps)

A presentation outlining the major programs of the California Best Practices Manual, including the custodial plan, site and grounds maintenance plans, and others.

### Best Practice Manual: Better Building Management for a Better Tomorrow

California Department of General Services Building and Property Management Branch

<http://www.green.ca.gov/GreenBuildings/BBBTManual.htm>

The Best Practices Manual comprehensively outlines State policies and procedures for managing and maintaining public facilities. Specifically, it discusses programs including a custodial plan; integrated pest management procedures; an engineering and trades plan; construction and renovation policies; and programs for site and grounds, purchasing, and waste and recycling management.

### Sustainable Activities by the Building Occupant

<http://www.documents.dgs.ca.gov/green/SustainabilityActivitiesByOccupants.pps>

A presentation focusing on occupant measures to improve existing building performance.

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## Existing Buildings: Waste Stream Auditing

### U.S. EPA Waste Wise Program

[www.epa.gov/wastewise](http://www.epa.gov/wastewise)

Waste Wise is a free, voluntary EPA program that helps U.S. organizations eliminate costly municipal solid waste disposal.

### Waste Stream Audit: Six Steps to Dumpster Diving

PowerPoint presentation prepared by the Department of General Services

<http://www.documents.dgs.ca.gov/green/WasteStreamAudit.pps>

A presentation explaining the concept of waste stream auditing; explaining how such an audit can help a building obtain LEED-EB credits in pursuit of compliance with California policies for greening state facilities; and outlining steps for implementation.

### Technical Specification for the Evaluation of Environmentally Preferable Janitorial Chemicals

State of California

<http://www.ciwmb.ca.gov/greenbuilding/Specs/Janitorial/Janitorial.doc>

A sample of a comprehensive set of standards for rating janitorial chemicals.

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## Existing Building Commissioning

### Sample Building Operating Plan used for LEED-EB version 2.0

Department of General Services Building and Property Management Branch

<http://www.documents.dgs.ca.gov/green/BuildingOpPlanSAMPLE.doc>

Sample plan for facilities that are in the process of retro-commissioning under the State of California's Department of General Services Retro-Commissioning (RCx) Program. It provides information about the current operational needs and its contents are derived from existing building equipment manuals, previous commissioning reports, and documents submitted for LEED-EB version 2.0 certification.

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## Program Scope and Scale

State of Washington Leadership in Energy and Environmental Design (LEED) Quality Assurance Process Guidelines for State Agency/College and University Facilities

State of Washington General Administration

<http://www.ga.wa.gov/eas/green/LEEDGuide.doc>

A sample process for tracking the progress of LEED-NC version 2.2 Silver projects.

Design Procedures Manual Submittal Requirements for LEED Projects

New York State Office of General Services

<http://www.ogs.state.ny.us/dnc/generalInfo/designmanual/09050GreenCleanBuildings.pdf>

Chapter 9 from New York State OGS Design Procedures Manual listing submittal requirements for in-house designers or consultants working on LEED projects.

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## Reporting to Stakeholders

Washington State 2006 Green Building Report to stakeholders

State of Washington General Administration

<http://www.ga.wa.gov/eas/green/StateGreenBuildingReport-2006.pdf>

Report includes a full description of Washington's quality assurance and verification process for green building, including all associated submittal forms and performance reports on several completed projects.

State of California Green Building- Fast Facts

California Department of General Services

[www.documents.dgs.ca.gov/dgs/pio/green/highlights.pdf](http://www.documents.dgs.ca.gov/dgs/pio/green/highlights.pdf)

A summary table of green objectives and progress to date.

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## Facility Performance Evaluations and Tracking

California Facility Performance Evaluation (Formerly Post-Occupancy Evaluation) Plan

State of California Department of General Services

<http://www.poe.dgs.ca.gov/The+Emerging+POE+Model/default.htm>

An outline of a comprehensive program for ongoing facility evaluation and improvement.

## Measured Performance Materials

New Buildings Institute

<http://www.newbuildings.org/measuredMeetingCurResP.php>

Bibliography list provides brief descriptions and links to key documents and tools currently available for measured performance analyses and case studies.

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**The USGBC Government Resources Page** is your entry point to the tools and expertise you need to formulate effective green initiatives in public policy, develop a top notch public sector green building program, and encourage green building in the private sector. Through these resources the U.S. Green Building Council is creating a national forum for discussing and sharing green building best practices at all levels of government.

LEED Government Programs Include:

- Developing tools for LEED implementation on a portfolio scale
- Delivering Targeted Education
- Supporting green initiatives in public policy
- Creating a forum for the national green government community

**[www.USGBC.org/government](http://www.USGBC.org/government)**



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