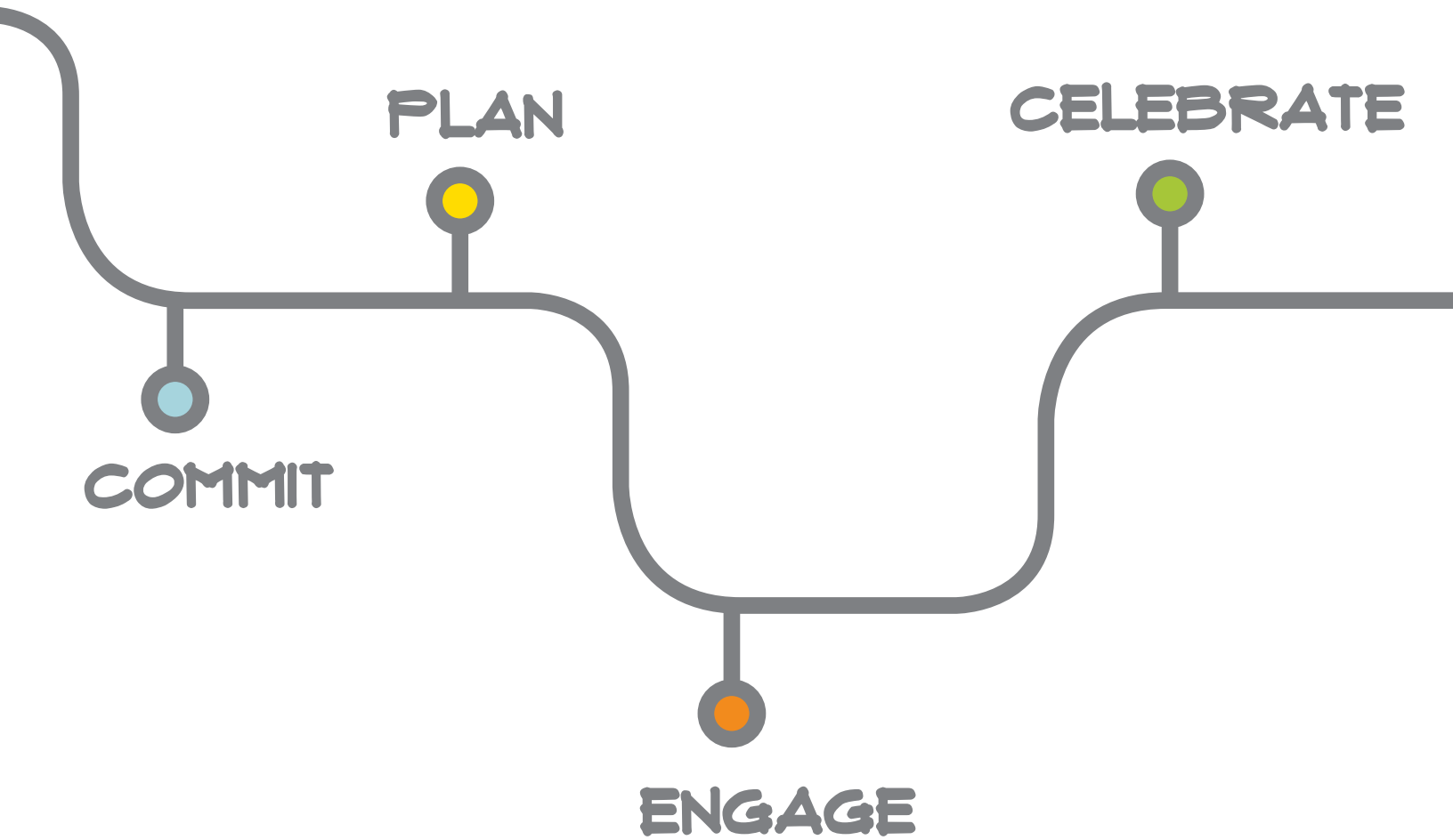


ROADMAP



TO A
**GREEN
CAMPUS**



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FOREWORD

An Introduction from Rick Fedrizzi, president, CEO & founding chair of the U.S. Green Building Council

Across America, the next generation of leaders walks into classrooms, libraries, dining and lecture halls that are compromising their ability to learn, not enhancing it. As the President, CEO and Founding Chair of the U.S. Green Building Council (USGBC), I've witnessed the profound impact green buildings have on our lives and the innovation they have poured into the marketplace - from office and retail buildings to government facilities and individual homes. However, none of these markets speak more powerfully to the benefits and potential of green buildings than our schools.

Here at the USGBC we have a vision: green schools for everyone within this generation. For this reason, we have formed the *Center for Green Schools at the U.S. Green Building Council*. The Center is increasing our efforts to drive change in how we design, construct and operate our schools and campuses so that all educational facilities can enhance student learning experiences. We believe that everyone, from the kindergartner entering the classroom for the first time to the Ph.D. student performing research in a lab, should have the ability to learn in green buildings.

Colleges and universities already have a higher percentage of LEED-certified green space than any other sector, including government, retail and hospitality. While this is notable, colleges and universities have only just begun to scratch the surface of transforming their aging campuses. Today, there are more than 83,000 college buildings comprising 3.48 billion square feet on campuses across the country.

The Center for Green Schools is continuing the work USGBC has started through its Green Campus Campaign, and we are working directly with staff, faculty, students and administrators to expedite the transformation of all campuses into sustainable places to live and learn, work and play.

While every institution's path will be different, the *Roadmap to a Green Campus* provides the strategy for using LEED as a framework for developing and evolving campus-wide sustainability plans, references more than 100 tools and resources to support campus greening efforts and profiles several institutional success stories.

The Center is here to elevate and accelerate important conversations with campus stakeholders and provide the tools and resources, such as this Roadmap, to help make the transformation toward green campuses possible.



ROADMAP TO A GREEN CAMPUS



Campus. The word originates from the Latin, “field,” and was used in the 18th century to define the open space or plain within which a college or university was situated. It was an entity set apart to educate and advance knowledge. The 21st century campus is now recognized as a comprehensive and complex system of interrelated elements. Campuses today range from rural to urban, from single buildings to expansive complexes, and from community colleges to public and private four-year institutions to major research universities. Today, some 18 million students, as well as a corresponding number of faculty, staff and visitors, experience the campus in the United States. With more than 4,300 institutions of higher education located throughout the nation, encompassing hundreds of millions of square feet of building space, the campus has become an integral part of our communities.

INTRODUCTION

A growing and collective desire to create a society living in harmony with the environment is revolutionizing how buildings and neighborhoods are envisioned, built and operated. As dynamic places that conduct research, pioneer technological innovations, engage faculty and students and encourage community partnerships, America's college and university campuses have the opportunity to serve as leaders, models and incubators for the creation of new and revitalized green communities. Colleges and universities are the most viable forces for change in today's society. Their commitment to sustainability is critical to establishing new standards, developing ground breaking approaches and preparing future global citizens.

In 2008, the U.S. Green Building Council (USGBC) launched its Green Campus Campaign as a way to acknowledge the integral role of campus communities in accelerating the sustainability movement. A green campus focuses on more than the life cycle of buildings, grounds, and infrastructure. It encourages research, promotes advocacy efforts, develops curriculum, and supports academic and mission-based goals that further sustainability on-campus.

sus·tain·a·bil·i·ty

Sustainability promotes meeting the needs of the present without compromising the ability of future generations to meet their own needs. Its success is measured by the triple bottom line: environmental responsibility, economic prosperity, and social equity.

USGBC's vision is to achieve green schools for everyone within this generation. As a way to meet this vision and build on the work of the Green Campus Campaign, USGBC recently formed the Center for Green Schools at USGBC.

green cam·pus

A green campus is a higher education community that is improving energy efficiency, conserving resources and enhancing environmental quality by educating for sustainability and creating healthy living and learning environments.

The Center encourages the participation of all stakeholders, including administrators, capital planning and facilities staff, faculty, students, and the surrounding community by providing the tools, dialogue and resources needed to create green schools. The success of a green campus is dependent on an integrated approach to planning and implementing sustainability initiatives.

Engaging these stakeholders early will result in a plan that reflects the realities and needs of the campus and community while furthering the institutional mission.

**THE CENTER
FOR GREEN SCHOOLS**



Universities and colleges are living laboratories. They develop the tools and techniques needed to implement innovative green technology and methodology. Through comprehensive sustainability plans that integrate curriculum offerings, research initiatives, student engagement opportunities, and collaborative partnerships, educational institutions can realize the concept of “campus as teacher.” In the process, green campuses provide students opportunities to develop green job skills that prepare them to be top candidates in an increasingly competitive job market.

To advance the objectives of the Center for Green Schools and assist colleges and universities of various sizes, budgets, and locations in defining and meeting their sustainability goals, USGBC created the *Roadmap to a Green Campus*. The *Roadmap* offers a strategy for using the LEED® green building certification program as a framework for developing and evolving campus-wide sustainability plans. LEED is an internationally recognized third-party certification system that measures how well buildings and communities perform using several metrics, including site management, energy savings, water efficiency, CO₂ emissions reduction, improved indoor environmental quality, and stewardship of resources. It provides a concise framework for identifying and implementing practical and measurable green campus solutions. The *Roadmap* references more than one hundred tools and resources to support campus greening efforts and profiles institutional success stories.

The approach detailed in the *Roadmap* has been successfully initiated on campuses across the United States. While every institution’s path will be different, the core commitment to leading efforts toward a greener tomorrow transcends vast differences in campus size, setting, and history. The steps and strategies outlined in the *Roadmap* provide the information and guidance

that all institutions need to ensure that they can take their rightful place at the forefront of the movement to build a sustainable future.

A. WHO IS USGBC?

Founded in 1993, USGBC is a nonprofit community of leaders working to make green buildings and communities available to everyone within a generation. USGBC works toward its mission of market transformation through its LEED green building certification program; green building planning and implementation support; robust educational offerings and publications; research; a nationwide network of chapters, affiliates, and student groups; the annual Greenbuild International Conference & Expo; and advocacy in support of public policy that encourages and enables green buildings and communities.

USGBC leads a diverse constituency of builders and environmentalists, corporations and nonprofit organizations, elected officials and concerned citizens, colleges and universities, teachers and students. Through its member companies and organizations, chapters and USGBC Students™, USGBC is the driving force in developing and promoting innovations in green building technology.



BENEFITS OF USGBC MEMBERSHIP

Corporate Members

USGBC's national members are organizations, corporations and institutions from across the globe. An organization's USGBC membership benefits extend to all full-time employees. National benefits include discounts on products and services, such as LEED reference and study guides, LEED project registration and certification, courses and trainings, LEED Professional Credential exams, registration for the Greenbuild International Conference & Expo, and more. Member companies are listed in USGBC's online member directory and have access to the member logo for use in marketing and promotional material.

Chapter Members

Any individual, regardless of whether or not his or her entity is a national member, can affiliate with USGBC by joining a local chapter. Chapter members have the opportunity to support the USGBC mission of market transformation at the local level through education, advocacy, and outreach. Benefits include meeting other green building professionals, sharing expertise to help raise awareness, or honing skills in areas such as public policy advocacy, communications, and event planning. Chapter members also have the opportunity to become a USGBC course reviewer and earn continuing education hours (CEs) toward LEED Professional Credentials. Each chapter offers unique benefits to its members including, but not limited to, discounted rates for chapter programs and continuing education opportunities hosted by the chapter.

USGBC Students™



USGBC
STUDENTS™

USGBC Students is the college/university student engagement program of USGBC. The program was created to help recruit, equip, and connect the next generation of leaders to the green building movement and sustainable design industry by empowering students to transform their campuses, careers, and communities. USGBC Students are chartered and officially recognized student organizations by their respective college and university campuses across the country and USGBC. Benefits include special discounts on USGBC education courses and publications, including free access to USGBC's online course, *LEED 101: Green Building Basics & LEED*.

For more information on USGBC membership
and to join, visit www.usgbc.org.

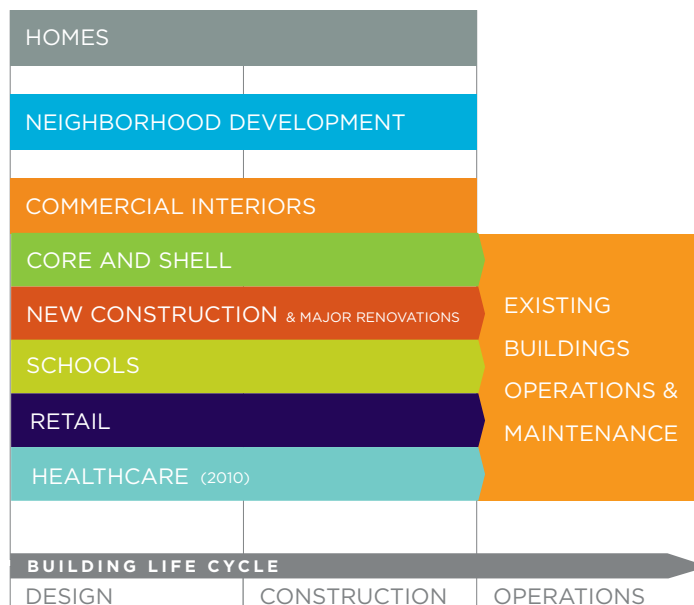
Understanding its responsibility as a leader in advocating for green buildings and communities, USGBC is committed to working with colleges and universities to help create campuses that serve as models of sustainability and provide students an opportunity to live and learn in places that showcase the success of the integrated approach to green campus planning and implementation.

B. WHAT IS LEED?

In 2000, USGBC established the LEED green building certification program as a way to define and measure green buildings. LEED is an internationally recognized green building certification program, providing third-party verification that measures how well a building or community performs across the metrics that matter most:

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

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



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

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

GREEN BUILDING CERTIFICATION INSTITUTE (GBCI)

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

USGBC provides numerous educational programs and products on green design, construction, operations and maintenance for professionals from all sectors of the building and planning industries. Formats are varied and include in-person workshops, online courses, webinars and podcasts, as well as publications such as LEED Reference and Implementation Guides, LEED project case studies, and green building white papers. USGBC's educational resources also include study guides for those pursuing a LEED Professional Credential.

HOW IT ALL FITS TOGETHER

USGBC

**Develops
and supports
LEED via:**

Member Committees
Member Balloting
Education
Advocacy
Chapters
Greenbuild



GBCI

**Certifies
LEED Projects**

**Administers LEED
Credentials**

The LEED credit categories include a wide range of solutions that are applicable to colleges and universities, including alternative transportation, purchasing, solid waste management, interior renovations, stormwater management, and energy management.



LEED Credit Categories



SUSTAINABLE SITES
Alternative Transportation
Stormwater Management



ENERGY & ATMOSPHERE
Energy Performance
System-Level Metering



WATER EFFICIENCY
Water Performance
Water-Efficient Landscaping



MATERIALS & RESOURCES
Sustainable Purchasing
Solid Waste Management



INDOOR AIR QUALITY
Occupant Comfort
Green Cleaning



INNOVATION & DESIGN
Engaging students on LEED projects
Using buildings as teaching tools

LEED RATING SYSTEMS

LEED® for New Construction & Major Renovations™

LEED for New Construction is designed to guide and distinguish high-performance commercial and institutional projects, including administration buildings, high-rise dormitories, recreational facilities, and laboratories. It certifies the design and construction activities of both new buildings and major renovations of existing buildings. (For LEED for New Construction, the renovations must affect over 50% of the building.) If the renovation scope does not involve significant design and construction activities, LEED for Existing Buildings: Operations & Maintenance may be appropriate.

LEED® for Existing Buildings: Operations & Maintenance™

LEED for Existing Buildings: O&M helps measure operations, improvements, and maintenance on a consistent scale, with the goal of maximizing operational efficiency while minimizing environmental impacts. LEED for Existing Buildings: O&M addresses whole-building cleaning and maintenance issues, recycling programs, exterior maintenance programs, and systems upgrades. It can be applied both to existing buildings seeking LEED certification for the first time and to projects previously certified under LEED for New Construction, Schools, or Core & Shell.

LEED® for Commercial Interiors™

LEED for Commercial Interiors is the recognized system for certifying high-performance green interiors that are healthy, productive places to work; are less costly to operate and maintain; and have a reduced environmental footprint. LEED for Commercial Interiors gives the power to make sustainable choices to tenants and designers who do not always have control over whole-building operations, such as spaces leased by institutions.

LEED® for Core & Shell™

LEED for Core & Shell is a rating system for designers, builders, developers and new building owners who want to address sustainable design for new core and shell construction. Core and shell covers base building elements such as structure, envelope and the HVAC system. LEED for Core & Shell is designed to be complementary to the LEED for Commercial Interiors rating system, as both rating systems establish green building criteria for developers, owners and tenants. The rating system is applicable to buildings which institutions design and construct to be partially or fully occupied by tenants such as food vendors. LEED for Core & Shell applies to buildings in which 50% or more of the building's leasable square footage will be occupied by tenants.

LEED® for Schools™

LEED for Schools recognizes the unique nature of the design and construction of academic facilities. Based on the LEED for New Construction rating system, it addresses issues such as classroom acoustics, master planning, mold prevention and environmental site assessment. The rating system is applicable to many higher education academic facilities. All new and major renovations of K-12 facilities built on-campus must utilize this rating system when seeking LEED certification.

LEED® for Neighborhood Development™

LEED for Neighborhood Development integrates the principles of smart growth, urbanism, and green building into a system for neighborhood design. The rating system is appropriate for primarily new developments in a variety of place types, from small infill sites to adjacent sites near services and previously developed land. LEED for Neighborhood Development extends the principles and benefits of LEED beyond the building footprint into the public realm, from energy generation to transportation infrastructure and stormwater management. The rating system also serves as a guide for campus master planning.

LEED® for Homes™

LEED for Homes is a rating system that promotes the design and construction of high-performance green homes, which use less energy, water, and natural resources, create less waste, and are more durable and comfortable for occupants. While most dormitories would utilize LEED for New Construction, new faculty residences or some dormitories with three or fewer stories could be certified under the LEED for Homes rating system.

LEED® for Retail™

LEED for Retail acknowledges the special requirements of the retail environment and addresses the different types of spaces retailers need for distinctive product lines. For campuses with retail sites, including bookstores and third-party establishments, LEED for Retail would apply.

LEED® for Healthcare™ (in development)

LEED for Healthcare was developed to meet the needs of the health care market, including inpatient care facilities, licensed outpatient care facilities, and licensed long-term care facilities. It may also be used for medical offices, assisted living facilities, and medical education and research centers. LEED for Healthcare addresses issues such as increased sensitivity to chemicals and pollutants, traveling distances from parking facilities, and access to natural spaces.

C. LEED® AS A ROADMAP

There are over 4,300 institutions for higher education in the United States. Some are clusters of pre-Civil War buildings in bucolic settings; some are downtown high-rise buildings; and others are land grant schools located in wide open areas. Although diverse in type and location, college and university campuses function as small cities and towns, requiring master plans that coordinate new construction and building renovations, facilities management, transportation planning, and procurement procedures. Determining how to develop and implement a campus-wide sustainability plan may seem daunting, but it does not have to be. LEED can provide a concise framework to guide discussions, outline plans, and implement solutions.

THE GREEN CAMPUS CAMPAIGN: PROMOTING A COLLABORATIVE APPROACH

A campus-wide sustainability plan addresses more than buildings and infrastructure. Thus, it is important to engage organizations that are actively involved in other aspects of creating a green campus as well as those that can support the implementation of the plan. These entities may include groups focused on developing curriculum, supporting research initiatives, promoting advocacy efforts, or engaging the community. Critical to success is convening these organizations to discuss how to design a plan that best reflects the institution's overall sustainability goals and objectives.

Several initiatives are noted in the chart below. Additional information is located in the [Resources](#) Section.

American College and University Presidents' Climate Commitment (ACUPCC)

An ever increasing number of presidents and chancellors, over 680, have signed the ACUPCC, which commits institutions to develop a comprehensive plan to achieve climate neutrality, to initiate two-of-seven-listed tangible actions to reduce greenhouse gas emissions, and to publicly report their progress.

Association for the Advancement of Sustainability in Higher Education (AASHE)

With more than 975 member organizations, AASHE serves as a clearinghouse of information about campus sustainability and provides networking opportunities for campus advocates through an online portal and educational programming. AASHE developed and administers the Sustainability Tracking Assessment & Rating System (STARS), a voluntary self-reporting tool for colleges and universities to gauge progress toward sustainability. STARS addresses campus activities ranging from education and research, planning, administration, engagement, and operations. Campuses that are already using LEED will automatically qualify for multiple points within the Operations section of STARS.

The Association of Higher Education Facilities Officers (APPA)

With over 5,000 members from educational facilities, APPA serves the needs of facilities management professionals on campuses throughout North America. APPA educates its membership on a range of issues, from reducing campus carbon footprints to understanding how green cleaning policies may be developed to meet LEED requirements.

National Association of College and University Business Officers (NACUBO)

Representing the financial management professionals from higher education, NACUBO has focused on offering the business case for renewable energy development on campus, and provides resources on a range of campus management issues from green purchasing to solid waste management systems.

Society for College and University Planning (SCUP)

Representing facility planning and design professionals from campuses located throughout the world, SCUP provides a dynamic forum for the exchange of ideas and lessons learned on green building including in-depth sessions related to the LEED process.

LEED is much more than a single building certification program. LEED acts as a benchmark for campus greening efforts and helps to measure progress. Many of the LEED credits can be applied to campus-wide policies and programs, used to set design standards, and integrated into a university's or college's master development plan and specifications, helping to institutionalize sustainability efforts.

SHARE BEST PRACTICES

Colleges and universities develop green campus best practices through research, implementation and a willingness to revise and adapt. These best practices should be shared with colleagues to ensure that effective strategies and successful initiatives can be easily adapted and replicated. USGBC encourages higher education institutions to work collaboratively to develop practical solutions and share lessons learned.

These best practices include the following measures:

- Adopting green operations and maintenance practices
- Implementing green cleaning policies
- Developing alternative transportation strategies
- Coordinating procurement efforts
- Establishing recycling programs
- Promoting innovative landscape planning and maintenance
- Evaluating food purchasing procedures
- Organizing student and staff education programs to reduce energy and water consumption

Several recent changes to LEED include a stronger emphasis on transportation, water efficiency, and energy use reduction, making the rating systems even more applicable to campus-wide sustainability efforts as universities and colleges seek ways to implement alternative transportation plans and make new and existing facilities more energy efficient.

AASHE'S CAMPUS SUSTAINABILITY DISCUSSION FORUMS

The Association for the Advancement of Sustainability in Higher Education (AASHE) provides online discussion forums on a variety of topics related to green campus planning, including curriculum, co-curricular education, research, buildings, dining services, purchasing and grounds. For more information, visit AASHE's [Campus Sustainability Discussion Forums](#).

The new LEED for Neighborhood Development rating system's emphasis on bringing buildings and infrastructure together to better relate the community to the landscape all within a local and regional context makes many of its credits applicable to college and university campuses, including bicycle network and storage, access to recreational facilities, and community outreach and involvement. LEED for Neighborhood Development also sets guidelines for both decision making and development to provide an incentive for better location, design, and construction of new residential, commercial, and mixed-use developments. This could be particularly helpful for colleges and universities looking to develop affordable faculty and staff housing that is easily accessible to campus and other amenities by walking, biking, or other means of alternative transportation.

LEED PROVIDES PROJECT-BASED LEARNING OPPORTUNITIES FOR STUDENTS

Colleges and universities across the country are finding increased opportunities to engage students in implementing LEED projects. Students have researched LEED credits, conducted energy and water audits, developed and implemented recycling programs, administered building occupant and transportation surveys, and facilitated design charrettes. As a result, institutions drive down project costs and students garner critical project experience, which helps to distinguish them in an increasingly competitive job market.

The LEED for Existing Buildings: Operations & Maintenance rating system offers the greatest potential to guide the development and implementation of campus sustainability plans. Its emphasis on upgrading building systems to improve energy efficiency, implementing operations and maintenance best practices, coordinating purchasing, and establishing alternative transportation plans makes many of the credits applicable to campus-wide initiatives.

Begin the Journey to a Green Campus

The *Roadmap* outlines the steps for creating, launching and implementing a campus-wide sustainability plan. It is not a prescriptive guide, but rather a tool that colleges and universities can use on their journey to institute green and sustainable practices that reflect their unique needs and attributes. In most cases, the first step begins with identifying stakeholders and developing the process to gain their consensus in committing to a green campus.



SET THE DESTINATION: COMMIT TO A GREEN CAMPUS



The goal to green a campus may start with the administration or may be initiated through grassroots efforts led by students, faculty or staff. Regardless of how the initiative begins, in order to develop and implement a green campus plan, the institution will need to make a commitment to sustainability and gain the consensus of key stakeholders.

IMPORTANCE OF GRASSROOTS EFFORTS IN GREENING CAMPUSES

Grassroots initiatives should not be overlooked, since many are critical in building momentum for campus sustainability activities. Students have initiated many successful sustainability efforts at colleges and universities across the United States. Engaged students, faculty and staff can influence the administration's commitment to campus greening and will be essential partners in advancing and implementing green practices on campus.

A. COMMIT TO SUSTAINABILITY

The process for establishing a campus-wide commitment to sustainability will vary. In many cases, institutions will declare a formal commitment only after they have established a team to assess current sustainability initiatives, evaluate opportunities, identify challenges and secure the support of key stakeholders. The commitment may be in the form of a sustainability plan, green building policy and/or climate action plan. Institutions may also choose to sign the American College & University Presidents' Climate Commitment (ACUPCC) to

further solidify their commitment. The institution can determine the form of the commitment, but the purpose is to lay a solid foundation for developing and implementing a green campus plan and to communicate those goals to faculty, staff, students, alumni, and the community.

“Spelman is a choice to change the world. But before we can change the world, we have to change ourselves ... Understanding our own environmental impact and seeking to reduce it is a choice that all of us can make every day.”

—Spelman’s President
Dr. Beverly Daniel Tatum

GREEN CAMPUS PROFILE

UNIVERSITY OF NEW HAMPSHIRE-DURHAM

COMMITTING TO GREEN BUILDING AND OPERATIONS

To meet its ACUPCC obligations and related [commitments](#) to sustainability, including an ongoing energy efficiency program and sustainable landscaping master plan, the University of New Hampshire (UNH) modified its UNH design and construction building standards in 2008 so that all new campus construction and major renovation projects will meet LEED Silver standards. [UNH Design Guidelines](#) used by UNH Facilities Design and Construction require that designs use energy efficient systems and components and consider environmental impacts. For 30 years, UNH has operated an ongoing energy efficiency and retrofit program that has resulted in savings of millions of dollars each year, which is promoted through the campus’s [Energy and Campus Development Division](#). Standards and commitments like this have prevailed at UNH due to an early commitment to sustainability; UNH has the “oldest endowed sustainability program in Higher Ed”, managed by the [Office of Sustainability](#) (UOS). Furthermore, in 2007, UNH’s President elevated energy division and UOS authority for greater cross-campus leadership. Among [other demonstrations of commitment](#), UNH is a founding member of AASHE, which supports a [list](#) of institutions that have green building policies and standards, and was one of the seventy campuses chosen to pilot STARS in 2008.

B. ESTABLISH A CORE TEAM

Many successful campus-wide sustainability initiatives begin by establishing a core team to research opportunities, build consensus and develop a plan of action. Some institutions may have an informal group focusing on green initiatives that can be tapped to play this role. Others may need to assemble a team. Members should include representatives from departments that will be directly involved in implementation, such as capital planning and facilities departments, custodial and dining staff, procurement departments, as well as administrators, faculty, students and community members. Institutions should consider a position, such as a Director of Sustainability (or like title), to lead the development and implementation of a comprehensive program for campus-wide sustainability. Institutions that establish a lead for green initiatives early on can task him or her with building a core team as an initial responsibility.

Core team members should participate in preliminary discussions and help to define what a green campus means for the institution. Members can work collaboratively to brainstorm ideas, set goals, identify potential obstacles and challenges, research solutions, develop a plan of action, and outline assessment criteria. The team should present a final report to the administration detailing their efforts, including a list of guiding principles and recommendations on the operational and personnel structures needed to implement the plan.

See [Create an Implementation Strategy](#) for more details.

C. GAIN CONSENSUS

The core team will also seek ways to engage key stakeholders and to gain their consensus and commitment to the green campus plan. Critical to this endeavor will be communicating the benefits of the plan and outlining the resources needed to enact it. Since team members work in the departments that will be most directly affected by the plan, they serve as ambassadors by communicating the plan's goals and objectives to their colleagues.

Initial steps to engage stakeholders include:

- Organize an initial meeting with interested parties, existing groups on-campus, and key decision makers to brainstorm ideas and develop a common vision.

- Promote incremental improvements through grassroots campaigns that set a base for further changes. An informal policy change, such as requiring double-sided printing, will raise awareness and indicate that change is possible.
- Network at campus events and seek champions in groups that have a different sphere of influence.
- Act on the sustainability principles being promoted by changing personal habits. For example, riding a bike to work instead of driving can influence how change is perceived on-campus.
- Host an event or forum that brings campus stakeholders together to exchange ideas and build relationships.
- Conduct a survey of the campus community to determine what is important to each constituent group and how they define a green campus.

GREEN CAMPUS PROFILE

BOSTON COLLEGE

ROLES AND RESPONSIBILITIES

The job description for the Director of Sustainability & Energy Management at Boston College (BC), a [position](#) within the campus Facilities Management department, sought an individual with strong interests in innovation, technology and the environment to oversee the development and implementation of a comprehensive program for sustainability and energy management. The position for this “green champion” arose from BC’s establishment of a sustainability committee in conjunction with the [master planning](#) process that it initiated in 2008.

With a well-established director position housed in the campus’ operations and planning department, BC is implementing new sustainability policies, including [green building requirements](#) and a plan to assess and monitor the energy performance of existing buildings throughout the institution (see BC’s “[energy dashboard](#)”). As a related benefit, the office’s initiatives support ongoing greening efforts by student groups and BC’s permit applications to the City of Boston, which has LEED-based [regulatory requirements](#) for new development of the scale being planned.

Greening a campus requires advocates with institutional clout and committed individuals throughout the institution. Job descriptions should detail the responsibilities for ensuring sustainability-related policy implementation and enforcement (e.g., recycling, purchasing, green cleaning and energy conservation) and for providing education about sustainability tools and resources.



ASSESS THE LANDSCAPE: EXAMINE AND DOCUMENT EXISTING ACTIVITIES



A. EVALUATE EXISTING EFFORTS AND CAPABILITIES

Many colleges and universities have begun to implement important sustainability initiatives, which can be used to foster support for a more formal green campus plan. An important first step is to inventory current sustainability efforts to benchmark progress and better understand in-house capabilities. The inventory will also identify areas in need of improvement.

UNDERTAKE AN INVENTORY OF EXISTING CAMPUS ACTIVITIES AND RESOURCES

Identify Current Environmental Initiatives and Course Offerings

Institutions often are already undertaking more elements of campus sustainability than expected both in and outside of the classroom. Environmental initiatives may include recycling programs, a network of on- and off-campus public transit, student activism, and university-endorsed activities such as Earth Day celebrations or talks on climate change.

Determine Current Staff Capacities

Evaluating the availability and existing knowledge of the current staff will help formulation of a strategy for achieving campus sustainability.

Identify What Training Resources are Available Locally or Beyond to Enhance Current Staff Capability

An effective way to develop a sustainability program is to invest in training staff across a variety of disciplines. Trained staff can in turn provide leadership and transmit knowledge to others.

Assess Current Operating Budgets and Funding Mechanisms

Because budgets play a pivotal role in determining what gets done, understanding the cost of campus operations (accounting for staff, material, and energy expenses) and identifying cost-intensive facilities can help to identify opportunities, justify improvements, and make more informed decisions for which initiatives to implement.

Review Existing Policies and Plans

Assemble and review policies and plans, including master plans, design standards and specifications, and other documents that are integral to an institution's operations and to campus greening.

B. REVIEW CAMPUS IMPROVEMENT PLANS

Campuses are continually evolving and adapting to changing needs and demands. As a result, most institutions have improvement plans in place. It is important to review current plans and seek ways to align sustainability strategies and activities with them.

<p>ASSESS PLANNED CAMPUS EXPANSIONS, RENOVATIONS, RETROFITS, AND OTHER IMPROVEMENTS</p>	<p>Institutions should catalogue near- and long-term planned activities on campus and in the adjacent community. This will serve to identify opportunities as well as bring together the different players who should be incorporating sustainability into their future efforts.</p>
<p>REVIEW EXISTING MASTER PLANS</p>	<p>Campus master plans provide a context and vision for future campus improvements. Institutions can utilize campus master plans to develop a campus sustainability strategy and address system-wide improvements (e.g., addressing central plant demands and efficiencies, identifying building space sharing opportunities, etc.).</p>
<p>EVALUATE PEER INSTITUTIONS</p>	<p>Evaluating the efforts of similar institutions can help inform development of green campus goals. Understanding the challenges and successes other institutions have faced build upon others' efforts in order to streamline a green campus strategy.</p>
<p>CONSIDER YOUR INTENDED OUTCOME</p>	<p>Institutions should seek to identify community-oriented goals in developing a green campus. It is important to consider how greening a campus will influence the students and faculty who decide to join the campus community.</p>
<p>UNDERSTAND THAT A SUSTAINABILITY PROGRAM IS GOOD BUSINESS</p>	<p>The implementation of a sustainability program and commitment to renewable and efficient energy solutions will result in long-term cost savings. In addition, financial models are available that allow colleges and universities to install renewable and efficient energy systems with no required upfront capital investment.</p>

CHART THE COURSE

A. ESTABLISH CAMPUS SUSTAINABILITY GOALS AND VISIONS

Establishing measurable goals and objectives provides a path to follow and metrics to track progress.

Overarching sustainability goals should be converted into specific campus goals and objectives to guide changes in current planning and operations. Measurable goals and objectives should be tailored to the unique culture, needs and requirements of the campus. The path chosen will vary and will depend on variables such as whether it is a public or private institution; rural, suburban, or urban campus; single- or multiple-location campus; climate context; enrollment growth; age of facilities and infrastructure, etc. Examples of campuses with robust visions and related goals include [University of Arizona](#), [University of British Columbia](#), [Oberlin College](#), the [University of California-Berkeley](#), and [Emory University](#).

Using participatory goal-setting tools, such as online surveys, charrettes and campus-wide forums, the core team should solicit stakeholders to develop a set of environmental goals and related objectives that address the organizational, financial, operational, physical and cultural needs of the campus.

ENGAGE FACULTY AND STUDENTS WHEN PLANNING A GREEN CAMPUS

Faculty and students should be engaged in the process to green a campus. Faculty can conduct research to aid the institution in determining its path to a green campus and students can be encouraged to participate through courses, internship and volunteer programs or focus thesis projects on an aspect of the plan.

When refining campus planning goals, it is important to align and, where possible, exceed existing and emerging state, regional or local green mandates and voluntary commitments. Doing so will enhance important regulatory relationships and may help to accelerate planning approval processes.

GREEN CAMPUS PROFILE

UNIVERSITY OF HAWAII—MANOA

FREAR HALL - LEED BY EXAMPLE

An increasing number of public and private higher education institutions must now comply with state and local green building requirements, especially for new construction and major renovations. LEED is often the qualifying benchmark identified to address such policies, adding impetus for many campuses to adopt LEED. In June 2006, Linda Lingle, Governor of Hawaii, signed legislation HB 2175 that required projects seeking public funding to be designed and constructed, to the extent possible, to meet LEED-Silver certification. The law applies to all new, state-owned construction of 5,000-square-foot or greater facilities, including public K-12 schools and public institutions of higher education. The law creates an opportunity for state agencies and institutions to lead by example, helping to bring green building experience and associated skills to the regional market.

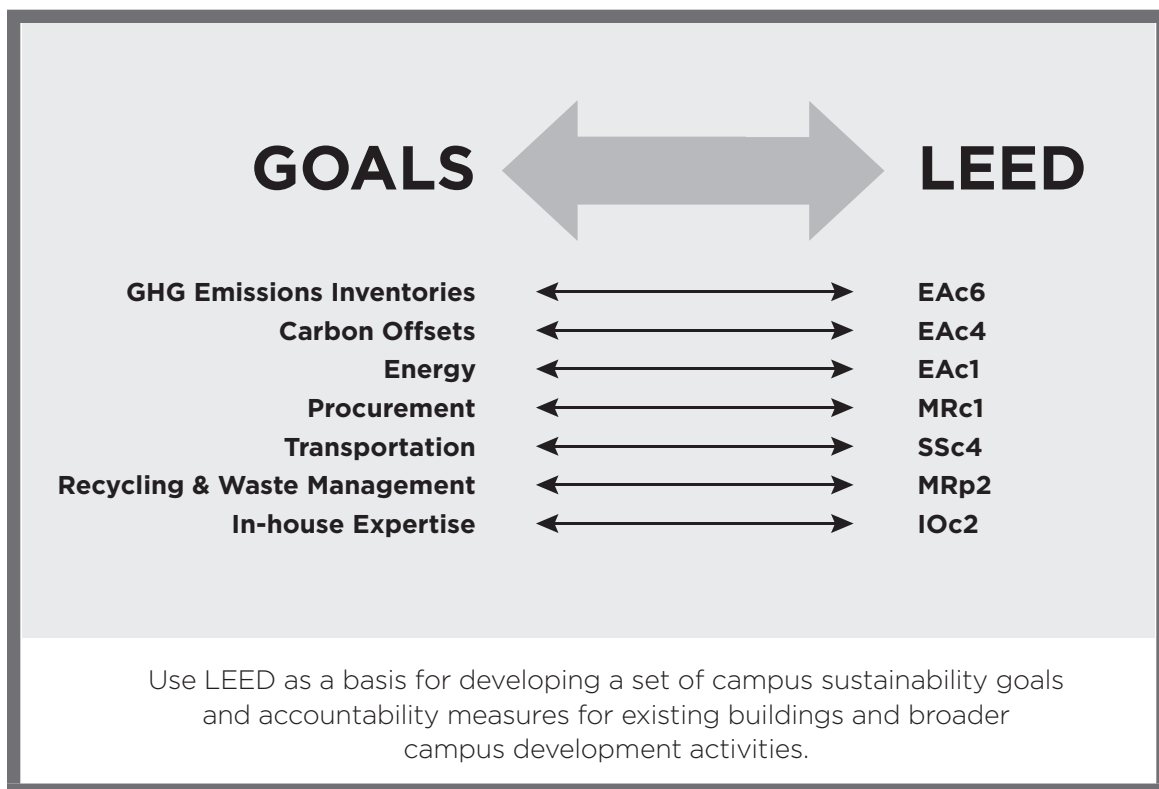
The University of Hawaii's strategic plan for its 10 campuses is rooted in Native Hawaiian values which include the conservation of natural resources and stewardship of the land. As a result, the University of Hawaii system embraced the new law that required seeking LEED certification.

In 2008, **Frear Hall**—a \$71 million, 12 story student housing project—became UHM's first LEED certified facility. As a result of the project's success, three additional UHM projects are seeking certification that meets or exceeds LEED Silver standards.

1. Create a Framework for Action

The core team should create a framework to guide all aspects of green campus planning. The framework should ensure sustainability goals are integrated into the institution’s formal capital planning approval process and its operations and maintenance policies and procedures. The framework should also address ways to assess and update sustainability goals over time to ensure continual improvement. Green campuses also seek ways to integrate sustainability in curricula development and research initiatives, so it is important to ensure these objectives are addressed in the goals. Institutions may reach out to organizations such as the Association for the Advancement of Sustainability in Higher Education (AASHE) for guidance.

As noted in the [LEED as a Roadmap](#) Section, institutions can look to LEED to provide direction on how to create a green campus. LEED is a concise framework that can help the development and implementation of a campus-wide sustainability plan. It can be used to guide discussions, determine goals and objectives, outline plans, implement solutions and benchmark progress.



GREEN CAMPUS PROFILE

EMORY UNIVERSITY

VISION

Emory's Senate [Committee on the Environment](#) (COE), comprised of faculty, staff and student members, was created in 1990 in response to the growing university need for discussion and action on environmental issues. Environmental issues from transportation studies to plans for stormwater management, forest management, and bicycle and pedestrian access, are regularly resolved by the COE through review of potential impacts from capital projects in the context of the whole Emory environment—"the Emory ecosystem."

By 2006, the creation of a broader environmental vision of the Emory campus was deemed necessary to guide future use of its resources. Emory formed a Sustainability Committee that produced a report exploring a "[Sustainability Vision for Emory.](#)" Now, the institution broadly promotes its vision [online](#) and elsewhere "To help restore the global ecosystem, foster healthy living, and reduce the University's impact on the local environment. Progress will be measured using the environmental, economic, and social 'triple bottom line' of sustainability." This vision has helped to guide Emory in its continual improvement since its Board of Trustees first endorsed LEED in 2002 for use as a [guiding principle for green building](#).

Today, all of the university's construction and renovation projects must meet LEED Silver. Emory has achieved numerous certifications, and by 2009, the campus had one of the largest inventories of LEED certified building space (by square footage) in the United States. Emory will soon complete the [Clifton Road Mixed Use Project](#), a LEED for Neighborhood Development pilot project.

2. Revise and Update Green Campus Vision and Goals

Green technologies, innovations and methodology are constantly being refined and updated, so an institution's green campus vision and its related goals and objectives should be too. Colleges and universities need to establish a process to update and revise its sustainability plan to reflect ongoing progress in green campus planning.

B. CREATE AN IMPLEMENTATION STRATEGY

Create a strong implementation strategy by outlining roles and responsibilities, researching funding sources, and creating reporting tools.

Developing an implementation strategy involves identifying procedures and plans needed to meet the campus-wide sustainability goals and objectives. By infusing sustainability into an institution's master plan, design standards, and campus-wide policies and practices, the goal of institutionalizing sustainability on-campus will be met. As noted in the [LEED as a Roadmap](#) Section, the LEED framework can be used to help guide this process.

The core team will need to outline the organizational structure for implementing the green campus plan. It is recommended that a Director of Sustainability (or similarly titled position) be established to serve as the point person and to manage the plan's implementation. The position should be dedicated solely to green campus planning and efforts should be made to avoid adding this important responsibility to an established position without providing the time and resources needed to complete the work.

FOUR STEPS TO CREATING AN IMPLEMENTATION STRATEGY:

1. Define Roles and Responsibilities for Campus Greening Efforts

- Greening a campus requires a high level position focused solely on implementing a campus-wide sustainability plan, such as a Director of Sustainability. The director should have the expertise, experience, and position within the institution needed to affect greening buildings and implement campus-wide sustainability initiatives.
- In order to effect the greatest positive impact on greening campuses, institutions should determine where in the existing organizational structure the champion should be located, or should create a new position such as a Director of Sustainability with campus-wide influence. Sources of funding for this position and its longer term arrangement within the institution should be defined as part of this initial step.
- Many groups are responsible for guiding campus development:
 - Faculty who articulate the pedagogic needs and understand curricular change processes on campus
 - Planning and design professionals who translate these needs into space requirements
 - Facility managers who establish operational and maintenance policies and procedures
 - Financial professionals who determine capital budgets and funding needs
 - Campus administrators focused on sustaining the overall institutional mission
 - The campus body, whose presence and behavior ultimately dictate the outcome of green campus initiatives

2. Create Pilot Programs That Have Scalability

- Effecting change is difficult, particularly at large institutions. Starting small is often an effective strategy.
- Pilot projects can be an effective way to ease transitions and obtain buy-in, as well as to bring out concerns and criticism. The fear of change can be ameliorated by incremental steps and good ongoing communication.
- Pilot projects also help to develop internal capacities, uncover and address institutional barriers, build internal support, streamline processes, reduce costs, and foster campus support for wide scale adoption.

3. Develop an Integrated Budgeting Process

- Greening a campus involves larger capital projects such as new construction, building renovations, or transit development, as well as smaller day-to-day efficiency upgrades, such as lighting or behavioral changes. The budgeting processes for these, however, are usually managed separately; funding for larger capital projects are managed via the capital improvements budget, whereas campus operational improvements are typically funded through the operation and maintenance budget. Green campus initiatives should be integrated into both of these funding mechanisms.

3. Develop an Integrated Budgeting Process (continued)

- Life cycle cost analyses should be conducted to intersect the two budgeting processes since major capital improvements, such as new green buildings will undeniably affect continuing operational efficiencies (see the [Harmonizing the Budgeting Process](#) box).
- The integrated budget process should also consider curriculum funding that supports integrating sustainability with current or new courses. Efforts should be made to encourage incorporating sustainability in a wide range of disciplines, not just the buildings arts and sciences.

4. Establish Accounting and Reporting Processes

- A regular assessment of the “state of the campus” is important as a way to learn, educate, and plan for future progress. Accounting metrics and reporting protocols will vary by institution. Metrics may range from resources conserved to CO₂ emissions reductions.
- Metrics should be performance-based and employ recognized methods for their development in order to allow for peer-to-peer comparisons.
- Reports may be distributed internally to the campus community, trustees or board in the form of summaries or presentations. Reporting may also extend to the greater public through posting on the institution’s website, for example.
- Reporting should be the responsibility of the sustainability lead, drawing on the resources of all those stakeholders involved in the campus greening process.
- The need for transparency is reinforced through the ACUPCC requirement that all signatories report on their progress.
- Fair and accurate communication of the lessons learned along the way provides for continual improvement, broad-based support, and valuable knowledge for the community beyond the campus.

HARMONIZING THE BUDGETING PROCESS

Budgeting for Capital Improvements

- Most campuses operate within a three- to five-year funding cycle. Capital projects, which include new buildings, renovations and other campus improvements, typically have a project-approval cycle that extends over a year, from a pre-planning phase through design and construction. An integrated approach to the capital project budgeting process should be applied at the pre-planning phase and continue through the design phase. By including budgeting as an integrated component of the project cycle, technologies or specific design and operational considerations that result in lower ongoing operating and maintenance costs can be justified. It is important to include the LEED project coordinator in all aspects of the process, including budgeting. In doing so, the coordinator can provide an overall project perspective, which helps to ensure important measures are not overlooked due to cost and that a holistic approach to creating a green campus is used.

Budgeting for Operational Improvements

- Securing funding for campus-wide operations and maintenance improvements, such as retrofits and renovations to increase a building's energy efficiency performance or to improve transportation infrastructure, requires creativity, since many ongoing maintenance budgets rarely contain sufficient funds to upgrade services. As equipment reaches the end of its useful life, it is important to plan for more efficient replacements, such as low-flow fixtures, ENERGY STAR® appliances, or thermal window assemblies, which will result in future energy cost savings.
- Life cycle cost analysis is a useful tool to help with this endeavor, since it demonstrates a return on investment (ROI) that results from the increased efficiencies. Life cycle costing considers both the initial cost and the cost of ownership over time. For example, a more energy efficient pump may cost more to buy than a conventional pump, but the energy cost-savings over the pump's useful life more than covers the initial cost premium. Using life cycle cost analysis to review utility bills and to identify wasteful equipment and systems can help make the case for improvements to existing buildings, infrastructure and operations.
- Campuses may want to consider the paid-from-savings approach to funding building improvements. This funding approach leverages the savings generated from system improvements to help fund the greening project. Paid-from-savings projects "bundle" or combine the utility cost saving measures from the new, more energy efficient systems with other green project measures to ensure an acceptable ROI and simple payback period. When longer payback measures are combined with the quicker measures, the project will have a shorter overall payback period and higher ROI.

Budgeting for Curriculum Funding

- A green campus is more than buildings, grounds and infrastructure. It also includes integrating sustainability into curriculum and research efforts. The budget should include funds to assist faculty from a variety of disciplines, not just the building arts and sciences, to design courses that incorporate sustainability.

Engaging Students Can Help to Drive Down Costs

- Many students are looking for opportunities to garner hands-on experience and to develop green job skills. Engaging students in campus-wide planning efforts, including LEED project work, not only provides such opportunities, it can also help drive down costs. Students can conduct audits, administer surveys, facilitate charrettes, research solutions, analyze data, organize recycling programs, and design and implement green campus educational programs.

GREEN CAMPUS PROFILE

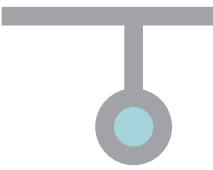
SPELMAN COLLEGE

LONG-TERM PLANNING AND MAPPING A SUSTAINABLE STRATEGY

Sustainability became a focus area of the [planning process](#) before a Strategic Plan update began in 2006 at Spelman, a historically black college in Atlanta. In the Comprehensive Campus Plan for 2000-2015, pedestrian access and greening the [Suites](#) residence halls, which Spelman's President had identified as a priority, were highlighted. The plan's priorities cover everything from incorporating sustainability into the curriculum to educating the Spelman community to be global citizens.

Spelman has a goal of creating a green campus that is modernized and sustainable and it plans to identify the institutional gaps in supporting environmental initiatives on campus. From considering renewable energy options and cooling buildings with geothermal energy to redirecting parking and transit on its campus, Spelman advises its peers to start small and build up, working incrementally on progressing between shades of green. This is possible even in difficult economic times and campuses can adapt to continue their green initiatives by finding outside sponsors. For Spelman, reaching out has helped them stay on track with their plans and has led to the achievement of many goals:

- A recent award for a one-year Grants to Green Assessment grant from the Community Foundation for Greater Atlanta
- Partnership with the Southface Energy Institute and Community Foundation to provide a building assessment energy and water audit of the Albro-Falconer-Manley Science Center
- Assistance in calculating the college's carbon footprint and developing a reduction plan
- A campus energy audit from Georgia Power
- Collaboration with [Second Nature](#) and the [United Negro College Fund](#) on the Building Green at Minority-Serving Institutions initiative, which aims to promote green building and provide resources to under-resourced schools, such as small liberal arts schools and/or historically black colleges or universities



LAY THE GROUNDWORK: PLAN



A. IMPLEMENT CAMPUS-SCALE PLANNING

Campus-wide planning will enhance the efficiency of individual projects.

1. Establish a Coordination and Accountability Function

A campus-wide planning process involves a high degree of stakeholder involvement and decision-making complexity. Critical to coordinating such efforts is a structure that ensures clear and concise communication between all engaged parties. This responsibility should rest with the Director of Sustainability (see the [Create an Implementation Strategy](#) Section), who acts as an internal change agent tasked with identifying and removing barriers to success as well as fostering continual improvement by applying lessons learned. [Hiring](#) or assigning an individual with significant influence and support from the administration will be effective in achieving necessary changes. In addition, key members of the core team should be responsible for delivering green building and sustainability goals and for reporting on progress throughout the campus planning process.

2. Promote an Integrated Approach to Campus Planning, Design, Operations and Maintenance

Use an approach to integrate all major campus systems, including building, transportation and water, to develop a plan that will yield synergies and can significantly improve a campus' overall energy efficiency performance, helping to meet sustainability and financial goals. This holistic approach requires involving representatives from all affected departments throughout the planning, implementation, and assessment processes. Utility system planners

and managers need to work with building design teams, finance staff, building managers and occupants throughout the planning and construction process. If a critical stakeholder does not participate in this collaborative approach, the goal of reaching the optimal system performance will most likely not be met. To foster a collaborative approach to campus-wide planning, consider the following activities:

- Map and update planning and decision-making pathways
- Incentivize, recognize and reward collaboration from beginning to end
- Use the charrette process to foster team problem solving
- Use modeling tools to explore different system solutions
- Adopt life cycle costing to evaluate full system costs and savings of different planning options

An integrative approach to campus sustainability requires the engagement of all campus stakeholders



3. Use Pilot Projects to Build Capacity

Campus-wide planning processes that consider both existing and future facilities typically involve multiple activities that will occur over a period of several years. The long-term nature of this kind of planning provides campuses with a rare opportunity to engage in a deliberate process to pilot projects in order to develop internal capacities, uncover and address institutional barriers, build

internal support, streamline processes, reduce costs, and foster campus support for wide-scale adoption. To build capacity, implement a process to gather and apply lessons learned from the pilot projects.

4. Foster Continual Improvement

Institutions should consider investing in measurement and verification strategies for green facilities to evaluate the actual performance of campus features and ensure they are working as designed and planned, so that energy efficiency and cost savings goals are met. Information from these strategies will also inform future decisions. Other components for fostering continual improvement include targeted training and development as discussed in the [Build Capacity: Education & Training](#) section to ensure staff is aware of new technologies and

GREEN CAMPUS PROFILE

BATES COLLEGE

TARGETED GIFT

In 2008, an [alumni donor](#) bestowed \$2.5 million on Bates College in Lewiston, ME, to support expanded use of organic, natural and farm-fresh foods on the campus. The donor's gift for sustainability included a stipulation that investment earnings on the donation finance the additional cost of serving more local and organic food. At Bates, 22% of the yearly food budget was already spent on natural food and the gift boosted existing sustainable operations to 28%, in addition to complimenting energy efficiency initiatives for the campus's [award-winning](#) green dining halls. While Bates does not have a specific "green fund" or projects that donors can support, the college provides a high level of dialogue about its sustainability endeavors in general, which makes good public communications an important tool in garnering more gifts. Other universities have encouraged targeted gifts for sustainability through online communications about their initiatives and donor opportunities to contribute to positive environmental impacts.

The University of Utah has established a [sustainable giving website](#) for contributions to a campus renewable energy fund. Stanford University's [sustainability fund](#) supports the development of its new [Graduate School of Business facility](#) that has a goal of LEED Platinum certification.

methodologies and is continually identifying and addressing organizational barriers to learning, innovation and collaboration.

B. UNDERTAKE PROJECT SCALE-PLANNING

Planning an individual project requires an integrated design process.

1. Engaging a Project Team

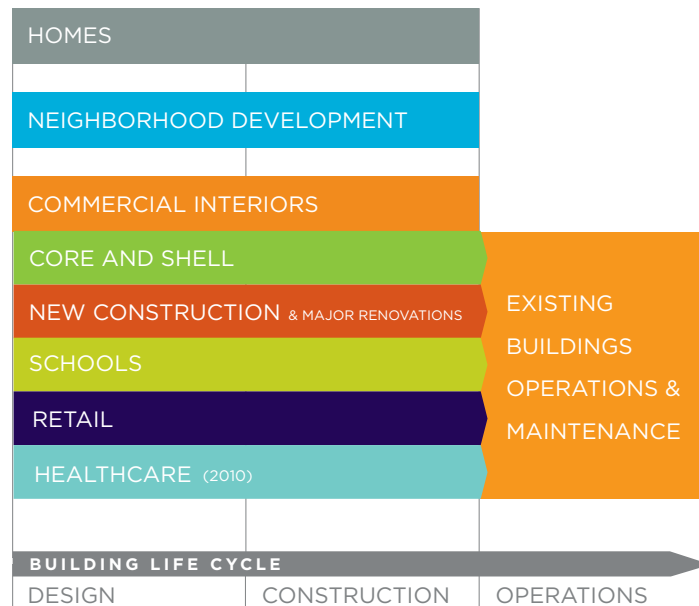
To effectively develop and implement project-scale sustainability strategies, key stakeholders should participate on the project team. Known as the integrated design approach, this process encourages team members, including architects, building engineers, facilities management, operations and maintenance staff, to plan, implement and assess a project plan.

The integrated design process not only produces a project that showcases a collaborative team approach to planning, it can also help reduce project costs. This whole systems approach to planning encourages participation and input from all stakeholders during the development phase. As a result, project teams identify potential problems and inefficiencies early in the process, which allows the team to address issues quickly and cost effectively. For example, hiring cost estimators early in the process to price materials helps to alleviate costly change orders during the later construction phase; also, using energy modeling as a design tool will help the MEP (mechanical, electrical and plumbing engineer) specify a more efficient system early in the design phase.

In using this approach, it is also important that project team members share the same vision of sustainability as defined by the institution. The definition should be described during the interview process and outlined in all critical documents, such as the RFP/RFQ (request for proposal/request for quote), project requirements and contractual agreements with selected design team members. It should be noted that there will be some modest costs associated with the integrated design approach, such as facilitating the charrette or cost estimating. These costs, however, are offset by the reductions in operating costs that result from the new energy-efficient green building.

2. LEED Addresses the Complete Life Cycle of Buildings

The LEED framework addresses the complete life cycle of buildings from design and construction to ongoing operations and maintenance. Its diverse suite of rating systems makes LEED applicable to many facilities on-campus and a viable tool to help implement a holistic approach to green campus planning.



Many college campuses are composed of diverse building types; therefore, it is important to assess and identify the appropriate LEED rating system to use for each facility. Institutions should work to ensure LEED rating system requirements and relevant credit language are embedded into design and construction documents for future projects and policies and plans for ongoing campus operations thus helping to institutionalize sustainability.

C. UTILIZE GREEN CAMPUS FINANCING

Research innovative financing strategies to optimize project cost effectiveness.

When developing a strategy to finance green campus planning, institutions should research the many innovative financing mechanisms that are available to implement sustainability initiatives. As the Green Campus Profiles in this section demonstrate, creative approaches, such as revolving loan funds, power

purchase agreements, grant programs, and student fees, among others, provide opportunities for institutions to craft financing solutions that best meet their unique needs and situations. Key to success will be developing a comprehensive financial strategy early in the planning process. Identifying and securing funding early will help to ensure the sustainability initiatives remain in the plan, if future budget reviews seek cost-cutting measures.

The National Association of College and University Business Officers (NACUBO) is an excellent resource for researching and developing financial solutions to green campus planning. Its *Financing Sustainability on Campus* is a comprehensive handbook that includes creative strategies, clear explanations of a wide variety of tools and programs, and real-world success stories. For more information, visit www.nacubo.org.

It may be helpful to establish a finance working group to research various options and develop a plan that integrates these options with existing capital, operations and maintenance, and procurement budgets. Several financing strategies, such as green performance contracting and the paid-from-savings approach, require that building systems improvements generate utility costs savings, which, in turn, help pay for the system upgrades and/or other green project measures. To ensure the projected cost savings are realized, building systems must be operated and maintained as designed and their performance measured and verified. Finance teams may consider including members of the building operations staff on the team or during critical conversations to confirm operational assumptions, assist in considering alternatives, and identify training and technical assistance needs.

FINANCING STRATEGIES

- Savings capture and reinvestment
- Revolving loan funds
- Bond programs
- Energy service company-university partnerships (ESCUPs)
- Energy savings performance contracts (ESPCs)
- Green performance contracting
- Power purchase agreements
- Tax-exempt lease-purchase agreements
- Paid-from-savings approach
- Grants
- Student fees
- Targeted gifts

For more information on financing, see the links in the [Resources](#) section.

GREEN CAMPUS PROFILE

STATE UNIVERSITY OF NEW YORK

GOVERNMENT GRANTS

In October 2009, New York's Governor David A. Paterson announced \$7.89 million for innovative water quality **projects** in the Hudson Valley through the American Recovery and Reinvestment Act (ARRA). Several institutions, including the State University of New York (SUNY) received grants:

- \$2.1 million to the SUNY at Purchase, Westchester County, for the construction of a 24,000 square foot green roof
- \$1.77 million to Bard College, Dutchess County, for the installation of a new microfiltration system and a finished water storage tank
- \$928,600 for the construction of a green roof, a rainwater harvesting system, and an irrigation system that will reuse stormwater on-site at the Newburgh Campus of the Orange County Community College

SUNY Purchase President Thomas Schwarz said: "We are honored that our proposal for the construction of a green roof that will decrease stormwater runoff by 33% has been recognized under the Governor's Green Innovation Grant Program. We know that our entire region will benefit from this grant. This builds upon our initiatives in green buildings and policies including our early membership in the American College & University Presidents' Climate Commitment."

Some green campus initiatives include benefits that do not generate savings, but are deemed important, such as improving community relations, student and faculty recruitment, and promoting staff health and productivity. Conversations among key stakeholders about such benefits should be discussed early in the development process and their significance conveyed to the finance team, so their priority status is understood.

A Financing Strategy Approach

The Paid-from-Savings Approach to Green Existing Buildings

With over 83,000 existing buildings on campuses today, the cornerstone of many campus-wide sustainability plans will include efforts to green these facilities. The paid-from-savings approach is a successful strategy for financing the greening of such buildings, including those seeking LEED for Existing Buildings: O&M certification. The approach leverages the utility costs savings generated from building system upgrades to pay for a comprehensive greening project within a defined payback period.

For paid-from-savings projects seeking LEED certification, there will be project measures that do not generate savings. There may also be recurring expenses related to ensuring compliance with LEED certification. Paid-from-savings projects seeking LEED certification can “bundle” or aggregate the utility cost saving measures with non cost saving measures to optimize green opportunities and project economics.

To determine the feasibility of the paid-from-savings approach, conduct an economic assessment of the project to:

- Estimate the range of utility cost savings that each project measure can generate
- Establish if the measures, in aggregate, can achieve the desired return on investment (ROI) and simple payback period
- Determine the financial mechanism that will support the project’s cash flow requirements

Preparing for the assessment includes deciding how the energy and water cost savings will be determined. Options include using empirical project data or Building Information Modeling (BIM).

USGBC'S "PAID-FROM-SAVINGS GUIDE TO GREEN EXISTING BUILDINGS"

The *Paid-from-Savings Guide to Green Existing Buildings* provides basic information to help building owners understand the paid-from-savings approach and decide if it is a viable option to green their existing building, including the steps to assess if the building has the potential to achieve LEED for Existing Buildings: O&M certification.

The guide also includes information on Green Performance Contracting (Green PC). Green PC is a process based on the same project delivery methods as traditional performance contracting [see [Energy Savings Performance Contracting \(ESPC\)](#)], but enhanced by the inclusion of the LEED for Existing Buildings: O&M rating system as green criteria. The range of project measures in a Green PC project is broader than the utility system upgrades found in a traditional performance contract and allows for the inclusion of O&M best practices and sustainable policies.

GREEN CAMPUS PROFILE

MIAMI UNIVERSITY

REVOLVING LOAN FUND

Stakeholder input from the campus community is driving sustainability at Miami University (MU), of Oxford, Ohio. In 2009, a [town hall style meeting](#) called “Towards a More Sustainable Miami” provided a forum for students, administrators and staff to make a difference on important past, present, and future issues. The event featured the announcement of a \$50,000 Green Fund grant to invest in cost saving, feasible, environmentally impactful, and well-researched projects on the MU campus. The basic concept behind such [revolving loan funds](#) (RLF) is that money saved as a result of the projects will be paid back into the fund and will be made available for new projects; the “self-growing” fund is expected to eventually increase beyond the original \$50,000.

The first round of proposals, open to staff, faculty and students, were due in November 2009. A variety of drivers influenced the fund’s creation: the desire to improve MU’s national green campus rankings; pressure from student government; a successful push for an MU task force on environmental sustainability; growing demand for more connections between academic programs and future careers in the emerging green market; and financial considerations on building efficiency. MU has observed great efficiency gains from greening both new buildings and existing facilities, such as through the campus’s LEED Certified Farmer School of Business.

Like many other higher education institutions, MU has realized that it can tighten its belt and make smart economic decisions while concurrently exploring new strategies that promote sustainability. While MU’s new RLF may seem relatively small, the road to a green campus is made up of steps of all sizes resulting in the continual evolution and scaling up of best practices.

EXAMPLES OF CAMPUS REVOLVING LOAN FUNDS

Harvard University. The interest-free Green Campus Loan fund was seeded by the Harvard Bank with \$3 million, and with successful **returns**, has expanded to \$12 million, with \$11.5 million loaned to 153 projects since 2001. The median ROI is 27%, and has resulted in \$4 million in savings.

Dartmouth College. To support greenhouse gas reduction goals, trustees allocated **\$12.5 million in loan funds** that will be repaid over time through energy saving projects focused on the 20% of the campus buildings that have the most obsolete systems and consume 80% of the total campus energy.

Macalester College. In 2006, students started a **Clean Energy Revolving Fund** with an initial grant of only \$700 to implement energy efficiency pilot projects. By working with the student government, the Environmental Studies department, staff, and alumni, the fund has grown to over \$100,000. Since then, 90% of the estimated savings from projects are paid back to the fund annually until 110% of the project cost, adjusted for inflation, has been repaid. Alternatively, for longer term projects, 50% of the estimated savings may be paid back annually until 125% of the inflation-adjusted cost has been repaid.

“The more money we are spending on energy is more money not spent on the core mission.”

—David Prytherch, Professor of Geography and coordinator of MU’s sustainability committee

ROI

$$\frac{\text{annual net savings}}{\text{total cost}} = \text{ROI (\%)}$$

Simple Pay-Back Period

$$\frac{1}{\text{ROI}} = \text{simple payback (years)}$$

Information on how to calculate a project's ROI and simple payback period are outlined below. Owners often focus on the ROI of an individual project measure and not the overall project ROI. This limited approach may result in the elimination of important project measures because they do not, on their own, produce the desired ROI.

To calculate the ROI, divide the annual net savings by the project's total cost.

The ROI will vary depending on both the size of the project and the amount of savings produced.

Simple payback is the number of years it will take to recover installation costs based on annual cost savings. To calculate simple payback, divide the project's total cost by the annual net savings. The simple payback is the mathematical inverse of the ROI. To determine a target for simple payback, match the ROI to the project life. For example, if the project life is twelve years, then the matching ROI—the mathematical inverse of simple payback—would be 8.3%. Bundling quicker payback measures, such as lighting upgrades, with longer payback measures, such as chillers and large HVAC components, helps lower the overall payback period.

ENERGY SAVINGS PERFORMANCE CONTRACTING (ESPC)

ESPC is a well-established means of procuring and financing needed building repairs and upgrades. 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 facility, and generate guaranteed savings over time. The facility then shares a portion of the savings with the ESCO as lease payments and uses the remaining savings to budget for additional facility improvements. Rules and restrictions regarding the use of ESPCs in public buildings vary widely from state to state, but have been extremely effective in funding energy efficiency programs. In some jurisdictions, local utility companies provide similar services for customers.

GREEN CAMPUS PROFILE

CARLETON COLLEGE

POWER PURCHASE AGREEMENT

Carleton College has an environmental [statement](#) of principles that commits to incorporating sustainability into campus operations and the daily lives of individuals. As part of its journey to a green campus, Carleton has become a signatory of the ACUPCC. Carleton's strategies for reducing the campus's carbon footprint include using less energy where possible and aiming to achieve LEED Silver certification on all new construction projects. The campus is also making use of its natural assets to reduce emissions by supporting on-site renewable energy. Carleton's Environmental and Technology Studies program and others in the campus community [worked together](#) to explore options that would provide an acceptable rate of return for clean power. The result was that in 2004, in cooperation with the local school district, Carleton completed a 1.65 megawatt, 360-foot tall [wind turbine](#) located one and a half miles east of the campus. It is the first utility-grade turbine in the country to be owned and operated by a college. Students contributed to writing a green energy plan to develop the installation, and learned hands-on about renewable energy technology selection, wind power siting, turbine selection and mechanics, commissioning, energy grid connections, as well as associated environmental and [economic opportunities](#). Students are now monitoring the turbine's performance and emissions reductions. Central to this project's financial success has been Carleton's power purchase agreement (PPA) with a utility supplier, which operates the distribution lines with which the turbine interconnects. Overall, Carleton has secured assistance to pay for the long-term maintenance and capital costs of the project through diversified means:

- State incentives, such as a Minnesota Department of Commerce grant for \$150,000 and production credits of 1.5 cents per kilowatt-hour for a 10 year period
- Federal Production Tax Credits, which are available to nonprofits like Carleton for 1.8 cents per kilowatt-hour for 10 years
- A PPA [arrangement](#) with a utility supplier, which provides monthly payments to Carleton to buy the energy produced, at a fixed rate of 3.3 cents per kilowatt-hour, for a 20 year period

The total calculated payback, with incentives, is 10 to 12 years. Carleton is now planning a second turbine based on the same model, as well as a 25 kilowatt solar PV system for new residence halls. Carleton's new turbine will be located near the recreation center and generated electricity will be used directly by the campus.

Carleton's wind turbine generates approximately 4.7 million kilowatt-hours annually—equal to about 31% of the campus's annual electricity use, and enough to power about 500 homes. Over the turbine's life, it is estimated that Carleton will reduce local greenhouse gas emissions by 1.5 million tons, in addition to preventing other noxious emissions.

GREEN CAMPUS PROFILE

UNIVERSITY OF MISSOURI—COLUMBIA

STUDENT FEES FOR SUSTAINABILITY PROGRAM

Since 1990, the University of Missouri—Columbia's (MU) campus energy expenditures have been reduced by 12 percent (\$4 million) annually, and carbon emissions have been reduced by 96,000 tons. In addition to other initiatives, the school developed materials management programs for recycling paper, electronics, and drink containers, as well as systems of reuse, via a campus-wide rummage sale. In 2007, MU decided that it was ready to take additional steps toward greening the campus, which it explored in a Sustainability Task Force Report. The self-evaluation resulted in MU joining the ACUPCC and adopting a formal statement in support of sustainability and the decision to enhance synergies between the various programs by expanding current staff positions (e.g., a recycling coordinator) to include oversight of all campus efforts, through a new [sustainability coordinator](#).

Under the sustainability coordinator's new office, MU is assembling a team of students to work as "sustainaReps" as part of a peer-to-peer training program; sustainaReps will interface with other students to improve communication and environmental efforts within various campus groups. Out of a list of approximately 150 items that the sustainability office identified, eight key issues were targeted for the first semester; sustainaReps will divide project responsibilities by issue, including LEED certification, natural resources, alternative transportation, procurement, recycling, environmental justice, energy efficiency, research, and academics. The Sustainability Coordinator and sustainaRep positions, and some of the initiatives, are funded through the implementation of a sustainability fee that was approved by a [student referendum](#) and which generates about \$52,000 annually. The sustainaReps have five hours of paid work each week and gain valuable career experience by collaborating side by side with full-time MU staff.



BUILD CAPACITY: EDUCATION & TRAINING



Education and training are critical to providing continuity and long-term success of an institution's green campus plan. Sustainability is not a one-time endeavor, but an ongoing pursuit to continually improve efforts. This requires those who plan, design, build, operate and maintain access to technical training and those who use the campus—students, faculty, staff and community members—opportunities to learn about the sustainability initiatives on-campus. Another educational component of a green campus is integrating sustainability into curricula across a broad range of disciplines to prepare students for the new green economy and to help foster a lifelong commitment to sustainability as discussed in [The Campus as a Living Laboratory](#) section.

1. Build Awareness and Capacity

Educational programs will need to address both broad concepts of sustainability and specific issues related to the green features of the campus. Efforts should enhance the campus community's general knowledge of sustainability and create a receptive culture for it. Staff should be exposed to key concepts, be aware of the institution's commitments, and understand their role in maximizing the elements of the green campus.

To increase capacity, efforts should focus on developing partnerships and shared knowledge across campus departments and groups, including:

- Administrators
- Department heads
- Faculty members
- Students
- Human resources
- Information technology
- Program staff
- Operations staff
- Facility managers
- Finance
- Residential staff
- Student affairs

Institutions should consider developing a campus sustainability module or toolkit, such as the [MIT Campus Sustainability Toolkit](#) (go to the Get Involved tab) to ensure easy access to educational resources. It can be a stand-alone program or integrated with an existing employee orientation and should be available to staff, faculty, students, community members and contracted service providers.

Building occupants will need to understand their role and responsibilities in maximizing the features of their green building, so training on the specific elements and how to use them may be required and can be accomplished through orientations, presentations, tours and signage.

Strategies for Building Awareness and Capacity



2. Train Building Staff

Building staff, including design, construction, and operations and maintenance, need to not only be well-versed in the overall green campus plan, but must know the details of the new building standards and the policy and procedure changes that will directly affect their work. Training should be ongoing for all relevant staff. Ongoing training acknowledges that green buildings and campuses are constantly evolving as new innovations and technologies are discovered and adopted. It also helps to ensure that building systems are being properly maintained and operated and energy efficiency and cost savings goals met. It is also important to use staff experience to augment training, since many

employees have years of valuable service and knowledge that can inform even the newest of systems.

Design and Construction Staff

Design and construction staff need to know green building design, operations best practices, energy modeling tools and green construction management techniques. Offering ongoing training and building in-house capacity facilitates new skills for existing staff and demonstrates the institution's investment in its staff, ultimately reducing costs for the institution and enhancing staff morale.

KEY PROJECT DESIGN AND CONSTRUCTION TRAINING TOPICS:

Green Building Design

- Best practice in green building design and operations
- Codes and standards (e.g., ASHRAE, building codes)
- Third-party certifications (e.g., LEED)
- Self-assessments (e.g., STARS)
- Grants, funds and green building economics

Process Participation and Management

- Integrated design process
- Green specifications (for both in-house and external RFP/RFQ's, contracts and purchase orders)
- Administration (e.g., quality control, documentation, and data measurement and management to capture sustainability data and track processes)
- Construction management
- Commissioning and post-occupancy evaluation

Decision-Making Tools

- Design and simulation tools
- Energy modeling
- Life cycle analysis and costing

Strategies

- Environmental health and safety and indoor environmental quality
- Carbon reduction strategies
- Materials and procurement

Operations and Maintenance Staff

Operations and maintenance (O&M) staff ensure the new facilities and system upgrades work as intended, meeting energy efficiency and cost savings goals. O&M staff manage a wide variety of facilities, including athletics, laboratories, bookstores and cafes, as well as campus-wide systems such as water, transportation and energy. These employees need to be trained on how to use and operate the systems through ongoing education programs.

KEY OPERATIONS AND MAINTENANCE TRAINING TOPICS:

Green Operations and Maintenance

- Best practice in facilities management for green building operations and maintenance
- Codes and standards (e.g., ASHRAE, building codes)
- Third-party certifications (e.g., LEED and Green Seal)
- Self-assessments (e.g., STARS)
- Grants, funds, and green building economics

Process Participation and Management

- Integrated design process
- Collaboration (make use of partnerships and relationships to support communications and other tools that add consistency and social marketing to training efforts)
- Green specifications (for both in-house and external RFP/RFQ's, contracts, and purchase orders)
- Administration (e.g., quality control, documentation, and data measurement and management to capture sustainability data and track processes)
- Vendor training (for different product or service applications)
- Retrocommissioning

Decision-Making Tools

- Energy modeling
- Life cycle analysis and costing

Strategies

- Procurement (e.g., how to select environmentally preferable purchasing and leverage collective purchasing power of institutions)
- Materials and Waste minimization, reuse, and reduction
- Green cleaning
- Green building retrofits (including commissioning)
- Technologies and practices for resource efficiency and conservation
- Environmental health and safety and indoor environmental quality
- Training staff on educating occupants

3. Engage in LEED Professional Credential Program

The LEED Professional Credential program offers two professional credentials: LEED Green Associate™ and LEED AP® (Accredited Professional). The program is managed by the Green Building Certification Institute (GBCI) to ensure balanced and objective development. GBCI has adopted credentialing maintenance requirements through continuing education to ensure LEED professionals stay current in their knowledge of green building best practices, design, standards and technology.

LEED Green Associate

The LEED Green Associate credential attests to basic knowledge and skill in understanding and supporting green design, construction and operations. The LEED Green Associate, along with the associated preparatory courses, is ideal for students and other campus members who may not be involved in projects, but are looking to further their education, credentials and careers.

LEED AP

The LEED AP (with specialty) credential signifies an advanced depth of knowledge in green building practices and specialization in a particular LEED rating system. The LEED AP credential requires LEED project experience. LEED AP specialties include:

- Building Design & Construction (BD&C)
- Interior Design & Construction (ID&C)
- Operations & Maintenance (O&M)
- Homes (Homes)
- Neighborhood Development (ND)

Institutions may consider requiring staff critical to implementing the green campus plan to seek LEED credentials. Faculty and students from varied disciplines may wish to pursue a LEED credential to help further their knowledge of green buildings and sustainability planning.

View [more information](#), about GBCI's professional credential program.

4. Utilize USGBC Education Resources

USGBC offers a multitude of educational and training resources to assist building design, construction, operations and maintenance staff to develop and implement green building projects. Options include in person courses, online classes, webinars, podcasts and reference and study guides.

Faculty can also use these resources to enhance coursework and research efforts. Student groups can tap these offerings when preparing to volunteer on LEED projects or implement green campus initiatives. The director of sustainability and the human resources department may also reference these educational tools when preparing the institution's sustainability toolkit. USGBC's full [course catalog](#) can be obtained through USGBC's website.

USGBC COURSE LEVELS

100 Level: Awareness

Designed for individuals who have limited or no prior knowledge of green building principles.

200 Level: Understanding

Designed for individuals who are familiar with the LEED Green Building Rating System™ and green building principles, but seeking intermediate understanding.

300 Level: Implementation

Designed for individuals who are implementing and applying the LEED Rating System.

USGBC's LEED Core Concepts & Strategies Online Course

USGBC's LEED Core Concepts & Strategies online course is intended for those who want more than a basic understanding of LEED, including those directly involved in green building projects and those pursuing GBCI's LEED Green Associate credential. The course provides essential knowledge of sustainable building concepts that are fundamental to all LEED rating systems. It begins with an introduction to the benefits and integrative approach to green building and a brief background on USGBC and LEED, including basics of the building certification process. The core of the course presents LEED intents and concepts at the credit category level and across building types and rating systems, touching on strategies, synergies and specific examples that are reinforced through case studies.

GREEN CAMPUS PROFILE

UNIVERSITY OF FLORIDA—GAINESVILLE

BUILDING CAPACITY

The University of Florida's (UF) Facilities Planning & Construction division manages the institution's [LEED program](#), as part of the UF's overarching [sustainability program](#). UF recognizes that campus-wide change will require others on campus to be aware of the program and be empowered to access and apply the guidance. UF has adopted LEED as the basis of its [Sustainable Design Guidelines](#), including requirements for commissioning and LEED expertise in [contract language](#) for applicable procurements. UF sought to obtain the highest level of LEED certification feasible to support its commitment to preserving the environment and minimize the institution's carbon footprint. UF hired a LEED coordinator in 2003 to manage certifications and some credit calculations, in addition to working directly with project planning, design, construction and operation teams to enforce the guideline criteria, implement related policies and ensure delivery of sustainable buildings. As UF builds competence in applying LEED, its capacity to reach higher standards has grown. In 2009, the guidelines were elevated to require the LEED Gold standard at a minimum for all major (over \$1 million) new construction and renovation projects—as well as for minor projects (e.g., using LEED for Commercial Interiors).

To facilitate the certifications, it has been important to assure consistent application of the sustainability standards from one project to the next, underscoring the value of having one person, UF's LEED coordinator, supervising the process. This role also involves building knowledge of and competence in applying LEED criteria through in-house capacity building, such as peer-to-peer training, project team collaboration and teaching by example. Staff and project teams are provided with educational presentations or workshops on UF's sustainability commitment, roles and responsibilities for the LEED project at hand, and strategies for transitioning between current practices and the new best practices.

Activating consistent practices on a campus-wide basis means that when a facility is ready for LEED certification, the process can be expedited and members of the project team are likely to already have basic LEED training. Also key to awareness and capacity building are public LEED plaque and certification ceremonies, and the development of project brochures and case studies for UF's projects. The [cases](#) act as references for best practices and engage the campus and surrounding community in the green building process, with documentation centralized and made public online. Case data collection by staff and students eventually helped UF to determine that LEED certification can be obtained with no additional hard costs due to UF's best practices. As a result, UF further expanded the program. Since 2007, UF has been implementing LEED for Existing Buildings: O&M at the campus scale, pursuing certification at 32 buildings. The LEED coordinator's office also works with faculty and students on campus projects that are used as a living laboratory to learn about sustainability (e.g., building and waste management assessments). UF's growing cadre of best practices is further enhanced by linking to ideas and talent in the greater community, which is demonstrated by the LEED coordinator's office being highly active in education, leadership and training with the local USGBC chapter.



GREEN BUILDINGS AND LEED



In addition to serving as an effective green campus-wide planning and implementation tool, institutions can seek LEED certification for facilities to ensure sustainability goals are met for individual building projects. Project teams seeking LEED certification for a project should first assess whether the prerequisites outlined in the chosen rating system can be achieved. The team can then choose the credits to pursue based on environmental and performance goals and the desired level of LEED certification.

To oversee the LEED certification process, it is advisable for the project team to identify a LEED coordinator who registers the project with GBCI, coordinates team members' efforts, and manages the LEED documentation process through LEED Online.

Prerequisites and credits in the LEED green building rating systems are organized by seven topics (with the exception of LEED for Neighborhood Development, which uses different credit categories).

LEED CREDIT CATEGORIES



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



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



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



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



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



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



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

UNDERSTANDING LEED PROJECT COSTS

Green buildings do not have to cost more than conventionally constructed buildings.

Level of Experience

- The cost premium of building green goes down with experience. That is to say, an institution can expect that their first green building projects may cost more than subsequent ones due to the various benefits of experience. If a campus does not have the benefit of multiple projects to learn from, then the benefit of experience must be secured through well-selected consultants and the guidance of colleagues from peer institutions. Consider including in RFPs that consultants should have worked on a minimum of three LEED certified projects.

Integrated Design

- The cost premium of designing and retrofitting green buildings is very much related to the institution's level of commitment to sustainability and active leadership; the design team's ability to undertake a comprehensive integrated design process; and the proper sequencing of all important tasks throughout the design and construction process. If these factors are managed successfully through early engagement and use of best management practices, the costs of building green can be dramatically reduced or even completely mitigated. For example, Furman University's LEED Certified Duke Library had a no cost premium for its green design.

Perceived Costs

- The costs of the actual LEED registration and project certification are minimal; a small fraction of total project costs.
- The cost to register and certify a LEED project is based on the project's square footage. This process provides a comprehensive third-party review of the energy and environmental performance of the school and ensures that goals are met.
- For a 100,000 square foot building, LEED for New Construction, LEED for Schools, LEED for Core & Shell and LEED for Commercial Interiors registration and certification fees are less than \$6,000.
- For a 100,000-square foot building, LEED for Existing Buildings: O&M registration and certification fees are less than \$4,000.
- A list of fees associated with registration and certification are available on [GBCI's website](#) and are subject to change.
- The primary soft costs of quality design and construction may include bringing team members in early and engaging them throughout the integrated design process; hiring a sustainability consultant, a cost estimator and energy modeler; and securing additional commissioning. These services are all important investments and best practices in building design, regardless of LEED certification aspirations. If these investments are made and managed well, they will typically pay themselves back through reduced operating costs and, at times, reduced upfront costs. Commissioning, for example, has been shown to pay for itself within one to three years.¹

¹ Mills, E., Friedman, H., Powell, T., et al., "The Cost-Effectiveness of Commercial-Buildings Commissioning: A Meta-Analysis of Energy and Non-Energy Impacts in Existing Buildings and New Construction in the United States," [December 2004](#).

Life Cycle Cost Accounting

- An early and sustained commitment to life cycle costing, the integrated design process and the effective engagement of energy modeling and cost estimation expertise from the early stages of the project provide the most significant opportunities for maximizing project economics in relation to both upfront cost and operating cost.

Effective Budgeting

- When budgeting for green buildings, it is important to differentiate between small and large projects. Small projects, such as retrofitting an office space into a laboratory or vice versa, are often on an expedited schedule and occur frequently within a given academic year. The timeframe for larger projects, on the other hand, lend themselves more easily to documenting and managing the process. As a result, small projects may appear to have a greater proportional burden on resources.
- Institutions can overcome this administrative hurdle by establishing campus-wide policies and a comprehensive approach to be applied to all projects on campus, regardless of size and pursuit of LEED certification (e.g., specifying low VOC paints).

FOR IMPLEMENTATION GUIDANCE FOR EACH RATING SYSTEM, REFER TO THE APPROPRIATE REFERENCE GUIDE.

Rating System	Reference Guide
LEED for New Construction & Major Renovations	GREEN BUILDING DESIGN & CONSTRUCTION 2009 Edition
LEED for Core & Shell	
LEED for Schools	
LEED for Healthcare*	
LEED for Retail	
LEED for Commercial Interiors	GREEN INTERIOR DESIGN & CONSTRUCTION 2009 Edition
LEED for Retail Interiors	
LEED for Existing Buildings: O&M	GREEN BUILDING OPERATIONS & MAINTENANCE 2009 Edition
LEED for NEIGHBORHOOD DEVELOPMENT	NEIGHBORHOOD DEVELOPMENT 2010 Edition
*In development	
Each LEED rating system has an associated reference guide to support the LEED process.	

Using LEED as a Project Management Tool

Implementing an integrated, systems-oriented approach to green project design, development and operations can yield synergies, decrease upfront costs and improve the overall performance of a building. Initial LEED assessment will bring the project team together to evaluate and articulate the project’s goals and the certification level sought. LEED provides an effective accountability framework for green building design, construction and operations by offering the following tools:

- Credit checklists
- Reference guides
- LEED Online

Sample Checklist

LEED for Existing Buildings: Operations & Maintenance 2009					Possible Points 110						
Yes	?	No	Sustainable Sites	Possible Points	26						
			Credit 1	LEED Certified Design and Construction	4						
			Credit 2	Building Exterior and Hardscape Management Plan	1						
			Credit 3	Integrated Pest Mgmt, Erosion Control, and Landscape Management Plan	1						
			Credit 4	Alternative Commuting Transportation	3 to 15						
				Reduce by 10%	3						
				Reduce by 13.75%	4						
				Reduce by 17.5%	5						
				Reduce by 21.25%	6						
				Reduce by 25%	7						
				Reduce by 31.25%	8						
				Reduce by 37.5%	9						
				Reduce by 43.75%	10						
				Reduce by 50%	11						
				Reduce by 56.25%	12						
				Reduce by 62.5%	13						
				Reduce by 68.75%	14						
				Reduce by 75%	15						
			Credit 5	Site Development—Protect or Restore Open Habitat	1						
			Credit 6	Stormwater Quantity Control	1						
			Credit 7.1	Heat Island Reduction—Nonroof	1						
			Credit 7.2	Heat Island Reduction—Roof	1						
			Credit 8	Light Pollution Reduction	1						
Yes	?	No	Water Efficiency	Possible Points	14						
Y			Prereq 1	Minimum Indoor Plumbing Fixture and Fitting Efficiency							
			Credit 1	Water Performance Measurement	1 to 2						
				Whole building metering	1						
				Submetering	2						
			Credit 2	Additional Indoor Plumbing Fixture and Fitting Efficiency	1 to 5						
				Reduce by 10%	1						
				Reduce by 15%	2						
				Reduce by 20%	3						
				Reduce by 25%	4						
				Reduce by 30%	5						
			Credit 3	Water Efficient Landscaping	1 to 5						
				Reduce by 50%	1						
				Reduce by 62.5%	2						
				Reduce by 75%	3						
				Reduce by 87.5%	4						
				Reduce by 100%	5						
			Credit 4	Cooling Tower Water Management	1 to 2						
				Chemical Management	1						
				Nonpotable Water Source Use	2						
Yes	?	No	Energy & Atmosphere	Possible Points	35						
Y			Prereq 1	Energy Efficiency Best Management Practices							
Y			Prereq 2	Minimum Energy Efficiency Performance							
Y			Prereq 3	Fundamental Refrigerant Management							
			Credit 1	Optimize Energy Efficiency Performance	1 to 18						
				ENERGY STAR Rating of 71 or 21st Percentile Above National Median	1						
				ENERGY STAR Rating of 73 or 23rd Percentile Above National Median	2						
				ENERGY STAR Rating of 74 or 24th Percentile Above National Median	3						
				ENERGY STAR Rating of 75 or 25th Percentile Above National Median	4						
				ENERGY STAR Rating of 76 or 26th Percentile Above National Median	5						
				ENERGY STAR Rating of 77 or 27th Percentile Above National Median	6						
				ENERGY STAR Rating of 78 or 28th Percentile Above National Median	7						
				ENERGY STAR Rating of 79 or 29th Percentile Above National Median	8						
				ENERGY STAR Rating of 80 or 30th Percentile Above National Median	9						
				ENERGY STAR Rating of 81 or 31st Percentile Above National Median	10						
				ENERGY STAR Rating of 82 or 32nd Percentile Above National Median	11						
				ENERGY STAR Rating of 83 or 33rd Percentile Above National Median	12						
				ENERGY STAR Rating of 84 or 34th Percentile Above National Median	13						
				ENERGY STAR Rating of 85 or 35th Percentile Above National Median	14						
				ENERGY STAR Rating of 86 or 36th Percentile Above National Median	15						
				ENERGY STAR Rating of 87 or 37th Percentile Above National Median	16						
				ENERGY STAR Rating of 88 or 38th Percentile Above National Median	17						
				ENERGY STAR Rating of 89 or 39th Percentile Above National Median	18						
				ENERGY STAR Rating of 90 or 40th Percentile Above National Median	19						
				ENERGY STAR Rating of 91 or 41st Percentile Above National Median	20						
				ENERGY STAR Rating of 92 or 42nd Percentile Above National Median	21						
				ENERGY STAR Rating of 93 or 43rd Percentile Above National Median	22						
				ENERGY STAR Rating of 94 or 44th Percentile Above National Median	23						
				ENERGY STAR Rating of 95 or 45th Percentile Above National Median	24						
				ENERGY STAR Rating of 96 or 46th Percentile Above National Median	25						
				ENERGY STAR Rating of 97 or 47th Percentile Above National Median	26						
				ENERGY STAR Rating of 98 or 48th Percentile Above National Median	27						
				ENERGY STAR Rating of 99 or 49th Percentile Above National Median	28						
				ENERGY STAR Rating of 100 or 50th Percentile Above National Median	29						
				ENERGY STAR Rating of 101 or 51st Percentile Above National Median	30						
				ENERGY STAR Rating of 102 or 52nd Percentile Above National Median	31						
				ENERGY STAR Rating of 103 or 53rd Percentile Above National Median	32						
				ENERGY STAR Rating of 104 or 54th Percentile Above National Median	33						
				ENERGY STAR Rating of 105 or 55th Percentile Above National Median	34						
				ENERGY STAR Rating of 106 or 56th Percentile Above National Median	35						
				ENERGY STAR Rating of 107 or 57th Percentile Above National Median	36						
				ENERGY STAR Rating of 108 or 58th Percentile Above National Median	37						
				ENERGY STAR Rating of 109 or 59th Percentile Above National Median	38						
				ENERGY STAR Rating of 110 or 60th Percentile Above National Median	39						
				ENERGY STAR Rating of 111 or 61st Percentile Above National Median	40						
				ENERGY STAR Rating of 112 or 62nd Percentile Above National Median	41						
				ENERGY STAR Rating of 113 or 63rd Percentile Above National Median	42						
				ENERGY STAR Rating of 114 or 64th Percentile Above National Median	43						
				ENERGY STAR Rating of 115 or 65th Percentile Above National Median	44						
				ENERGY STAR Rating of 116 or 66th Percentile Above National Median	45						
				ENERGY STAR Rating of 117 or 67th Percentile Above National Median	46						
				ENERGY STAR Rating of 118 or 68th Percentile Above National Median	47						
				ENERGY STAR Rating of 119 or 69th Percentile Above National Median	48						
				ENERGY STAR Rating of 120 or 70th Percentile Above National Median	49						
				ENERGY STAR Rating of 121 or 71st Percentile Above National Median	50						
				ENERGY STAR Rating of 122 or 72nd Percentile Above National Median	51						
				ENERGY STAR Rating of 123 or 73rd Percentile Above National Median	52						
				ENERGY STAR Rating of 124 or 74th Percentile Above National Median	53						
				ENERGY STAR Rating of 125 or 75th Percentile Above National Median	54						
				ENERGY STAR Rating of 126 or 76th Percentile Above National Median	55						
				ENERGY STAR Rating of 127 or 77th Percentile Above National Median	56						
				ENERGY STAR Rating of 128 or 78th Percentile Above National Median	57						
				ENERGY STAR Rating of 129 or 79th Percentile Above National Median	58						
				ENERGY STAR Rating of 130 or 80th Percentile Above National Median	59						
				ENERGY STAR Rating of 131 or 81st Percentile Above National Median	60						
				ENERGY STAR Rating of 132 or 82nd Percentile Above National Median	61						
				ENERGY STAR Rating of 133 or 83rd Percentile Above National Median	62						
				ENERGY STAR Rating of 134 or 84th Percentile Above National Median	63						
				ENERGY STAR Rating of 135 or 85th Percentile Above National Median	64						
				ENERGY STAR Rating of 136 or 86th Percentile Above National Median	65						
				ENERGY STAR Rating of 137 or 87th Percentile Above National Median	66						
				ENERGY STAR Rating of 138 or 88th Percentile Above National Median	67						
				ENERGY STAR Rating of 139 or 89th Percentile Above National Median	68						
				ENERGY STAR Rating of 140 or 90th Percentile Above National Median	69						
				ENERGY STAR Rating of 141 or 91st Percentile Above National Median	70						
				ENERGY STAR Rating of 142 or 92nd Percentile Above National Median	71						
				ENERGY STAR Rating of 143 or 93rd Percentile Above National Median	72						
				ENERGY STAR Rating of 144 or 94th Percentile Above National Median	73						
				ENERGY STAR Rating of 145 or 95th Percentile Above National Median	74						
				ENERGY STAR Rating of 146 or 96th Percentile Above National Median	75						
				ENERGY STAR Rating of 147 or 97th Percentile Above National Median	76						
				ENERGY STAR Rating of 148 or 98th Percentile Above National Median	77						
				ENERGY STAR Rating of 149 or 99th Percentile Above National Median	78						
				ENERGY STAR Rating of 150 or 100th Percentile Above National Median	79						
				ENERGY STAR Rating of 151 or 101st Percentile Above National Median	80						
				ENERGY STAR Rating of 152 or 102nd Percentile Above National Median	81						
				ENERGY STAR Rating of 153 or 103rd Percentile Above National Median	82						
				ENERGY STAR Rating of 154 or 104th Percentile Above National Median	83						
				ENERGY STAR Rating of 155 or 105th Percentile Above National Median	84						
				ENERGY STAR Rating of 156 or 106th Percentile Above National Median	85						
				ENERGY STAR Rating of 157 or 107th Percentile Above National Median	86						
				ENERGY STAR Rating of 158 or 108th Percentile Above National Median	87						
				ENERGY STAR Rating of 159 or 109th Percentile Above National Median	88						
				ENERGY STAR Rating of 160 or 110th Percentile Above National Median	89						
				ENERGY STAR Rating of 161 or 111th Percentile Above National Median	90						
				ENERGY STAR Rating of 162 or 112th Percentile Above National Median	91						

LEED Credit Checklists

The Credit Checklist helps project teams identify individual measures within the rating system that are definitely, potentially or unlikely to be achievable. It can also be used as a tool for project management to monitor progress. Institutions can customize the checklist to better track the initiatives they have chosen to undertake.

The LEED checklist provides the LEED coordinator with a guide to help lead discussion during the charrette and to assign responsibilities to project team members early in the process (e.g., through a task assignment matrix). Throughout the design, construction and operations processes, the LEED checklist should be routinely referred to for assessing progress, ensuring accountability, guiding documentation efforts and tracking changes.

Example Credit Task Assignment Matrix

Credit	Lead Role	Support Role	
SSc2	Build Exterior and Hardscape Management Plan	Facilities - Grounds Section	Operations & Maintenance
SSc3	Integrated Pest Management, Erosion Control, and Landscape Management Plan	Facilities - Grounds Section	Safety & Environmental Section
SSc5	Site Development—Protect or Restore Open Habitat	Facilities - Grounds Section	
SSc6	Stormwater Quantity Control	Facilities - Planning Dept	Grounds Section
SSc7.1	Heat Island Reduction—Nonroof	Facilities - Planning Dept	Grounds Section
SSc7.2	Heat Island Reduction—Roof	Facilities - Planning Dept	Operations & Maintenance
SSc8	Light Pollution Reduction	Facilities - Planning Dept	
IEQc2.4	Daylight and Views	Facilities - Planning Dept	Academic Department
WEp1	Minimum Indoor Plumbing Fixture and Fitting Efficiency	Facilities - Plumbing Shop	
WEc1	Water Performance Measurement	Facilities - Plumbing Shop	
WEc2	Additional Indoor Plumbing Fixture and Fitting Efficiency	Facilities - Plumbing Shop	
WEc3	Water Efficient Landscaping	Facilities - Plumbing Shop	Grounds Section
WEc4	Cooling Tower Water Management	Facilities - Plumbing Shop	
EAp1	Energy Efficiency Best Management Practices (BMP)—Planning, Documentation, and Opportunity Assessment	Facilities - HVAC Shop	Electric Shop, Energy Management Section
EAp3	Fundamental Refrigerant Management	Facilities - HVAC Shop	
EAc2.1	Existing Building Commissioning—Investigation and Analysis	Facilities - HVAC Shop	
EAc2.2	Existing Building Commissioning—Implementation	Facilities - HVAC Shop	Operations & Maintenance
EAc2.3	Existing Building Commissioning—Ongoing Commissioning	Facilities - HVAC Shop	Operations & Maintenance
EAc3.1	Performance Measurement—Building Automation System	Facilities - HVAC Shop	
EAc3.2	Performance Measurement—System-Level Metering	Facilities - HVAC Shop	
EAc5	Enhanced Refrigerant Management	Facilities - HVAC Shop	
IEQp1	Minimum Indoor Air Quality (IAQ) Performance	Facilities - HVAC Shop	
IEQc1.2	IAQ BMP—Outdoor Air Delivery Monitoring	Facilities - HVAC Shop	
IEQc1.3	IAQ BMP—Increased Ventilation	Facilities - HVAC Shop	Planning Dept
IEQc1.4	IAQ BMP—Reduced Particulates in Air Distribution	Facilities - HVAC Shop	
IEQc2.3	Occupant Comfort—Thermal Comfort Monitoring	Facilities - HVAC Shop	
EAp2	Minimum Energy Efficiency Performance	Facilities - Energy Management Section	

Manage Documentation with LEED Online

LEED Online is the primary resource for managing the LEED documentation process and can be an effective green building project management tool. Through LEED Online, project teams can manage project details, complete documentation requirements for LEED prerequisites and credits, upload supporting files, submit applications for review, receive reviewer feedback and ultimately earn LEED certification. LEED Online provides a common space where members of a project team can work together to document compliance with the LEED rating system. The LEED certification process requires teams to submit project applications to GBCI using LEED Online. This online portal establishes direct communication with the GBCI review teams and provides a space for ongoing project dialogue. Engaging students to assist with documentation and support LEED Online project management can reduce soft costs in addition to providing students with valuable LEED project experience, an eligibility requirement to apply for the LEED AP with specialization credential exam.

FEATURES OF LEED ONLINE:

Team Administration

- The LEED Online “Project Administrator,” typically the LEED coordinator, is the person who registers the project in LEED Online and who has full control of the project account. The project administrator will also assign prerequisite and credit responsibilities to team members who can be granted varying degrees of account access.
- Some project administrators may prefer to handle all documentation and not grant direct access to other team members, whereas other project administrators may want to delegate more control to the project team.

Project Organization

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

Status Indicators and Timeline

- The LEED Online system explains all the steps in the review and certification process and highlights steps completed. The system also displays specific dates associated with each phase and step.

Support for Certification Review and Submittals

- The LEED Online system guides each project team through the entire certification process, from initial project registration through all review phases. During a LEED review, if any minor clarifications are needed, the online system allows the reviewer to contact the project team through the system.

Data Linkages

- Some data, such as a building’s gross floor area or full-time equivalent (FTE) occupancy, are required in the documentation for several LEED credits. LEED Online automatically populates fields in all appropriate forms after the data is initially entered, saving time and helping to ensure project-wide consistency. If needed, an override option is available.

Automatic Data Checks

- The LEED Online system will alert users when required data is missing, providing a chance to correct the error before submitting the certification application.

Leveraging the research and lessons learned from the documentation process of one project (e.g., modification of building or campus system changes) will save time, streamline project implementation and foster continual improvement. Some higher education institutions have made their LEED submittals available to the public. At minimum, an institution can improve almost all aspects of campus

sustainability by making use of centralized access areas (e.g., a website or network files) that serve as the institutional memory, providing examples of LEED project documentation for the campus community over the long-term.

GREEN CAMPUS PROFILE

HARVARD UNIVERSITY

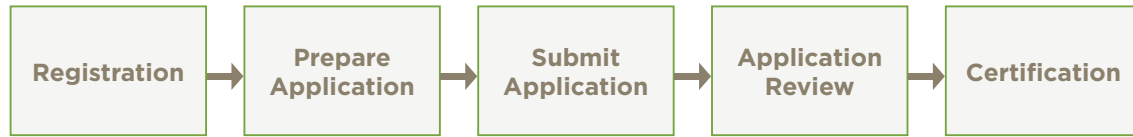
LEED DOCUMENTATION

Harvard has one of the most expansive and well-established green campus initiatives in the world. In 2007, Harvard committed to all construction and renovation projects achieving a minimum LEED Silver level of certification. In 2008, Harvard pledged to reduce campus-wide GHG emissions by at least 30% below 2006 levels by 2016, including all campus growth. Harvard intends to meet and exceed these aggressive goals by engaging the collective efforts of students, faculty, staff, vendors and service providers. In 2004, Harvard's Green Campus Initiative, now the [Office for Sustainability](#), realized that providing open access to lessons learned from real green building projects on Harvard's own campus was one of the most effective strategies that it could utilize to foster wide-scale engagement, learning and continual improvement. As a result, Harvard is now one of the few campuses that publicly shares all of its successful LEED certified project documentation, which it does through its [Green Building Resource](#) website. This website is an accessible, frequently updated, and comprehensive database of the institution's scores of registered and completed projects. It provides links to resources, tips on funding and easily navigated pages on its LEED documentation for new and existing building projects—including guidance on project team management, the integrated design process and examples of LEED project and campus-wide policies. The higher education community and the broader public can learn from Harvard's commitment to continually seek ways to identify and implement sustainability best practices.

LEED Third-Party Certification

The third-party certification process provided by the GBCI ensures the overall quality of green building design, construction and operations is consistent. With this third-party certification, organizations are widely recognized for meeting public accountability and performance standards.

LEED Online Certification Application Review Process



Project teams should utilize the many resources supporting the LEED process on [GBCI's website](#).

Continual Improvement and Expansion

Lessons learned from each green building project should be documented and shared to inform continual improvement in green building design and operations; streamline LEED documentation efforts; assist in the ready adoption of proven design strategies and technologies; and provide case studies, site tours, and training opportunities for the purpose of expanding institutional support and capacities.

Measurement and verification is a formal, systematic process for determining the functional performance of a building's system. Collecting data on the actual performance of building design features and technologies not only serves as a tool to monitor progress, but data can also be evaluated over time to inform future decisions. Additional efforts should also be made to continually improve energy modeling strategies and assumptions based upon post-occupancy performance. All certified projects under the latest version of LEED, LEED 2009, must commit to sharing available whole-project energy and water usage data with USGBC.

Higher education institutions are uniquely positioned to engage in ongoing research and development of new green building design and operations strategies. Engaging students and faculty in teaching

BENEFITS OF ENGAGING STUDENTS AND FACULTY IN GREEN BUILDING PROJECTS

Students gain valuable hands-on project experience and develop green job skills and can use that experience to help obtain LEED Professional Credentials.

Faculty can enhance the academic experience by integrating project-based learning opportunities within the curricula and can benefit by using the on-the-ground project experience to inform their research and keep curricula up to date.

and research activities that can lead to better green building outcomes should be encouraged and is essential to initiating a successful green campus plan. (See the [The Campus as a Living Laboratory](#) Section).

Since building and planning technologies are constantly evolving, LEED is updated and revised through a consensus-based process to stay current with market innovations. USGBC members participate in the LEED development process through such mechanisms as technical advisory groups and member balloting for new LEED rating systems. If campuses discover methods for improving any of the LEED standards, they can reach out to USGBC to determine the most effective way for their input to be considered. USGBC welcomes such input, as its goal to continually improve LEED relies on experience in the field to inform future improvements.

The Association for the Advancement of Sustainability in Higher Education (AASHE) maintains a list of examples of policies for use in sustainability planning at the [Campus Sustainability Policy Bank](#).

“Sustainability, in simplistic terms, is leaving our campus in a better condition for our next generation. We have seen a cultural transformation of our entire facility management team. What we do and how we think emulates sustainable practices and LEED principles and it is no longer a new initiative.”


—Peter Strazdas, WMU Associate Vice President of Facilities Management

GREEN CAMPUS PROFILE


WESTERN MICHIGAN UNIVERSITY

CONTINUAL IMPROVEMENT—SCALING UP PROJECTS

Western Michigan University (WMU) a 1,000-acre institution based in Kalamazoo, Mich., had been involved with energy conservation for over two decades. LEED certification was identified as the next step in a more comprehensive approach and complimented many of WMU's facility initiatives while formalizing intentions to continue progress with sustainable practices. In 2009, WMU was recognized for its first green building. The [College of Health and Human Services](#), a 240,000 square foot, \$48 million project, which included a \$15 million Department of Energy grant, achieved LEED EB v.2.0 Gold certification. The project features a curved glass, highly efficient 'curtain wall' building envelope on one façade; other LEED-related elements include minimal alteration to the surrounding green space, low impact external lighting, stormwater runoff management, maximizing daylight harvesting, comprehensive energy monitoring systems for HVAC controls, and a fully integrated maintenance program. A new low-impact cleaning products policy and training to custodial employees on improved techniques help green the building internally, while giving occupants a sense of validation for their environmental stewardship through the certification process. According to staff, faculty and student morale in the building has also improved. This building was WMU's greatest experience to date in engaging in the LEED process and it has become a model for the rest of the campus. The certification process and building success have had a significant impact on the rest of the campus, as many of the sustainable practices and materials used in that building are now being replicated in over 150 buildings across the campus. To support the expansion of these best practices, WMU implemented a campus-wide green awareness initiative that included launching a comprehensive [sustainability website](#) to inform the public on all school efforts, initiating various energy and cost saving programs, and signing the ACUPCC. The University has also established a program that all new or renovation projects exceeding \$1 million to incorporate, at a minimum, LEED Silver design principles. WMU's experience illustrates how many campuses are meeting with success in sustainable building by starting with a pilot project, then scaling up efforts post-certification by modeling other projects after the pilot.



DESIGN AND CONSTRUCT GREEN BUILDINGS



When designing and constructing green buildings, begin with campus-wide project measures that can be applied across campus to all buildings.

As discussed in the [Lay the Groundwork: Plan](#) Section, USGBC offers multiple LEED rating systems to guide the design and construction of green campus projects.

In the context of greening campuses, new buildings and major renovations represent a small piece of the sustainability puzzle, accounting for only a portion of campus-wide environmental impacts and greenhouse gas emissions. Nonetheless, new construction and major renovation projects offer a number of unique opportunities:

- Design and construction projects enable application of the LEED framework from the project pre-planning stage through to the building occupancy and associated operations and maintenance. This systematic approach can be an opportunity to more fluidly engage and involve stakeholders from across the campus.
- Utilizing the integrated design process during design and construction will help to drive down costs and save the institution capital dollars.
- Due to their visibility, new green buildings often appeal to alumni and other donors for targeting gifts.
- Institutions can use new buildings and major renovations to demonstrate larger design concepts, such as renewable energy, natural ventilation, etc., that can thereafter be scaled beyond single buildings.

- New buildings have the power to generate an image of the organization, to galvanize interest and draw attention to the emerging sustainability of the entire campus. Institutions should capitalize on the interest that new buildings can generate to garner support for furthering the organization's sustainability mission.
- Implementing major renovations can also have a similar effect; historic structures, for example, represent the institutional vernacular and as such are iconic buildings on-campus that could be used to gain support.

For design and construction projects, wherever possible, institutions should begin the greening process at the campus level, integrating efforts into existing campus-wide sustainability aspirations, the campus master planning process, and long-range vision development, as described in the [Establish Campus Sustainability Goals and Visions](#) section. There are a growing number of campuses with standalone sustainability master plans, such as [Furman University](#).

A. APPLY CAMPUS SCALE

Due to the multi-building nature of college campuses, institutions can benefit from approaching green building construction, not from an individual building perspective, but at the campus-scale level. Campuses should identify “base credits” that could apply to all projects thereby facilitating multi-project certification. Integrating LEED into the design standards and specifications, for example, would enable every project to achieve associated credits. Keeping documentation on file for every LEED project and sharing information across projects will help to streamline the certification process.

Campus buildings often share common infrastructure, such as utilities management, energy sources, and transportation. Targeting improvements in these areas facilitates campus greening and may contribute to securing credits for the individual buildings seeking LEED certification. Some credits can also be achieved by implementing campus-wide policies and procedures (e.g., such as materials procurement or recycling), which may already be in place as part of a campus-wide greening effort.

When using the LEED framework, it is important to distinguish between credits that will be pursued on a project basis and those that the university should implement campus-wide.

LEED for Existing Buildings: Operations & Maintenance Prerequisites and Credits with Potential Campus-Wide Application		
Prerequisites/Credits		
Sustainable Sites (SS)		Campus-wide Opportunity
SSc1	LEED Certified Design and Construction	
SSc2	Building Exterior & Hardscape Management Plan	X
SSc3	Integrated Pest Management (IPM), Erosion Control, Landscape Management Plan	X
SSc4	Alternative Commuting Transportation	X
SSc5	Site Disturb - Protect/Restore Open Habitat	X
SSc6	Stormwater Quality Control	X
SSc7.1	Heat Island Red (Non roof)	X
SSc7.2	Heat Island Red (Roof)	
SSc8	Light Pollution Reduction	X
Water Efficiency (WE)		Campus-wide Opportunity
WEp1	Minimum Indoor Plumbing Efficiency	
WEc1	Water Performance Measurement	
WEc2	Additional Plumbing Efficiency	
WEc3	Water Efficient Landscaping	X
WEc4	Cooling Tower Water Management	X
Energy & Atmosphere (EA)		Campus-wide Opportunity
EAp1	Energy Efficiency Best Management Practices (BMPs)	
EAp2	Minimum Energy Efficiency Performance	
EAp3	Fundamental Refrigerant Management	
EAc1	Optimize Energy Performance	
EAc2.1	Commissioning Investigation & Analysis	
EAc2.2	Commissioning Implementation	
EAc2.3	Ongoing Commissioning	
EAc3.1	Performance Measurement - Building Automation System (BAS)	X
EAc3.2	Performance Measurement - System	
EAc4	On/Off Site Renewable Energy	X
EAc5	Enhanced Refrigerant Management	
EAc6	Emissions Reduction Reporting	X
Materials & Resources (MR)		Campus-wide Opportunity
MRp1	Sustainable Purchasing Policy	X
MRp2	Solid Waste Management Policy	X
MRc1	Sustainable Purchasing: Ongoing Consumables	
MRc2	Sustainable Purchasing: Durable Goods	
MRc3	Sustainable Purchasing: Facility Alterations and Additions	
MRc4	Sustainable Purchasing: Reduced Mercury in Lamps	
MRc5	Sustainable Purchasing: Food	
MRc6	Solid Waste: Waste Stream Audit	X

Materials & Resources (MR) (continued)		Campus-wide Opportunity
MRC7	Solid Waste: Consumables (50%)	
MRC8	Solid Waste: Durable Goods	
MRC9	Solid Waste: Facility Alterations & Additions	
Indoor Environmental Quality (IEQ)		Campus-wide Opportunity
IEQp1	Minimum Indoor Air Quality (IAQ) Performance	
IEQp2	Environmental Tobacco Smoke (ETS) Control	X
IEQp3	Green Cleaning Policy	X
IEQc1.1	IAQ BMP: IAQ Management Program	
IEQc1.2	IAQ BMP: Outside Air (O/A) Delivery Monitoring	
IEQc1.3	IAQ BMP: Increased Ventilation	
IEQc1.4	IAQ BMP: Reduced Particulates	
IEQc1.5	IAQ BMP: Facility Alterations	
IEQc2.1	Occupant Comfort: Occupant Survey	
IEQc2.2	Controllability of Systems: Lighting	
IEQc2.3	Occupant Comfort: Thermal Monitoring	
IEQc2.4	Daylight and Views	
IEQc3.1	Green Cleaning: High-Performance Operations (HPO) Cleaning Program	X
IEQc3.2	Green Cleaning: Custodial Assessment	
IEQc3.3	Green Cleaning: Purchasing	X
IEQc3.4	Sustainable Cleaning Equipment	X
IEQc3.5	Indoor Chemical & Pollutant Control	
IEQc3.6	Indoor IPM	X
Innovation & Operations (IO)		Campus-wide Opportunity
IOc3	Documenting Sustainable Building Cost Impacts	X

GREEN CAMPUS PROFILE

LOS ANGELES COMMUNITY COLLEGE DISTRICT

INSTITUTION-WIDE POLICY FOR GREEN BUILDING DESIGN AND CONSTRUCTION

Los Angeles Community College District's (LACCD) focus on low-cost education for a diverse student body, most of which is of "nontraditional" age, has put great demand upon the school to grow as more and more higher education students seek part-time and economical options. In support of smart growth and to streamline costs and effort, LACCD has embraced a campus-scale [sustainable building program, "LACCD Builds Green,"](#) which applies to all nine of its member colleges, serves about 250,000 students annually—and covers 882 square miles within 36 cities. This is one of the nation's largest dedicated efforts to green construction, with more than \$6 billion assigned to modernizing the colleges through the Sustainable Building Program. The bulk of the funding comes from bond measures that were approved by voters in three rounds since 2001. LACCD's Board of Trustees adopted the sustainable building policy in 2002, which mandates that all new buildings funded with at least 50% bond dollars should be developed to meet the LEED benchmark. The policy made LACCD the first community college district in the nation to adopt such an extensive LEED policy. Additionally, it made LACCD's Bond Construction program one of the largest public sector sustainable building efforts in the U.S. The policy's implementation is enabled through LACCD's [Sustainable Design Standards \(PDF\)](#)—an excellent document to refer to as a model for integrating sustainability into campus design standards. Such standards represent a high-level opportunity for campuses to apply sustainable practices comprehensively across an organization's campuses; in particular, they can help campuses to integrate LEED into daily practices, such as through overlaying LEED onto design standards and specifications in all design and construction projects.

Having standards in the "blueprints" also potentially streamlines LEED certification for campuses when it comes time to documenting credits. For example, campuses can identify "base credits" which every new construction project should achieve by integrating LEED criteria into the design standards for planned and future projects. LACCD has done this in their revised standards. Keeping documentation on file for every LEED project and sharing information is also key to streamlining the LEED certification process, and is helping to guide over ninety-one registered LACCD projects through the certification process. In addition, LACCD has a [renewable energy plan](#) for on-site generation (especially solar power) on its campuses and is taking other actions to reduce the colleges' carbon footprint.

Resources: See [LACCD Builds Green](#) for fact sheets and more information about the program, related resources, the renewable energy plan, dashboard reports, and the GreenLibrary (presentations, energy toolkit, and bond measures).

LOS ANGELES COMMUNITY COLLEGE DISTRICT

Important Steps to Establishing a Campus-wide Green Design and Construction Policy

- 1. Identify and secure funds.** The California public education infrastructure is heavily dependent on voter approval for financial resources and LACCD voters have passed bonds to build and improve the colleges.
- 2. Initiate dialogue.** LACCD worked with their trustees and other stakeholders to identify key objectives, such as drought tolerant landscaping and waterless urinals to save water, and solar power and other strategies to save electricity and reduce future costs.
- 3. Understand the organization.** As a public entity in California, there is a specific policy-making process and LACCD follows a shared governance process to seek input from faculty, staff, and students about the possibility of green building on each campus.
- 4. Gain consensus.** LACCD addressed initial employee—including college president—concerns about green building costs, scope, and scheduling, among other topics.
- 5. Invite external support.** LACCD invited the Sierra Club and other environmental groups to join the dialogue, coordinate with policymakers and support public hearings for a green building policy.
- 6. Educate to overcome resistance.** LACCD explained life cycle costs and other new building concepts, supplemented by testimony and data from outside authorities like the municipality, utilities and USGBC.
- 7. Build momentum.** LACCD held committee meetings and public hearings, students mobilized on the campuses, and elected officials provided supportive letters to the Board.
- 8. Approve the policy.** LACCD's Board unanimously passed a detailed green building policy in 2002, a process that was covered favorably by local media and which solicited requests for mentoring from other institutions.
- 9. Implement.** LACCD fleshed out the policy's details such as how to achieve measurable goals of energy savings, long-term cost savings, and environmental improvement; utilized the LEED "lingo;" integrated LEED AP requirements into contract requirements for architectural and engineering teams; and provided staff with LEED training.
- 10. Celebrate.** In addition to multiple high profile green awards and recognition, LACCD shared its efforts publicly and received media coverage from local newspapers for its leadership and "forward thinking."
- 11. Expand.** LACCD leveraged momentum for the Green Building Program to get more voter approval for funding, adding master plans, green technology and green collar jobs to the ballot's coverage.
- 12. Evolve.** LACCD's actions were paralleled by marketplace growth in LEED certifications and providers, making it easier over time to support the announcement that every LACCD bid and design RFP/RFQ would include a requirement for green building skills or commitments.
- 13. Sustain continual improvement.** LACCD embraces ongoing challenges to re-educate employees to properly implement green building practices and create new curriculum that trains future green builders, solar panel installers, maintenance crews, etc.
- 14. Collaborate.** LACCD has been key to regional coordination of input from colleagues in other local entities, including an annual sustainability summit and creation of a cross-sector Sustainability Collaborative for monthly networking, information sharing and brown bag lunch meetings.

B. PURSUE PROJECT SCALE

With campus-wide elements in place, the remaining design and construction elements should be pursued on a project basis.

1. Project Management Overview

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 needed for LEED certification, a project manager has many tasks:

- To 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.
- To establish an integrated design process that emphasizes a whole-building approach. In contrast to traditional building design, characterized by a linear handing off of project responsibilities, integrated design involves multidisciplinary collaboration between all project stakeholders and design and construction professionals to achieve the desired performance level required by LEED.
- To ensure that the products and procedures used are properly documented.
- To allocate sufficient time in the project schedule to complete the LEED documentation requirements.

GREEN CAMPUS PROFILE

PRINCETON UNIVERSITY

LIFE CYCLE COST ACCOUNTING

Princeton's recent [development of policy initiatives](#) for sustainability included greenhouse gas emissions reduction targets and life cycle cost comparisons to assist in prioritizing low-carbon projects, including construction. As a result, Princeton's [campus plan](#) has a sustainability chapter that details green construction and renovation. The University's Sustainable Building Guidelines, a section in its [design manual](#), requires all new construction to meet LEED Silver standards and to be 50 percent more energy efficient than national code requirements. To help meet these design goals, Princeton's manual also outlines criteria, based on the [Whole Building Design Guide](#), for its Life Cycle Cost Analysis (LCCA) program: "Using Life Cycle Cost Analysis, described in Section 1.2 (6), and Social and Environmental Impact Assessment, described in Section 1.2 (7), an iterative process of recommendation, comparative modeling, decision-making and refinement is intended to enable the University to make better-informed choices regarding expenditures of resources..." Princeton requires LCCA of major proposed building systems and innovative green design options, as well as evaluation of all aspects of building design and performance, from stormwater management to materials choices. The LCCA efforts are expected to pay off considering higher future energy costs for campuses, and Princeton regularly applies LCCA calculators and template-based analyses (see [Life Cycle Comparative Study Sample](#)) to compare choices for energy systems, electrical systems, building envelope, siting and massing strategies, structural systems, mechanical systems, water systems, and interior materials. The Sustainability Manager maintains a record of previously generated LCCA studies for use on future projects.

WHY LIFE CYCLE COST ANALYSIS IS IMPORTANT

Institutions should consider committing to using life cycle cost analysis before the planning process begins and should integrate it into all related contracts and specifications. Life cycle cost analysis considers both the initial cost and the cost of ownership over time. For example, a more energy efficient pump may cost more to purchase than a conventional pump, but the energy cost savings over its useful life more than covers the initial cost premium.

When designing for new buildings or major renovations, energy modeling that considers life cycle costing should be used to evaluate alternatives at the schematic and design development phases. Cost estimators for the overall plan and specific projects should be included early so that costs can be continuously evaluated and compared, including operating cost projections.

2. Design Phase

An important role of a LEED coordinator is to integrate all stakeholders into the design process in order to ensure the sustainability goals and the corresponding LEED credits are met. Besides the client, project manager, architect, engineer and contractor, other stakeholders new to the integrated process need to be engaged early on.

KEY STAKEHOLDERS TO ENGAGE IN THE DESIGN PHASE
Sustainability/LEED Coordinator
<ul style="list-style-type: none"> • Acts as the client sustainability representative and provides guidance, accountability, ideas, research, collaboration, LEED process management and problem solving. This can be a staff position or contracted consultant.
Operations Representatives
<ul style="list-style-type: none"> • Advise on building design solutions, operating assumptions, operating costs for life cycle costing purposes, building staff training needs and post-occupancy operations.
Cost Estimators
<ul style="list-style-type: none"> • Assess and track capital and operating costs and savings resulting from different green design options. In collaboration with energy modelers, design engineers, and operations staff, they can develop essential life cycle costing estimates.
Commissioning Authorities
<ul style="list-style-type: none"> • Act as an independent third-party reviewer of key building specifications and documents. Commissioning authorities provide quality assurance in relation to the design and operations of energy-using systems and assist in achieving efficient, cost-effective designs.
Energy Modelers
<ul style="list-style-type: none"> • Provide effective energy modeling to aid the cost estimation, life cycle costing and integrated design process. Initiating energy modeling early in the schematic phase is ideal.

3. Charrettes and the Integrated Design Process

At the onset of the project, the LEED coordinator should convene a charrette to study and discuss the sustainable elements that the institution desires to incorporate into the project. All team members need to participate in the charrette to be sure that all points of view are identified and that as many questions as possible are answered. The outcome of the charrette will be a series of sustainable goals that have been agreed upon and prioritized for incorporation into the project.

4. Construction Phase

During construction of a green building, with the help of the LEED coordinator, the project manager must ensure the contractor is managing its resources and operations according to LEED requirements and that the appropriate documentation is being collected. LEED identifies a number of elements to address in the construction phase in order to minimize the impact of the project and safeguard the health of the workers.

The project manager will also need to review the contractor's submittals to ensure the appropriate materials were used, specifically verifying the recycled content, the presence of volatile organic compounds, regional sourcing, renewable resource content and other requirements outlined in the specifications.

It is recommended that the project manager 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 and training so that all contractors are familiar with the specifications and documentation needs of the project.

5. Commissioning

Whole-building commissioning should be integrated into the process, from pre-design planning through design, construction and post-occupancy. The commissioning authority reviews and tests whole-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 meets the design intent, supports overall campus sustainability goals, serves the needs of the building occupants and is operated by trained facility staff. Commissioning new or renovated buildings helps ensure 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 by ensuring the systems are running at optimum efficiency. 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 correctly².

Many campus organizations have commissioning requirements for all projects such as [Stanford's Project Delivery Process \(PDP\) Manual](#), which outlines required commissioning-related steps for each project phase, from initial scoping to closeout. The LEED coordinator should review any existing documents for compliance with the LEED fundamental commissioning requirements and modify, if necessary, to ensure the strategies employed by the design team to achieve the fundamental commissioning prerequisite fulfills all requirements set forth by the LEED reference guide.

USGBC's [Green Building Links](#) webpage lists a number of commissioning resources.

6. Planning for the Operations & Maintenance of the Building

Once constructed, green buildings must be maintained in order to ensure the buildings' systems are operating as efficiently as designed, and that the occupants are utilizing the facilities as planned. This process includes developing a system to continually document campus greening activities. A building automation system is an effective tool in tracking the performance of a building. The system uses computer-based monitoring to coordinate, organize and optimize building control subsystems, including lighting, equipment scheduling and alarm reporting. The following section describes how buildings can be operated, maintained and monitored in order to maintain an institution's overall efforts to green their campus.

² U.S. Green Building Council, "[Roadmap to Sustainable Government Buildings](#)," 2010.

GREEN CAMPUS PROFILE

LOYOLA UNIVERSITY

BUILDING AUTOMATION SYSTEMS FOR ONGOING PERFORMANCE

In 2008, Chicago's Loyola University completed the Richard J. Klarchek [Information Commons](#), a \$28.3 million, 70,495 square foot, LEED Silver annex to the campus's main library, adjacent to Lake Michigan using the LEED for New Construction rating system. It was envisioned as a bookless facility for student access to electronic resources. [Design](#) goals included sensitivity to preserving green space and the existing campus architecture, incorporating the aesthetics of neighboring art deco buildings. Architects also focused on interior systems controls to create a day-lit building with views of the lake. A common facilities management challenge in climates like Chicago's is balancing cold and dry winters with hot and humid summers, so technology controls were identified to assure that the building could maintain the thermal and visual comfort of occupants without excessive energy use. A ["mixed mode" building](#) resulted, combining passive, natural ventilation with active, conventional HVAC systems, in a design that uses less than half of the energy than the ASHRAE compliant standard. A building automation system (BAS) coordinates the various elements, including the windows, under-floor air distribution, and radiant ceilings, as it tracks a number of indoor and outdoor conditions with sensors located throughout the commons and a weather station mounted on the roof. As humidity and temperature change, the BAS determines when to switch to mechanical ventilation; it also controls the balance between daylight and fixture illumination levels. Through the BAS's data tracking capabilities, Loyola's facilities management and design teams have been able to collect operations data and assess post-construction—a critical capability for any scale of facility energy management and for broader, more long-term assessments of campus sustainability. They found that the building's better-than-expected thermal performance has helped to compensate for the Commons' energy-intensive technology services and computers.

7. Transition between Project Phase and Daily Operations

To ensure operations and maintenance procedures and policies are properly implemented upon the completion of the green building project, building managers and facilities staff should participate in the project development process from the beginning. They bring to the table valuable and accurate information about building use, occupant behaviors, operating costs, building control strategies, maintenance implications, storage needs, and metering and measurement strategies, that will not only inform the process, but will help to ensure the new green O&M policies and procedures will work as intended. In addition, building managers should be actively involved in identifying and addressing the training needs for the building O&M staff to ensure they are informed and prepared to operate and maintain the buildings as designed.

GREEN CAMPUS PROFILE

WEST VIRGINIA UNIVERSITY

GREEN HISTORIC RENOVATION

Revitalizing the existing building stock often requires significant renovations; this type of project salvages both materials and enhances “no growth” principles in terms of expanding the campus footprint. In 2007, Oglebay Hall became [West Virginia University's](#) (WVU) first building to receive certification, under LEED for New Construction & Major Renovations. The 55,000 square foot building, constructed in 1917 and listed on the National Register of Historic Places, underwent a five-year, \$23.5 million renovation that included stripping its masonry shell and wood frame structure. Green building is synonymous with materials reuse, and this project is a strong example of how historic preservation and sustainability work in concert with one another. The brick, limestone and terra-cotta exterior was restored and the interior was completely refitted with state-of-the-art classrooms, offices and laboratories. It is now the home of WVU's Forensic and Investigative Science Program and contains a mix of general purpose classrooms, support spaces, and high technology labs including Mitochondrial DNA labs. At Oglebay, the design and construction teams were careful to preserve the historical significance of the facility. Intensive mechanical systems were integrated into the building, utilizing the existing attic and ventilation chimneys to avoid any visual impact on the building exterior. Energy efficiency was also a challenge, due to the laboratories. Key sustainable [features](#) include:

- 75% of existing building shell and 50% of all construction waste reused
- 20% of all materials procured from local manufacturers
- Synthetic slate roof made of recycled rubber
- Heat island effect reduced through landscaping
- 90% of building space now uses natural light
- HVAC energy performance optimized
- Water-efficient landscaping by not using any potable water
- Waterless urinals, dual flush toilets and other efficient fixtures
- Low-emitting adhesives, sealants, paints, and carpet

“The LEED system offers an excellent framework to benchmark our practices with all aspects of building such as design, construction, commissioning and occupancy,” said Clement Solomon, director of the WVU [Office of Sustainability](#). “WVU Facilities Management has also been proactive in adopting many of these same sustainable standards and protocols all over campus.”



OPERATE AND MAINTAIN GREEN BUILDINGS

Existing buildings account for the vast majority of the building stock on campuses. As such, retrofitting and renovating existing buildings offer the greatest opportunity for institutions to cut energy and water consumption, save money and reach their sustainability goals. The LEED for Existing Buildings: O&M rating system provides the framework necessary to enhance building efficiencies, improve operations, and conserve resources.

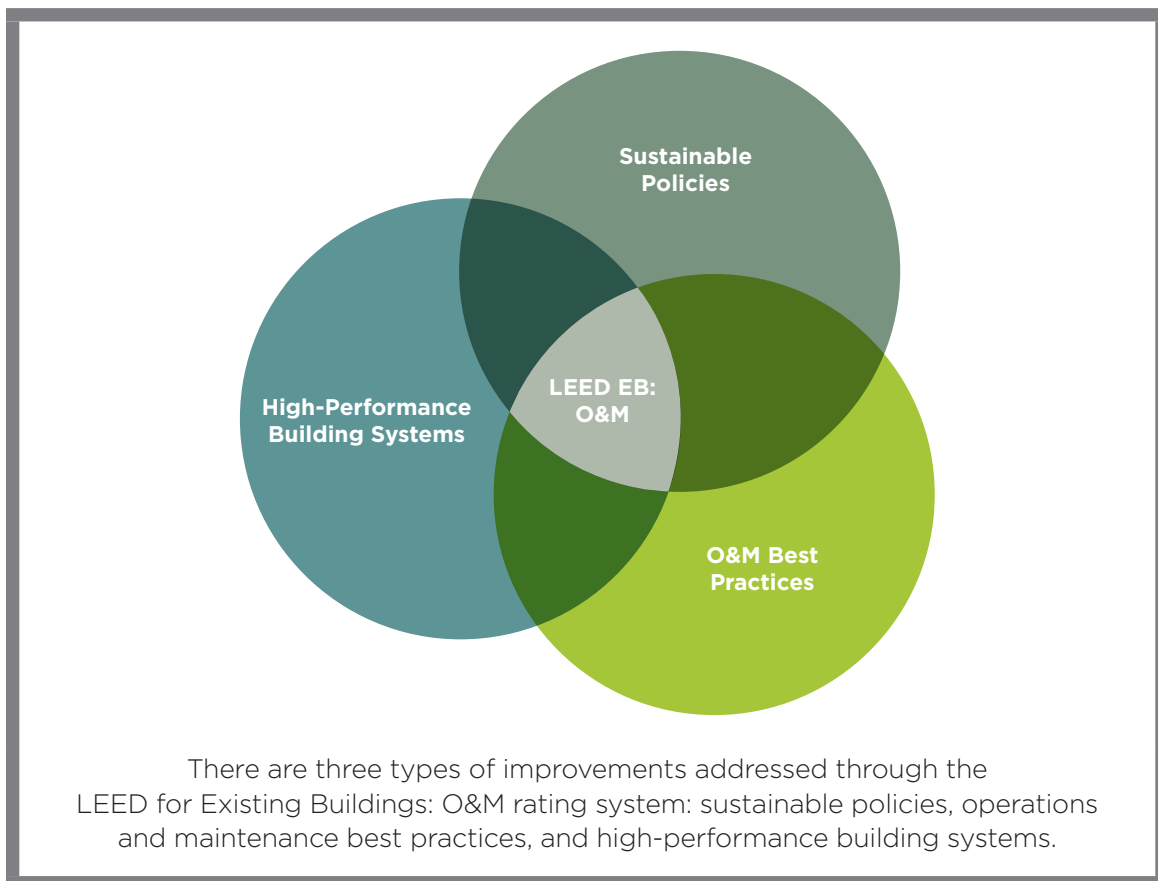
As with new construction and major renovations, it is useful to start at the campus scale when seeking to green the operations and maintenance of facilities. Identifying existing policies or creating new ones that can be extended to all buildings on-campus rather than on a case-by-case basis, can help streamline the process and avoid the duplication of efforts. Applying the LEED for Existing Buildings: O&M framework to campus-wide operations and maintenance practices will enhance the operational efficiency of buildings, regardless of their ability to be formally LEED certified. Maximizing the performance of existing buildings across campus is one of the most effective ways to reduce the campus' carbon footprint and meet the goals of the ACUPCC.

In contrast to a new construction project, greening an existing building is an incremental process. LEED for Existing Buildings: O&M certification is an ongoing process of improvement. It requires measuring and verifying the performance of current plans and designing a process to evaluate and implement new strategies to maximize building performance.

A. PURSUE CAMPUS-SCALE PLANNING

The LEED for Existing Buildings: O&M rating system is a tool for the sustainable, ongoing operations and maintenance of existing buildings that are not undergoing major renovations. It includes high-performance building systems,

O&M best practices, and sustainable policies. LEED for Existing Buildings: O&M can be applied both to existing buildings seeking LEED certification for the first time and to projects previously certified under LEED for New Construction & Major Renovations, Schools, or Core & Shell. It is the only LEED rating system under which buildings are eligible for recertification. In many cases, the LEED for Existing Buildings: O&M certification process can be completed in-house and offers a great opportunity to engage students on various LEED tasks, such as conducting water, energy and waste audits, administering occupant and alternative transportation surveys, researching LEED credit opportunities and completing the LEED documentation requirements.



As with new construction projects, there are a number of O&M best practices and sustainable measures that can be established through campus-wide policies, programs and plans. In this way, the certification of an individual building can result in operational improvements that extend throughout the campus, even if LEED certification is not possible because energy efficiency requirements cannot be met. In addition, many policies developed to green existing buildings

will also apply to new construction projects, such as renewable energy use, environmentally preferable product procurement, etc. The incremental nature of LEED for Existing Buildings: O&M makes pilot projects an ideal tool to advance new strategies and ideas, and overcome resistance to change, as described earlier in the *Roadmap*.

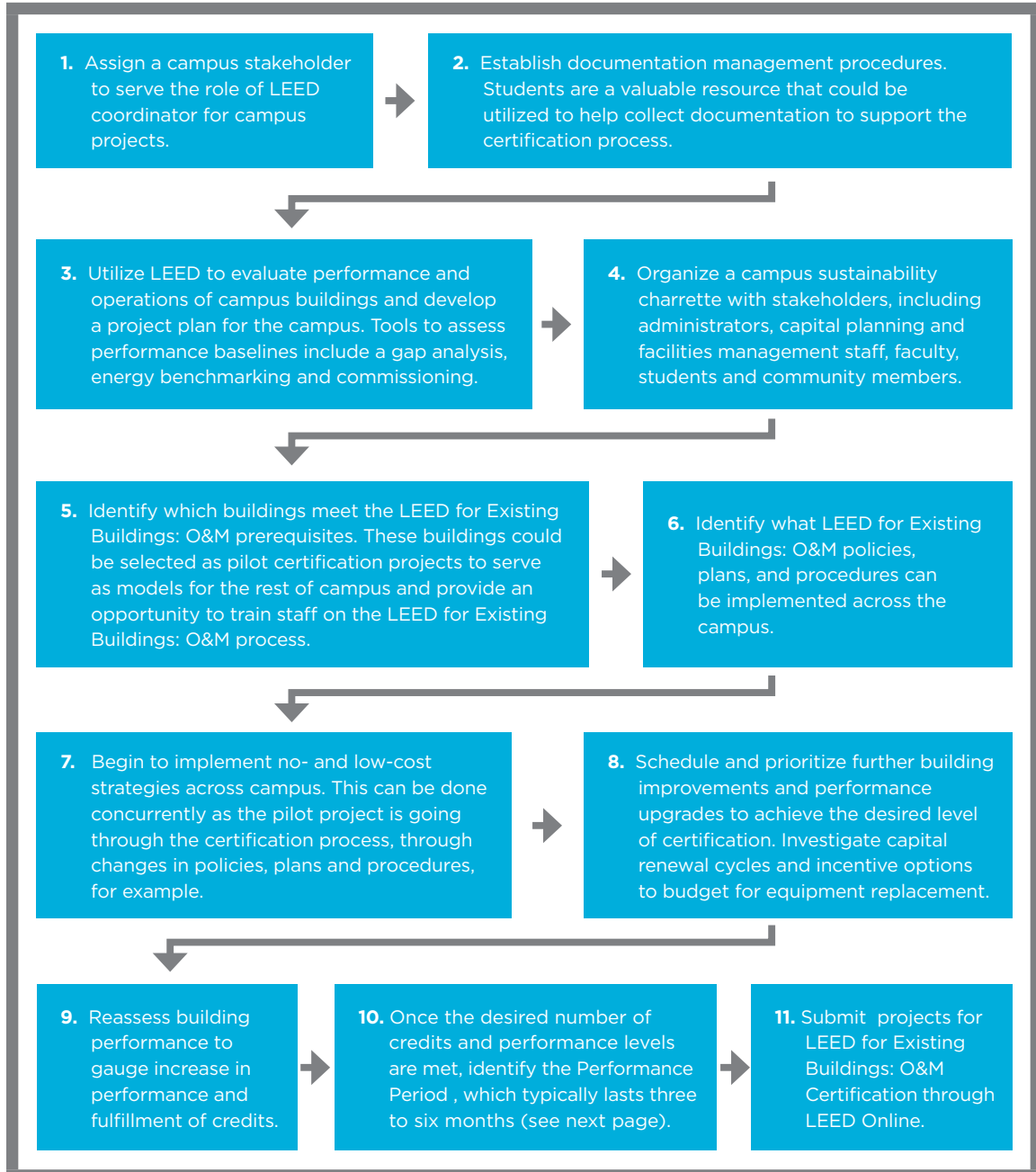
LEED for Existing Buildings: Operations & Maintenance Prerequisites and Credits with Potential Campus-Wide Application		
Prerequisites/Credits		
Sustainable Sites (SS)		Campus-wide Opportunity
SSc1	LEED Certified Design and Construction	
SSc2	Building Exterior & Hardscape Management Plan	X
SSc3	Integrated Pest Management (IPM), Erosion Control, Landscape Management Plan	X
SSc4	Alternative Commuting Transportation	X
SSc5	Site Disturb - Protect/Restore Open Habitat	X
SSc6	Stormwater Quality Control	X
SSc7.1	Heat Island Red (Non roof)	X
SSc7.2	Heat Island Red (Roof)	
SSc8	Light Pollution Reduction	X
Water Efficiency (WE)		Campus-wide Opportunity
WEp1	Minimum Indoor Plumbing Efficiency	
WEc1	Water Performance Measurement	
WEc2	Additional Plumbing Efficiency	
WEc3	Water Efficient Landscaping	X
WEc4	Cooling Tower Water Management	X
Energy & Atmosphere (EA)		Campus-wide Opportunity
EAp1	Energy Efficiency Best Management Practices (BMPs)	
EAp2	Minimum Energy Efficiency Performance	
EAp3	Fundamental Refrigerant Management	
EAc1	Optimize Energy Performance	
EAc2.1	Commissioning Investigation & Analysis	
EAc2.2	Commissioning Implementation	
EAc2.3	Ongoing Commissioning	
EAc3.1	Performance Measurement - Building Automation System (BAS)	X
EAc3.2	Performance Measurement - System	
EAc4	On/Off Site Renewable Energy	X
EAc5	Enhanced Refrigerant Management	
EAc6	Emissions Reduction Reporting	X

Materials & Resources (MR)		Campus-wide Opportunity
MRp1	Sustainable Purchasing Policy	X
MRp2	Solid Waste Management Policy	X
MRC1	Sustainable Purchasing: Ongoing Consumables	
MRC2	Sustainable Purchasing: Durable Goods	
MRC3	Sustainable Purchasing: Facility Alterations and Additions	
MRC4	Sustainable Purchasing: Reduced Mercury in Lamps	
MRC5	Sustainable Purchasing: Food	
MRC6	Solid Waste: Waste Stream Audit	X
MRC7	Solid Waste: Consumables (50%)	
MRC8	Solid Waste: Durable Goods	
MRC9	Solid Waste: Facility Alterations & Additions	
Indoor Environmental Quality (IEQ)		Campus-wide Opportunity
IEQp1	Minimum Indoor Air Quality (IAQ) Performance	
IEQp2	Environmental Tobacco Smoke (ETS) Control	X
IEQp3	Green Cleaning Policy	X
IEQc1.1	IAQ BMP: IAQ Management Program	
IEQc1.2	IAQ BMP: Outside Air (O/A) Delivery Monitoring	
IEQc1.3	IAQ BMP: Increased Ventilation	
IEQc1.4	IAQ BMP: Reduced Particulates	
IEQc1.5	IAQ BMP: Facility Alterations	
IEQc2.1	Occupant Comfort: Occupant Survey	
IEQc2.2	Controllability of Systems: Lighting	
IEQc2.3	Occupant Comfort: Thermal Monitoring	
IEQc2.4	Daylight and Views	
IEQc3.1	Green Cleaning: High-Performance Operations (HPO) Cleaning Program	X
IEQc3.2	Green Cleaning: Custodial Assessment	
IEQc3.3	Green Cleaning: Purchasing	X
IEQc3.4	Sustainable Cleaning Equipment	X
IEQc3.5	Indoor Chemical & Pollutant Control	
IEQc3.6	Indoor IPM	X
Innovation & Operations (IO)		Campus-wide Opportunity
IOc3	Documenting Sustainable Building Cost Impacts	X

In addition to implementing campus-wide improvements, achieving existing building certification requires identifying building-specific practices and performance criteria and strategies on a project-by-project basis.

B. INITIATE PROJECT PLANNING

Approaching LEED for Existing Buildings: O&M certification in a campus setting involves the following steps:



THE LEED FOR EXISTING BUILDINGS: O&M PERFORMANCE PERIOD

LEED for Existing Buildings: O&M certification requires performance data for the project over the performance period—the continuous, unbroken time during which sustainable operations performance is measured. The performance period may not have any gaps—any period of time longer than one full week.

Most prerequisites and credits in LEED for Existing Buildings: O&M require that operating data and other documentation be submitted from the performance period. The performance period is the most recent period of operations preceding certification application; it must be a minimum of three months for all prerequisites and credits except the Minimum Energy Efficiency Performance prerequisite (EAp2) and the Optimize Energy Efficiency Performance credit (EAc1), which have minimum durations of one year. At the project team's option, the performance period for any prerequisite or credit may be extended to a maximum of 24 months preceding certification application.

Consistent start times and durations of the performance periods for each prerequisite and credit are preferred but not strictly necessary. However, all performance periods must overlap and terminate within one week of each other. To ensure certification is awarded based on current building performance data, LEED for Existing Buildings: O&M certification applications must be submitted to GBCI within 60 calendar days of the end of the performance periods.

TOOLS TO HELP ASSESS BUILDING OPERATIONS AND MAINTENANCE PRACTICES

1. Gap Analysis

A gap analysis 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. 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 facilities staff to ensure that no- or low-cost efficiency measures are being executed consistently.

A high-performing maintenance and operation program can radically improve facilities staff operational productivity and create real opportunities to eliminate deferred maintenance. Moving from business-as-usual to high-performance productivity typically requires few additional resources, just a commitment to implement and adhere to a new way of doing business.

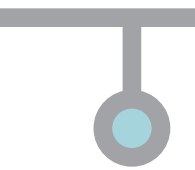
2. Energy Performance Benchmarking

Benchmarking energy use at the facility will help with tracking and prioritizing of energy performance efforts, identification of buildings in need of improvement and reporting success in meeting energy efficiency goals. The ENERGY STAR® Portfolio Manager, developed by the U.S. Environmental Protection Agency, is a free online energy management tool that allows energy and water consumption to be tracked across one or more buildings. The free tool benchmarks building energy performance over time, which helps to identify strategic opportunities for energy and cost savings. The tool allows the rating of a building's energy performance on a scale of 1-100 relative to similar buildings nationwide. For more information on energy performance benchmarking, see the [ENERGY STAR® Portfolio Manager website](#).

3. Commissioning

To assess and optimize ongoing performance of existing buildings, develop a regular schedule and standard practices for building commissioning. Properly executed commissioning can substantially reduce costs for maintenance, repairs, and water and energy resource consumption, and improve the building's indoor environmental quality—which enhances occupant comfort and productivity.

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. The institution should provide training 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 operation. One can also utilize properly trained facilities staff to encourage students and faculty to reduce energy and water use and minimize waste.



ENGAGE THE CAMPUS COMMUNITY



Greening a campus inspires community members to embrace sustainability. The process encourages many to make changes within their individual spheres of influence with the goal of collectively producing significant changes that will improve energy efficiency, reduce waste and preserve valuable resources.

To ensure the green campus is meeting its sustainability goals, the campus community needs to be aware of its roles and responsibilities in reaching campus-wide objectives, such as knowing how to utilize a building's green features, use alternative transportation options, and participate in recycling programs. Change in occupant behavior is more likely to occur if one understands the benefits of engagement and values the effects a green campus can have on personal well-being.

A. EDUCATE THE CAMPUS COMMUNITY

The use of many campus facilities extends beyond students, faculty and staff. Community members use campus sports complexes, gyms, theatres, classrooms and libraries; therefore, when developing programs to educate occupants about the green features of the campuses, it is important to consider all potential users.

Even if occupants are informed about green campus considerations, social science research shows that people make conscious decisions only about 5% of the time. As a result, even when occupants know about and understand the importance of something like energy conservation practices, information alone is not always enough to influence improvements, and it is likely that they are not consistently applying awareness to behavior. Greening a campus requires effective occupant education that includes clear and concise information on

the attributes of the green campus and the occupants' role in ensuring energy conservation and that sustainability goals are met. [Community Based Social Marketing \(CBSM\)](#) is one method for helping campus community members learn and engage in new behaviors that increase building performance and conserve resources.

COMMUNITY-BASED SOCIAL MARKETING STRATEGY (CBSM)

CBSM focuses on tailoring behavioral change strategies to a campus audience for long-term impact and momentum with specific initiatives. Steps to conduct a basic CBSM campaign include:

1. Identify Barriers and Benefits to the Initiative

- Review similar initiatives through literature, research, soliciting focus group and survey-based feedback, and pinpointing key stakeholders—both champions of the cause and perceived challengers.

2. Develop a Strategy

- Prioritize the barriers and select tools to address them. Persuasive communications are a critical component to effectiveness and the following tips may help:
 - Know the audience (students, staff, faculty, etc.) and frame the message to them—make it vivid and memorable
 - Use simple instructions
 - Use personal contact during engagement, and demonstrate that information and initiative support stem from credible sources
- Consider peer-to-peer campaigns for greatest influence

3. Run a Pilot Project

- Pilot the project on a small scale with a group which is representative of the overall target group on campus. Test strategies via one approach or through several alternatives simultaneously to weed out less effective methods. Measure the results with quantitative data, then evaluate it in order to adapt the project approach if needed.

4. Implement

- Scale up the pilot project to the entire target audience.

5. Continuously Monitor and Adapt

- Keep track of program effectiveness and make mid-course corrections.

B. IMPLEMENT BEHAVIORAL CHANGE STRATEGIES

The following strategies can be used to develop a CBSM strategy and effect behavioral change.

Persuasive Communication Strategies

- Use language that the audience understands by tailoring it to them.
- Make message vivid and easy to remember to capture attention (e.g., “the typical fume hood uses the same amount of energy as 3.5 houses!”).
- Frame in terms of what is being lost vs. saved (e.g., trees vs. power).
- Provide simple, clear instructions (e.g., computer off sticker).
- Use personal contact and credible sources; show expertise and build trust.
- Provide feedback in public spaces (e.g., chart of energy savings throughout a dorm competition or building dashboard).

Get commitment

- **Why:** People want to be seen as consistent and it alters self-perception.
- **How:** Commit to a small action—it is more likely to catch on than a large one.
- **Tip:** Write it down, make it public, actively involve people and secure group commitments.

Prompts

- **Why:** Not intended to change attitudes but to condition behaviors.
- **How:** Reminders help to trigger behavior on-the-spot (e.g., signs to turn off light switches and computers).
- **Tip:** Keep prompts close to the point of action, with eye-catching, noticeable and clear instructions.

Incentives

- **Why:** Incentives are motivation for action, and people like free stuff!
- **How:** Consider non-monetary rewards like recognition and competition and closely pair the incentive and the behavior.
- **Tip:** Make it visible, fun and achievable for as many people as possible.

Convenience

- **Why:** Students and others on campus are busy, and day-to-day, don't often use more than a few parts of the campus.
- **How:** Overcome physical barriers.
- **Tip:** With recycling programs, assure that bins are widespread, near the greatest waste sources and have clear instructions.

Social Norms

- **Why:** People want to be seen “doing the right thing.”
- **How:** If groups, departments, schools, etc. endorse a behavior, there is strong social pressure to conform because humans are “hard-wired” to imitate social norms. Cultivate new norms, but also enhance and use existing community norms. Peer-to-peer campaigns are one of the most effective types of CBSM strategies for occupant education.
- **Tip:** Make the endorsed norm visible to the community, with a personal, community-oriented touch, such as information tables/displays with a volunteer; t-shirts and stickers; and encouragement of the positive behavior at group events and in shared marketing or news pieces.

Tools to maximize campus performance through behavioral changes and peer-to-peer programs include competitions between dorms, kitchens, offices and libraries to turn off computers, lights, appliances and heating and cooling systems; compare results through charts on public display; and give special recognition where it’s earned. Many campuses have been participating in intercollegiate competitions, like the national [Recyclemania](#) program. Sustainability competitions within campuses, however, have also become increasingly common as an extremely effective way to engage residents and building occupants in learning about and practicing sustainable behaviors.

AASHE’s [“Dorm vs. Dorm Sustainability Competitions”](#) website links to other schools’ competition’s webpages, shares a video of Duke University’s Eco-Olympics and provides sample documents and other resources to facilitate competition organizing.

On-Campus Competition

Duke University’s [“Eco-Olympics”](#) is a competition between the dorms on East campus to reduce energy, waste, and water.

EXAMPLES OF PROGRAMS TO ENGAGE CAMPUS COMMUNITY MEMBERS

Offices	Laboratories	Dining Services
<ul style="list-style-type: none"> Whether student organization offices or the President's office, there are many opportunities to engage staff and volunteers through green teams or officers within the department, lunch and learn awareness discussions, workshops and relationships with other offices on campus. A "green office" initiative targets resource conservation, community-building, staff buy-in for sustainability projects, financial savings, and behavior change involving energy, events and meetings, kitchens and break rooms, publications, purchasing, waste reduction, transportation, and participation. Fact sheets and instructions, ready-made presentations, committed department leaders, and recognition and rewards all contribute to increasing engagement. 	<ul style="list-style-type: none"> Labs in chemical, medical and other research facilities are resource-intensive, from their nearly 24/7 operations for water, energy and ventilation, to materials use and disposal. A single fume hood's operational costs can be reduced by hundreds of dollars through addressing lab occupant behavior, such as through a campaign to adjust hood apertures and fan settings based on usage. Peer representatives who are familiar with labs can facilitate this campaign as well as comprehensive, check-list and visual audit-based lab sustainability assessments that support green lab certifications or comparable standards. CBSM might include prompts, feedback from trends data and lab competitions. 	<ul style="list-style-type: none"> Training in procurement and use of sustainable food choices is important for kitchen management. CBSM can also be applied in many ways to engage kitchen staff, such as tying training in efficient food heating settings to competitions between venues on the resulting fuel savings. It is important to make prompts comprehensible for everyone, as language barriers can impede efficiency. The more kitchen staff are able to gauge demand, actively solicit feedback, and accommodate suggestions, the less food and energy will be wasted. Get commitments from supervisors, share best practices, prompt action with instructive signs, reinvest some financial savings for gifts/celebrations for staff, give feedback through performance charts and foster pride and norms through recognition in newsletters.
Student Orientation	Student Living Programs	USGBC Students
<ul style="list-style-type: none"> Have returning student volunteers and other organizers incorporate sustainability into new student orientation by informing them of sustainability commitments, assisting pledge enrollment, providing recycling demonstrations (including for moving-related goods), reusable drink containers, alternative transportation schedules, discounts to used furniture and book vendors, and recommendations for energy efficient electronics and appliances, for example. Use sustainable materials, from food and dishware at events, where possible, and limit the distribution of printed materials by providing web links to resources such as the campus sustainability page, if there is one. 	<ul style="list-style-type: none"> Assign student representatives to communicate with other students in their residential communities and serve as liaisons to administrators regarding comfort, health, and resource conservation efficiency issues. Representatives should be outgoing, creative, and proactive students who want to engage their peers on issues of conservation and personal environmental responsibility. This may involve hired or volunteer coordinators, regular meetings with a lead coordinator, or topic assignments based on a checklist with suggested approaches and flexibility for personalization of the community. 	<ul style="list-style-type: none"> Encourage students to start a USGBC Student Group or to become involved in an existing group. USGBC Student Groups enable students to lead by example and take action on their campus. There are all sorts of creative ways student groups can become involved in campus sustainability activities, from advocating for LEED with campus decision makers to running an energy audit on a residence hall, to having a recycling competition among various departments on campus.



THE CAMPUS AS A LIVING LABORATORY



Higher education institutions are leading the way in addressing sustainable development and climate change.

Institutions, as well as organizations such as AASHE and Second Nature, and initiatives like the ACUPCC, have focused on disseminating sustainability knowledge through teaching, research, sharing the success of their own green building principles and practices and disseminating lessons learned. The [Resources](#) Section contains a list of organizations and resources to enhance efforts to develop a green campus plan.

A. LEARN FROM EXPERIENCE

Improvement over time involves creating a community that is capable of learning from its own green building experiences and teaching itself to go further. All campus stakeholders, including students, faculty, staff and the community, should be included in opportunities to learn and share their experiences, whether in the classroom, through on-the-job training, research or experimentation.

Experimentation in campus design and development is sometimes viewed as a risk, especially in the eyes of those who are inexperienced with the green building process, new technologies and products. To mitigate risk while pursuing cutting edge sustainability involves highly participatory planning that draws upon the expertise of faculty and others in related fields for ongoing evaluation of new practices or projects. It also requires adherence to the continual improvement approach.

GREEN CAMPUS PROFILE

UNIVERSITY OF MAINE—FARMINGTON

SUSTAINABLE ARCHITECTURE THAT TEACHES

The University of Maine—Farmington's (UMF) [Education and Health Rehabilitation Center](#) is certified LEED Silver. This particular building was born a darker shade of green, conceptualized from design to occupancy as an ecological teaching tool. Every day, faculty members and student leaders coordinate guided tours and educational programming for K-12 and university students, staff and community members to interact with the built environment.

This teaching initiative contributed to UMF's recognition as a [USGBC Excellence in Green Building Curriculum Award recipient in 2008](#). UMF faculty members use the exploration of green building technologies as a pedagogical tool. The idea has worked to engage students, who have created the Green Building Tour protocol, tour kit and a historical timeline of the building's development. The educational experience involves hands-on learning activities with building material samples, allowing visitors to become familiar with sustainable products, and what makes a building green. Take-away lesson plans and age-specific brochures are also provided in order for visitors to carry learning back to their own schools.

Thankful that university officials overcame the perception of financial obstacles to pursuing LEED certification, students decided to gather historical records from building donors on "why they felt it important" to contribute to this green building project. The final product is a historical timeline of the building's development and dedication to going green. From healthy green buildings to innovative green curriculum, the University of Maine-Farmington is an example of an institution working its way toward becoming a green campus.

UMF Resources:

[Video of Green Features in Education Center](#)

[Poster Description](#)

[Education Center Overview PPT](#)

[Tour Description & Photos](#)

1. Project-based Learning

One of the most effective ways to create a living laboratory on-campus is through project-based learning. Faculty members can work with the Director of Sustainability to identify green campus projects and seek opportunities to align project requirements with class assignments. For example, faculty can design a

course that includes assignments in which students complete tasks related to a LEED project, such as conducting waste and energy audits, researching LEED credits, administering surveys, fulfilling LEED documentation requirements, and collecting and analyzing lessons learned. Through the integrated approach to projects—a hallmark of LEED—students work with all members of the team, including administrators, architects, engineers, facilities managers, O&M staff, finance, and community members. This living laboratory presents an opportunity for the community and students to work collaboratively, creating a unique opportunity to foster a positive relationship and to create an atmosphere of mutual respect. Project-based learning also helps students develop hands-on project experience and provides an opportunity for faculty to use the on-the-ground experience to inform research and keep curricula up to date.

STORIES FROM PRACTICE

USGBC is developing a series of LEED certified project studies to help document lessons learned from the perspectives of team members, owners, and occupants. To view one of the video podcasts, go to [Arizona State University's Biodesign Institute](#). For a full project narrative and more information on conducting a project study on your campus, contact greencampus@usgbc.org.

When campuses serve as living laboratories for research and implementation, higher education demonstrates that it is still at the forefront of society with environmental leadership and sustainable living practices. Higher education is an essential partner in the long-term effort to move toward truly sustainable buildings through the ongoing development of LEED and related strategies.

2. Undergraduate and Graduate Coursework

Students learn what sustainability is through innovative curricula that include project-based learning, research, case studies that detail best practices, opportunities to build community connections, and ways to promote student initiatives. Even though the building arts and sciences, as well as natural resources, are the disciplines that first come to mind regarding sustainability courses, institutions should encourage other departments, such as business, communications, art and the social sciences, to integrate sustainability.

ADVANCING EDUCATION FOR SUSTAINABILITY: TEACHING THE CONCEPTS OF SUSTAINABLE BUILDING TO ALL STUDENTS

Second Nature, in collaboration with USGBC, has released a publication to provide guidance on integrating green building curricula across all disciplines and fields of study. [Advancing Education for Sustainability: Teaching the Concepts of Sustainable Building to All Students](#) is available for free download.

ELEMENTS OF A GREEN EDUCATION

Tools and Resources

- Connect to others beyond the campus by engaging with the growing community of green educators and access to sustainability curriculum resources, which provide databases, resource lists and a breadth of information for educators looking to use the green campus as context for learning.
- Utilize online learning or solicit external resources to reach a broader audience or fill gaps in the curriculum.

Faculty and Staff Education and Training

- Provide courses, workshops and seminars on sustainability to all staff as part of their professional development opportunities. If an institution is a USGBC member, benefits extend to all full-time employees on campus, which allows faculty and staff to take advantage of discounts on USGBC educational resources, such as in-person courses, online training, Webinars, podcasts and references guides.
- Take advantage of pooled knowledge in educator best practices, shared by peers and professionals online, interpersonally and at conferences and symposia.
- Hire staff that know the basics of ecological systems and sustainability and are able to translate related challenges in their teaching.

Curriculum Development

- Integrate and focus on sustainability across all disciplines in order to prepare students for their future careers, where technical and problem solving capabilities are demanded by today's green jobs market.
- Include a range of courses from energy engineering and climate science, to landscape design, sustainable development, resource economics, and construction, among others.

Interdisciplinary Teaching

- Encourage interdepartmental collaboration to overcome the “silo” effect that is pervasive on many campuses.
- Support participation in on-campus sustainability initiatives to offer faculty and experts across subjects an opportunity to leverage their talents.
- Promote multi-disciplinary degree programs that acknowledge the importance of an integrated approach to sustainability.

Project-based Learning

- Incorporate real life projects into the classroom to teach students complex problem solving as well as contribute to the institution’s sustainability efforts.
- Encourage students to participate in campus projects through student groups and other co-curricular activities, as described below.

Co-Curricular Opportunities

- Provide students with the opportunities to obtain hands-on experience through internships, work-study and volunteer programs focused on green campus planning, including LEED projects. These opportunities support students’ professional development and provide a valuable resource to project staff.

Study Abroad and Off-campus Programs

- Allow students to receive credit toward their degrees while pursuing opportunities to learn about sustainability at other domestic and international institutions.

Recognition

- Provide incentives and awards for curriculum leadership.
- Recognize exemplary curricula and programs in green building education that can serve as models and resources for other institutions. In 2008 and 2009, USGBC recognized several colleges and universities for their innovative programs through its [Excellence in Green Building Education Recognition Awards](#).

GREEN CAMPUS PROFILE

BALL STATE UNIVERSITY

TEACHING THE SUSTAINABLE DESIGN PROCESS

The faculty of Ball State University's (BSU) Center for Energy Research/Education/ Service (CERES) offers a [Daylectric™ Lighting Design](#) Studio, a nationally-lauded, innovative approach to sustainable design instruction for lighting. The architecture program's course has been recognized by the Illuminating Engineering Society of North America and received a \$20,000 grant from the Nuckolls Fund for Lighting Education. The studio is comprised of advanced architecture students that are divided into teams to study the coalescence of daylight and electric light—thus Daylectric™ light—in the lighting of buildings. Teams produce preliminary designs for the semester-long design project, a local branch library, and familiarize themselves with the tools of the trade used for lighting design evaluation. A course highlight is exposure to distinguished lighting design practitioners who visit CERES to teach specific segments, including workshops, critique sessions and a public lecture for the entire college. Overall, the design studio teaches tenets of design and the design process through the lens of the Daylectric emphasis. Students leave the course with knowledge of lighting, a significant aspect of the green building design process that is still rare in architecture schools across the nation, a qualification that will serve them well in their professional careers.

3. Co-Curricular Opportunities

Institutions should consider reaching out to student organizations and groups to assist with developing and implementing the green campus plan.

By recruiting students to work on the overall plan or specific initiatives, institutions harness the enormous volunteer energy of student groups. These organizations and clubs provide one of the few elements of student body continuity, as classes turn over each year. As a result, sustainability programs and initiatives designed and implemented by student organizations and groups can be maintained over time.

USGBC STUDENTS

USGBC Students is the college and university student engagement program of the USGBC. The program was created to help recruit, equip and connect the next generation of leaders to the green building movement and sustainable design industry by empowering students to transform their campuses, careers and communities.

USGBC Students are chartered and officially recognized student organizations by their respective college and university campuses across the country and USGBC.



USGBC Students organizations create a continuous supply of committed and engaged volunteers who provide valuable assistance on LEED projects and green campus initiatives.

OPPORTUNITIES FOR STUDENT ENGAGEMENT

Student Government

- Not only does student government give student leaders opportunities to participate in master planning and other campus greening projects, it can also act as a powerful tool for establishing and advocating for sustainability practices (e.g., passing resolutions for the student body to accept fees to finance Renewable Energy Credits, coordinating recycling drives or providing student body backing to make sustainability a key priority).

Residential Life

- Residential life is a significant part of many students' college experience. Engaging students in sustainability activities within their residences is an excellent way to implement green campus initiatives and effect long-lasting behavioral changes (e.g., dorm green living programs).

Environmental Clubs

- Many campuses now have environmental or sustainability clubs that advocate for green practices and organize events like Earth Week activities.

Student Service-learning and Community Service Activities

- Students seek hands-on learning experiences. Activities where students can actively participate and see results are often the most popular (e.g., Habitat for Humanity, campus/community clean-ups, and tree inventories and planting) and sometimes required for graduation.

Faculty and Staff Public Service Activities

- Faculty and staff can be a dynamic and valuable resource in organizing and participating in volunteer events (e.g., landscaping for green roofs, local food sourcing in community gardens or art shows with reclaimed material).

Events and Networking

- Sporting and social events are primary attractions for students on campus. As a result, involving sustainability activities in these events is a powerful opportunity (e.g., emphasize recycling at sports games and recruit volunteers in return for tickets, provide campus-related carbon offset opportunities to support climate neutrality goals).

Greek Letter Organizations

- Having a strong presence on many campuses and a tradition of philanthropy, Greek letter organizations can influence on-campus sustainability initiatives, as well as provide outreach to the greater community and alumni.

GREEN CAMPUS PROFILE

DRURY UNIVERSITY

COMMUNITY SERVICE

The [Sustainable Habitat for Humanity House](#), a LEED Platinum home in Springfield, Mo., was a major community service activity at Drury from 2007-2008. As part of their program's design/build course, architecture [students designed the house](#) to emphasize low-impact principles, including solar orientation and other passive efficiencies, native species landscaping, rain gardens, solar hot water, ENERGY STAR®-rated fixtures, and low-flow plumbing. Besides design, students learned about construction, management, and the LEED certification process, and between credit and volunteer time, over 5,000 hours were contributed to the project. Drury worked with the community to raise money for the materials and to make the house affordable for a low-income family to own. Partial funding was granted by The Home Depot Foundation, which provided students with an example of community-corporate partnership and outreach for project finance. In collaboration with the local [Habitat for Humanity](#) Chapter, which is supported by the [program's national green initiatives](#), Drury took advantage of opportunities to teach other students, non-student volunteers, and K-12 visitors about the home's lessons in environmental issues and service-based giving. The hands-on project has set the bar on what is possible for students in applying their green studies to practical, off-campus settings. It is also an on-campus educational demonstration of community leadership and engagement, and of Drury's growing movement to go green. Communications about the house and similar activities are promoted via Drury's [sustainability website](#) and other media like the President's Council of Sustainability monthly newsletter.

B. SUPPORT RESEARCH PROJECTS FOCUSED ON SUSTAINABILITY

Green campuses support both faculty and student research projects that focus on sustainability. Institutions should consider supporting research initiatives from a variety of disciplines, such as the social sciences, business, math and the communications arts.

Support sustainability research on campus through:

- **Degrees and Program Initiatives** (e.g., provide formal support of sustainability thesis opportunities, fellowships, internships and work-study)
- **Research Centers and Regional Institutes** (e.g., energy, materials science, environmental policy and similar [academic initiatives on sustainability](#))
- **Use Campus Projects for Student Research** (find ways to sync sustainability initiatives on-campus with student research projects)
- **Identify Technological Linkage Between Buildings and Research Efforts** (promote the linkages between research and buildings, e.g., sensors, monitors, data collection)
- **Interdisciplinary Projects** (encourage research projects that integrate several disciplines, such as design, business, computer science, etc.)
- **Social Studies** (e.g., conducting surveys of sustainability awareness, attitudes, and values, as well as ideas specific to the campus and culture)
- **Other Resources** (e.g., online documentation of campus green building stories and a forum for sharing information about research)

GREEN CAMPUS PROFILE

COLORADO STATE UNIVERSITY

GREEN BUILDING RESEARCH CENTER

Colorado State University (CSU) has made outstanding strides in student engagement with LEED through practical, career-oriented learning opportunities developed at its [Institute for the Built Environment](#) (IBE). The multi-disciplinary institute has involved students and faculty from Construction Management, Interior Design, Landscape Architecture, Engineering, and Business in sustainable building research and service-learning projects since the mid-1990s. The IBE's faculty has used the program's successes to help CSU learn more about green building, which led to the campus to require new construction and major renovation projects to meet LEED Gold certification. This may not have been required without the work of IBE.

IBE is a fee-for-service program, which allows students, serving as consultants to the LEED project team, to become actively engaged on LEED projects both on and off campus. It is a model that can be replicated at other institutions. Students in the program have assisted on studies, including graduate theses that show that LEED projects do not have to cost more. Recently, a local school district hired IBE to support their elementary school project design team as it looked to build its first green school. Following that project's success, the district hired IBE to assist with green building research and LEED coordination for the new high school. From the start, IBE included students, especially graduate student interns, as active assistants in design charrettes, project team meetings, materials research, LEED coordination, documentation and correspondence.

IBE establishes university service contracts or research grants for each project, which allows staff to agree on scope of services and associated fees. The contracts clearly state that the signee (typically building owner or project architect) agrees that students will play important roles in the project which support their academic experience. Also, IBE's fees are commensurate with professional fees, to assure that there is not any unfair competition with private industry.

C. SHARE SUCCESS WITH THE COMMUNITY

Extend the educational mission by showing leadership in the community.

A college or university's successful sustainability plan can have a positive impact on the local community. As significant landholders and employers, institutions have a tremendous economic, fiscal and physical impact on local infrastructure and resources. A successful green campus plan demonstrates a commitment to reducing air and water pollution, improving energy and water efficiency, promoting recycling, and reducing CO₂ emissions. It also helps to stimulate the economy through local purchasing programs and green planning and development, providing an opportunity for the campus to serve as a responsible citizen and creating an avenue for collaboration between the institution, community and region. Institutions should share lessons learned and seek ways to extend the benefits of their green campus to the greater community.

Specific approaches for involving community members and others in experiencing the campus as a living laboratory include:

Inform	Speaker Series and Seminars	Events	Continuing Education	Public Process
<ul style="list-style-type: none"> Share information about green campus projects through public signs and presentations about installations, such as solar panels, porous pavement, building energy use, rain gardens, and LEED certification plaques. Feature pilot projects and sustainability stories in campus publications and online. 	<ul style="list-style-type: none"> Extend learning opportunities to the community. Topics can include broad discussions on sustainability or be more specific, such as a presentation detailing the specific attributes of a green campus facility that many in the community use, such as a sports complex or theatre. 	<ul style="list-style-type: none"> Host and support community events such as farmers markets, clean energy technology competitions, conferences featuring prominent public speakers, and green building and campus tours. Publicly post the calendar of events. 	<ul style="list-style-type: none"> Add sustainability to topics explored in credit and non-credit classes offered to those without full-time student status. 	<ul style="list-style-type: none"> Engage in public planning exercises, such as for alternative transportation linkage in the neighborhood and greater community collaboration on bike/pedestrian path development.

SOLAR DECATHLON

The U.S. Department of Energy [Solar Decathlon](#) challenges 20 collegiate teams to design, build and operate solar-powered houses that are affordable, energy efficient and attractive. The winner of the competition is the team that best blends cost effectiveness, consumer appeal and design excellence with optimal energy production and maximum efficiency.

Since 2002, the Solar Decathlon has involved 72 university-led teams, which pursued multidisciplinary course curricula to study the requirements for designing and building energy efficient, solar-powered houses; established a worldwide reputation as a successful educational program and workforce development opportunity for thousands of students; affected the lives of 12,000 university participants; and expanded its outreach to K-12 students by inviting Washington, D.C.-area schools to visit on class tours.

GREEN CAMPUS PROFILE

DUKE UNIVERSITY

ENGAGEMENT FOR THE COMPLETE BUILDING LIFE CYCLE

Duke University's administration has established [sustainable design guidelines](#) that require all new construction and major renovations to be LEED Certified, at a minimum, with every reasonable effort to be made toward achieving higher ratings. Technology research is being conducted at the undergraduate level through [The Home Depot Smart Home](#), a LEED Platinum residential dorm experiment sponsored by the [Pratt School of Engineering](#). The project is part of a hands-on engineering program that was conceived by a student for a senior thesis. Over 450 students were ultimately involved and several represented Duke during design and construction.

Ten students now use the house as a live-in research lab, and monitor all aspects of building performance. The program encourages students from different academic disciplines to form teams, learn project management skills and explore smart ways to use technology design in the home. It also includes prototyping and similar problem solving to address marketplace gaps in current available products. The home is frequently opened to tours and interviews and multiple Duke engineering classes use data from the various Smart Home projects to teach students in tangible ways. Duke benefits from having a cost effective, small scale, in-house means of piloting concepts prior to scaling them up more broadly on-campus. The program is supported financially by The Home Depot and other local industry members who enjoy the partnership's support of their own consumer technology research and development efforts. The Smart Home is a great example of how student energy can be utilized on campuses and how students can continue to be engaged in the complete life cycle of a green building.



CELEBRATE SUCCESS! REPORT, PROMOTE, AND REASSESS



Each step toward greening a campus should be celebrated and shared with campus stakeholders. Reporting and promotion, in addition to identifying opportunities for improvement, can help maintain the excitement and motivation needed to continually advance facility performance across campus.

A. CONDUCT AND DISSEMINATE REPORTS

A formal reporting system monitors progress and keeps stakeholders informed.

As emphasized throughout the *Roadmap*, institutions should seek to establish continual tracking and reporting mechanisms. Maintaining transparency and communicating achievements is important because a diverse pool of stakeholders are involved in campus initiatives, from alumni, to students, faculty, staff, and the many departments providing resources to support the institution's efforts. Assembling and reporting individual project data streamlines the overall assessment of campus sustainability progress. Reported results and trends will be of interest to those laying the groundwork for and implementing green building policies, because it allows them to measure and benchmark project efficacy from a top-level perspective of campus endeavors.

For internal reporting, institutions should develop an annual sustainability reporting program, which can be used to communicate the institution's efforts to current students and faculty, as well as potential students. For reporting to alumni, sustainability metrics can be incorporated into the institution's annual endowment report.

Many institutions are opting to sign formal, public greening commitments for certain improvements, such as the ACUPCC, which are required to develop a comprehensive plan to achieve climate neutrality as soon as possible and must submit a Climate Action Plan. Similarly, in states with green building standards, the campus may have to provide documentation on building performance. Establishing a proactive reporting strategy will facilitate these mandatory reporting tasks by making reporting information readily available.

Another reason for developing a reporting framework is for benchmarking green campus efforts with peer institutions. There are established voluntary reporting schemes that an institution can utilize to encourage standardization of reporting on green practices in higher education. For example, AASHE has developed the [**Sustainability Tracking, Assessment & Rating System \(STARS\)**](#), a self-reporting framework for gauging progress toward sustainability for colleges and universities.

SUSTAINABILITY TRACKING, ASSESSMENT & RATING SYSTEM (STARS)

The Sustainability Tracking, Assessment & Rating System (STARS®) is a transparent, self-reporting framework for colleges and universities to gauge relative progress toward sustainability. STARS was developed by AASHE with broad participation from the higher education community. STARS is designed to:

- Provide a framework for understanding sustainability in all sectors of higher education.
- Enable meaningful comparisons over time and across institutions using a common set of measurements developed with broad participation from the campus sustainability community.
- Create incentives for continual improvement toward sustainability.
- Facilitate information sharing about higher education sustainability practices and performance.
- Build a stronger, more diverse campus sustainability community.

The STARS framework is intended to engage and recognize the full spectrum of colleges and universities in the United States and Canada – from community colleges to research universities, and from institutions just starting their sustainability programs to long-time campus sustainability leaders. STARS encompasses long-term sustainability goals for already high-achieving institutions as well as entry points of recognition for institutions that are taking first steps toward sustainability.

B. CONDUCT OUTREACH & PROMOTION

To ensure continual innovation and improvement, institutions should implement robust outreach and promotion strategies, as discussed in the [The Campus as a Living Laboratory](#) section. Public communications and making certain submittals available for public viewing are also helpful in building institutional “memory” and leveraging initial achievements to help secure additional sustainability programs and initiatives. In addition to publicizing sustainability efforts, encouraging feedback and actively soliciting input from campus stakeholders is an integral component to achieving continual improvement.

Celebrations are also appropriate when milestones are met, such as achieving LEED certification, reducing energy usage as part of a dorm competition or receiving a grant to fund the installation of a solar array. Institutions should work with the public affairs department to maximize these successes by promoting them to the campus community, colleagues and the general public.

A SELECTION OF METHODS TO CONTINUALLY ENGAGE GREEN CAMPUS STAKEHOLDERS

Student Advocacy and Engagement	Public Outreach and Engagement	Sharing Resources	Sharing Experiences
<ul style="list-style-type: none"> • Develop student pledges and commitments • Support student groups and initiatives • Offer a student online advocacy course • Engage students in competitions and other community-based social marketing (see Engage The Campus Community) • Recognize student leadership, through institution-specific awards and external award programs, such as USGBC's Young Leader Awards Program • Promote green campus initiatives through student-led green building tours 	<ul style="list-style-type: none"> • Design a website focused on green campus initiatives • Create partnerships and collaborations of local and regional institutions working together (e.g., to support green building and greenhouse gas emissions reductions goals) • Foster “town and gown” community climate partnerships • Develop alumni outreach, through alumni magazines and fundraising efforts • Build donor outreach • Publicize for activities and success stories (e.g., press releases, brochures, videos) 	<ul style="list-style-type: none"> • Create online portals to share resources, such as centralized access to green building case studies • Establish on-campus research centers as creative warehouses for green campus initiatives • Use sustainability offices as centralized resource bases • Prepare university publications that share resources, tools, and lessons learned • Organize events, such as annual green summits, or ribbon cutting events, where the institution's stakeholders can come together, share ideas, and celebrate successes 	<ul style="list-style-type: none"> • Participate in educational programs, including in-person courses, Webinars, podcasts, or lectures on sustainability • Attend sustainability-focused conferences and events, such as AASHE's annual conference or USGBC's Greenbuild International Conference & Expo • Engage with organizations that support sustainability and higher education institutions, such as AASHE, NACUBO, SCUP and USGBC • Engage the community

C. REASSESS

The journey to a green campus is a process. As an institution implements the steps outlined in the *Roadmap*, it is important to revisit and reassess strategies, activities and progress. Engage students, faculty, stakeholders and other institutions in the process, as outside perspectives can provide important insights. Capacity building enables institutions to save costs by relying less on third-parties, and using the campus as a laboratory for new applications and strategies helps to further improve the institution's green campus performance.

It is important to establish a team of stakeholders who serve as an institutional asset of in-house experts, and who, over time, educate, support and tap into the more dynamic and transient population of students, thereby continuing the cycle of improvement. These "sustainability natives" foster a culture of change and deepen the foothold that the campus has as a thriving organization.

Begin the Journey to a Green Campus

Developing and implementing a campus-wide sustainability plan gives institution leaders the opportunity to provide an inclusive approach that educates, engages and encourages participation while maintaining the history and integrity of the institution. While there is no one-size-fits-all solution, the *Roadmap* outlines a concrete path that colleges and university communities can navigate as they embark on this important journey to green their campuses.



RESOURCES



A comprehensive list of supplementary resources are available online at <http://centerforgreenschools.org/roadmap-resources>



www.usgbc.org