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INL High Performance Building Strategy

Jennifer D. Morton

February 2010

The INL is a U.S. Department of Energy National Laboratory operated by Battelle Energy Alliance

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Idaho National Laboratory
Idaho Falls, Idaho 83415

http://www.inl.gov

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INL High Performance Building Strategy

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Approved by:

Ed Anderson, Interim Director
Facilities & Site Services — Date: 3/1/10

Robert P. Miklos
Project Management Office — Date: 3/3/10

EXECUTIVE SUMMARY

High performance buildings, also known as sustainable buildings and green buildings, are resource efficient structures that minimize the impact on the environment by using less energy and water, reduce solid waste and pollutants, and limit the depletion of natural resources while also providing a thermally and visually comfortable working environment that increases productivity for building occupants.

As Idaho National Laboratory (INL) becomes the nation's premier nuclear energy research laboratory, the physical infrastructure will be established to help accomplish this mission. This infrastructure, particularly the buildings, should incorporate high performance sustainable design features in order to be environmentally responsible and reflect an image of progressiveness and innovation to the public and prospective employees.

Additionally, INL is a large consumer of energy that contributes to both carbon emissions and resource inefficiency. In the current climate of rising energy prices and political pressure for carbon reduction, this guide will help new construction project teams to design facilities that are sustainable and reduce energy costs, thereby reducing carbon emissions.

With these concerns in mind, the recommendations described in the INL High Performance Building Strategy (previously called the INL Green Building Strategy) are intended to form the INL foundation for high performance building standards. This revised strategy incorporates the latest federal and DOE orders (Executive Order [EO] 13514, "Federal Leadership in Environmental, Energy, and Economic Performance" [2009], EO 13423, "Strengthening Federal Environmental, Energy, and Transportation Management" [2007], and DOE Order 430.2B, "Departmental Energy, Renewable Energy, and Transportation Management" [2008]), the latest guidelines, trends, and observations in high performance building construction, and the latest changes to the Leadership in Energy and Environmental Design (LEED®) Green Building Rating System (LEED 2009).

The document employs a two-level approach for high performance building at INL. The first level identifies the requirements of the Guiding Principles for Sustainable New Construction and Major Renovations, and the second level recommends which credits should be met when LEED Gold certification is required.

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- INL Procurement Services
- INL REC Engineering
- INL Project Management Office
- Kath Williams, Kath William + Associates, www.kathwilliams.com
- Integrated Design Lab - Boise, University of Idaho, www.idlboise.com.

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ACRONYMS

AP	Accredited Professional
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ATR	Advanced Test Reactor
BEA	Battelle Energy Alliance, LLC
BIM	Building Information Modeling
CAES	Center for Advanced Energy Studies
CD	Critical Decision
CI	Commercial Interiors
CPG	Comprehensive Procurement Guidelines
CRD	Contractor Requirements Document
CS	Core and Shell
DOE	Department of Energy
EB O&M	Existing Buildings: Operations & Maintenance
EIA	Energy Information Administration
EO	Executive Order
EPA	Environmental Protection Agency
FAQ	Frequently Asked Question
FAR	Federal Acquisition Regulation
GBCI	Green Building Certification Institute
GSA	General Services Administration
HVAC	heating, ventilation, and air conditioning
ICS-CERT	Industrial Control Systems Cyber Emergency Response Team
IDL	Integrated Design Lab
IMCL	Irradiated Materials Characterization Lab
INL	Idaho National Laboratory
ISWG	Interagency Sustainability Working Group
LEED	Leadership in Energy and Environmental Design
M&V	Measurement and Verification
MFC	Materials and Fuels Complex
NC	New Construction
O&M	operations and maintenance
OFEE	Office of the Federal Environmental Executive
OMB	Office of Management and Budget
PNNL	Pacific Northwest National Laboratory
RACL	Radioanalytical Chemistry Laboratory
RCL	Radiochemistry Laboratory

REC	Research and Education Campus
REL	Research and Education Laboratory
RESL	Radiological and Environmental Science Laboratory
SOW	statement of work
T&FR	technical and functional requirements
TDF	Testing and Demonstration Facility
USGBC	U.S. Green Building Council
VOC	volatile organic compound

INL High Performance Building Strategy

1. INTRODUCTION

The Department of Energy's (DOE) vision for Idaho National Laboratory (INL) is that it will enhance the nation's energy security by becoming the preeminent, world-class, nuclear research development and demonstration laboratory. To achieve this goal, additional state-of-the-art facilities are required at INL.

INL is comprised of three modern campuses that are necessary to achieve the DOE objectives: the Research and Education Campus (REC), Advanced Test Reactor (ATR) Complex, and Materials and Fuels Complex (MFC). As it moves forward in the design and construction of new facilities, INL will demonstrate its sustainability commitment by incorporating high performance building elements in the design specifications.

Construction of new facilities can be achieved through various funding mechanisms including private-sector funding, university funding, and government line-item funding; therefore, it is important to clarify INL's high performance building goals and commitment to sustainability in advance.

The goal of this document is to establish the foundation at INL for the design and construction of high performance sustainable buildings. The focus is on the technical and functional requirements (T&FR) that address the environmental issues specific to this geographical region (e.g., water efficiency), as well as those that are good economical sustainable practices (e.g., energy efficiency, material minimization). Overall, INL can improve the way its buildings are designed, constructed, and leased by committing to sustainability goals, while also meeting applicable executive and DOE orders.

Revision 1 of this document incorporates the latest federal and DOE orders that have been introduced since the original version was released in 2005, including Executive Order (EO) 13514, "Federal Leadership in Environmental, Energy, and Economic Performance" (2009), EO 13423, "Strengthening Federal Environmental, Energy, and Transportation Management" (2007), and DOE O 430.2B, "Departmental Energy, Renewable Energy, and Transportation Management" (2008), the latest guidelines, trends, and observations in high performance building construction, and the latest changes to the Leadership in Energy and Environmental Design (LEED®) Green Building Rating System (LEED 2009). The first version of this document (Rev. 0, previously called the INL Green Building Strategy) recommended individual sustainable building strategies for consideration and separated them into three levels of green building design ranging from baseline to innovative.

This revised High Performance Building Strategy has been aligned with DOE O 430.2B, a requirement per the BEA contract, and employs a two-level approach: the Guiding Principles for Sustainable New Construction and Major Renovations (referred to from here on as the "Guiding Principles,"[a]) (ISWG 2008), and LEED Gold certification. The first level identifies the requirements of the Guiding Principles, and the second level recommends which credits should be met when LEED Gold certification is required.

In addition to being reviewed by key INL personnel from Procurement, REC Engineering, and the Project Management Office, this strategy was also reviewed externally by industry experts, Kath Williams and the Integrated Design Lab. Kath Williams of "Kath Williams + Associates" is a founding member of the U.S. Green Building Council (USGBC) and known nationally and internationally for her

a. The latest version of the Guiding Principles is a revision from the January 2006 version from the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding that was signed by federal agencies, including DOE. The 2008 revision was issued by the Interagency Sustainability Working Group, a subcommittee of the Steering Committee established by EO 13423.

green building expertise. The Integrated Design Lab (IDL) in Boise is operated by the University of Idaho's College of Art and Architecture and dedicated to the development of high performance energy efficient buildings in Idaho and Eastern Oregon. Kevin Van Den Wymelenberg (IDL Director) and Gunnar Gladics (Research Scientist) reviewed this document on behalf of IDL.

2. BACKGROUND

In the U.S., commercial and residential buildings consume almost 40% of the energy and 72% of all electricity (Environmental Information Administration 2008), while accounting for 38% of all CO_2 emissions (Energy Information Administration 2008). Buildings are also large consumers of natural resources as they use 40% of the raw materials globally and 13.6% of all potable water nationally. The goal of green or high performance building design is to use a holistic approach to lessen a building's impact on the environment.

High performance buildings offer a number of benefits including:

- Reduce water and energy consumption
- Minimize consumption of virgin materials
- Reduce waste going to landfills
- Lessen the embodied energy of the building materials
- Provide a well-ventilated, comfortable environment that promotes occupant productivity
- Use interior materials that do not off-gas harmful pollutants, such as Volatile Organic Compounds (VOCs)
- Provide a healthy environment for their occupants and thus reduce sick building syndrome and absenteeism, while increasing employee retention.

As INL works to advance nuclear energy as an alternative to fossil fuel consumption, it is important to showcase INL's progressive, innovative, and environmentally responsible character. This is particularly effective by designing and constructing new high performance LEED-certified buildings.

The LEED Rating System and certification by the USGBC is the industry standard peer-reviewed mechanism for validating the design and construction of green buildings. While there is a small initial investment for preparing the LEED submittal package and the administrative fees to the USGBC for registering and certifying a building, the cost premium is easily recovered in the reduced energy and operating costs of the building over its life. Furthermore, the documentation deliverables and building commissioning process required by LEED helps to ensure that the building will perform according to its designed potential.

DOE has adopted the LEED Rating System and multiple other federal agencies have adopted LEED Silver or Gold as a minimum performance standard for new buildings. Within the DOE complex, an increasing number of sites have achieved or are in the process of receiving LEED certification on new buildings. For a full list of all federal and private buildings certified through the USGBC, see www.usgbc.org/LEED/Project/CertifiedProjectList.aspx.

As an example, Pacific Northwest National Laboratory (PNNL) currently expects all new constructions to be LEED Gold certified, regardless of size and building type (Fowler 2009). In addition, new buildings also need to meet the Guiding Principles (per EO 13423 and DOE O 430.2B). PNNL has observed that as long as LEED Gold is the goal from the beginning and is addressed in all planning meetings (including a pre-bid meeting with construction contractors), they have not seen a cost premium (Fowler 2009).

The Center for Advanced Energy Studies (CAES) is the first LEED building with which INL project management was involved. Although it is an Idaho State University building, the majority of building occupants are INL employees. Construction of the building was completed at the end of Fiscal Year (FY) 2008. CAES was designed under the LEED Core and Shell (CS) rating system with a goal of Silver; however, it was able to certify as LEED Gold.

New INL buildings in the planning, design, and construction process, including leases, are shown in Table 1.

Table 1. New INL buildings.

Category	Name	Area	Square Footage	Status	Design and Performance Goal
New Facilities Major Renovations <$5M Capital	Radioanalytical Chemistry Laboratory (RACL)	ATR	5,100	Under Construction	Guiding Principles
	Radiochemistry Laboratory (RCL)	MFC	8,200	Complete	Guiding Principles
	Test Train Assembly Facility	ATR	4,200	Complete	LEED Certified
	ATR Complex Technical Support Building	ATR	16,400	Complete	LEED Certified
New Facilities Major Renovations >$5M Capital	Irradiated Materials Characterization Lab (IMCL)	MFC	TBD	Postponed	LEED Gold
	Radiological and Environmental Science Laboratory (RESL)	REC	10,000–14,000	Design	LEED Gold
Leases	Industrial Control Systems Cyber Emergency Response Team (ICS-CERT) Facility (Formerly Office/Light Industrial Facility)	REC	30,000–40,000	Planning	Guiding Principles
	INL Testing and Demonstration Facility	REC	60,000–90,000	Procurement	Preference for LEED Gold
	Additional office space[b] on REC	REC	60,000–70,000	Proposed	Guiding Principles
	Research and Education Laboratory (REL)	REC	145,000	Procurement	LEED Gold

The Sustainable INL Program is a newly launched program that is part of a movement among federal agencies to evaluate current processes and establish goals for achieving sustainability. Its intent is to continue innovation and research while simultaneously improving energy efficiency, becoming responsible environmental stewards, and conserving natural resources. Focus areas within the program include those covered in EO 13423: energy efficiency, renewable energy, toxics reductions, recycling, sustainable buildings, electronics stewardship, fleet efficiency, and water conservation. The Sustainable INL Program is assisted by a Communities of Practice Advisory group and relies on management and employee participation to achieve its goals. Visit www.inl.gov/sustainable, or contact Chris Ischay (Program Manager, 208-526-4382, Christopher.ischay@inl.gov) or Ernest Fossum (208-526-2513, Ernest.fossum@inl.gov) with any questions.

b. Lease to be developed for adding office space to an existing building, possibly Willow Creek Building or Engineering Research Office Building.

3. REGULATORY DRIVERS

In addition to the green building benefits discussed previously, an additional reason for occupying and selecting buildings with high performance sustainable features is due to regulatory requirements of Executive and DOE Orders, which is discussed below. The requestor for a new, leased, or existing INL building is responsible for ensuring that all applicable Executive and DOE Orders are met.

3.1 Energy Policy Flow Down to INL

EO 13423 → DOE O 430.2B → BEA Contract

Executive Order (EO) 13423, "Strengthening Federal Environmental, Energy, and Transportation Management," sets goals for federal agencies in the areas of energy efficiency, renewable energy, toxics reductions, recycling, sustainable buildings, electronics stewardship, fleet efficiency, and water conservation. The EO 13423 Fact Sheet has been included in Attachment B for more information.

The EO 13423 sustainable building goals are to:

> *"ensure that (i) new construction and major renovation of agency buildings comply with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings set forth in the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (2006), and (ii) 15 percent of the existing Federal capital asset building inventory of the agency as of the end of fiscal year 2015 incorporates the sustainable practices in the Guiding Principles."*

EO 13423 was given further strength when it was codified as law as part of the Omnibus bill signed in spring 2009.

The Implementing Instructions for EO 13423 are more specific and state:

> *"(1) New construction and renovation. Beginning with the FY 2007 funding cycle, when planning the funding and design for construction of buildings that meet the agency-defined capital asset threshold, each agency shall meet or exceed statutory goals and address each of the five Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings (Guiding Principles). Written justification must be provided to OFEE and OMB if an agency proposes not to comply. In order to apply the Guiding Principles to building projects, all business cases for new building construction or major renovations, developed per OMB A-11, Part 7, Section 300, shall incorporate the Guiding Principles to the greatest extent practicable. These requirements apply to construction of new Federal buildings; new, renegotiation, or extension of leases for Federal occupancy, or major renovation projects."*

DOE issued Order 430.2B, "Departmental Energy, Renewable Energy, and Transportation Management," in February 2008 in response to EO 13423. This Order and its Contractor Requirements Document (CRD) are in List B of Battelle Energy Alliance's (BEA) contract. Language from the CRD that applies to new buildings, existing buildings, and leased buildings is in the following subsections.

3.1.1 New Buildings

All new buildings are to follow the Guiding Principles of Executive Order 13423; new buildings over $5 million are to be LEED Gold certified. Note that LEED is a tool to define and validate green buildings, and although this tool is referenced in DOE O 430.2B, there are federal orders and directives that take precedence and INL is bound to these whether or not a new building is LEED certified. An example is comparing the energy efficiency requirement in DOE O 430.2b against the minimum efficiency requirement (a prerequisite) of LEED; DOE O 430.2B calls for a 30% increase in energy efficiency as compared to the baseline minimum of the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) 90.1-2007 standard, while the LEED New Construction (NC) prerequisite is only a 10% improvement. Additional points are available in LEED NC for buildings that achieve the 30% energy savings, but the flexible nature of LEED does not generally constrain which sustainable design features a building should incorporate to earn points towards certification (with the exception of prerequisites). The specifics of LEED are discussed further in Section 5.2.

The text from the CRD in DOE O 430.2B that applies to new buildings is as follows:

> *"All new buildings will incorporate the Guiding Principles of Executive Order 13423 to the extent practical and life cycle cost effective. As of October 1, 2008, all new buildings and major buildings renovations at Critical Decision One (CD-1) or lower with a value exceeding $5 million, must implement the Guiding Principles of the Executive Order and attain LEED Gold certification. All new construction or major renovation projects must incorporate renewable energy equipment into building design to the maximum extent feasible. In the event that a project manager has compelling reasons for attaining a certification other than LEED Gold or believes that a certification can be attained from a nationally recognized certification program that exceed LEED Gold requirements, such project manager may seek to obtain a waiver from the LEED Gold requirement in consultation with the DOE Program/Site Office."*

For planning and information purposes, the new Executive Order 13514 requires that, beginning in FY 2020, all new building starts must be net zero facilities. This requirement means that the building must generate as much energy as it uses. Funding and designing such buildings will be a challenge, but meeting the current requirements of LEED Gold certification and implementing the Guiding Principles will assist in preparing INL for this new requirement. A copy of the Guiding Principles is included in Attachment A.

3.1.2 Existing Buildings

The CRD in DOE O 430.2B addresses existing buildings as follows:

> *"All contractors that own or lease real property must develop and implement a plan, as part of the Executable Plan, to ensure that 15 percent of their enduring buildings are compliant with the Guiding Principles of Executive Order 13423. Implementation of the plan must be documented within the programs' Ten Year Site Plans and through the appropriate LEED building credits."*

Note that there is a version of the Guiding Principles specific to Existing Buildings; the "Guiding Principles for Sustainable Existing Buildings" covers high performance building features that can be feasibly addressed in existing buildings. A copy of this guide is included in Attachment A.

3.1.3 Leased Buildings

The directive for leased buildings in the CRD in DOE O 430.2B is straightforward and states:

> *"Starting in FY 2008, all procurement specifications and selection criteria for acquiring new leased space, including build-to-suit lease solicitations are to include a preference for buildings certified LEED Gold. When entering into renegotiation or extension of existing leases, the contractor must include lease provisions that support the Guiding Principles."*

INL will include language in all new lease solicitations to require the Guiding Principles for all new leased facilities. In addition, the lease solicitations will indicate a preference for contracts that will provide a LEED Gold certified facility. This preference will be evident through a grading system, which encourages LEED certification, as part of the solicitation process that provides additional points for designs that will meet LEED Gold criteria.

When considering leasing a new building the typical rating system to be applied is LEED for New Construction. However, it is certainly possible that other LEED rating systems will be applied. In the case where LEED for Core and Shell has been used to certify the building, it is recommended to request that the owner finish the building to earn LEED for Commercial Interiors certification before occupying to ensure tenant improvements are made following sustainable design principles consistent with the rest of the building. For more information on the LEED rating systems, refer to Section 5.2.

INL has begun amending its lease packages. INL Managers evaluating space options must work with their procurement representative to ensure that new lease packages meet DOE O 430.2B. The following is sample language for the Testing and Demonstration Facility (TDF) lease package; this language was added to the solicitation after it had been issued. As discussed above, the TDF lease package requires the Guiding Principles and shows preference for LEED Gold certification:

> *"II. Section 2.3, "Executive Order 13423 Guiding Principles," is added to the Statement of Work (SOW) and includes the following verbiage:*
>
> *2.3 The "facility," to include all buildings and/or structures, shall be designed and constructed in accordance with requirements from the Executive Order 13423, "Guiding Principles of the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding," which includes the following criteria:*
>
> - *Employment of integrated design principles*
> - *Optimization of energy efficiency and use of renewable energy*
> - *Protection and conservation of water*
> - *Enhancement of indoor environmental quality*
> - *Reduction* of environmental impacts of materials.

III. The following is added to SOW Section 7, "Submittals":

> *Within 6 weeks of award, the Lessor shall submit for BEA review and concurrence, a plan identifying how it will meet or exceed the requirements of the Executive Order 13423, "Guiding Principles of the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding."*

IV. Reference Section 2.2 of the SFO document. Item A, "Building Design," is changed from 400 points available to 300. Item C, "Experience and Capabilities," is changed from 100 points available to 50. Item D is added, and includes the following:

> *D. Leadership in Environment Design (LEED) Certification:* ***150 Total Points Available***[c]
>
> *The offeror shall submit with its offer its intent to achieve LEED certification on the facility design and construction, for the version of LEED Green Building Rating System the offeror has selected. The award of points shall be:*
>
> *LEED Gold: 150 points*
>
> *LEED Silver: 75 points*
>
> *LEED Certified: 25 points.*

The SOW shall be revised at award to include the successful offerors proposed version of LEED certification.

V. Reference SFO document, Item "3.4.3.6" is renumbered to "3.4.3.7" and new Item "3.4.3.6" entitled "LEED Certification" is added and includes the following verbiage: "3.4.3.6.1. The offeror shall submit with its offer a preliminary LEED checklist for the version of LEED Green Building Rating System the offeror has selected."

Note that this language provides one method of showing a preference for LEED Gold. In the end, the language of this solicitation was revised to simply request a LEED Gold facility with no applicable grading criteria. This process is ongoing and every effort should be made to reasonably request LEED Gold facilities for INL occupancy.

3.2 Project Management

It is important to acknowledge an additional, not previously mentioned DOE Order that addresses high performance buildings. The final requirement in the CRD for DOE O 413.3A, "Program and Project Management for the Acquisition of Capital Assets," states that "High performance sustainable building principles must be applied to the siting, design, construction, and commissioning of new facilities and major renovations of existing facilities." The companion guide, DOE Guide 413.3-6, "High Performance Sustainable Building," identifies a number of suggested approaches for achieving a high performance sustainable building (2008). Another method for achieving this goal is to use this document, the "INL High Performance Building Strategy."

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c. Note that the points available are used by INL for rating proposals; these are not LEED points towards certification.

3.3 Federal Procurement Guidelines

In addition to meeting the high performance sustainable building requirements from DOE O 430.2B, it is important to remember that federal guidelines require purchasing designated environmentally preferable construction products, including energy and water-efficient products, as well as those with recycled and biobased content. Environmentally preferable alternatives are exempt when the cost is unreasonable, inadequate competition exists, items are not available within a reasonable period of time, or items do not meet reasonable performance specifications. For more information, including a full list of designated green products for federal procurement, look at the "Building Construction" tab on the database available at http://www.ofee.gov/whats/Green_Products_Compilation_v3.xls. This list should be considered when selecting building materials such as concrete and insulation, as well as furnishings, fixtures, and appliances. Additional information on recycled content products is available at Comprehensive Procurement Guidelines (CPG), www.epa.gov/cpg.

4. FINANCIAL INCENTIVES

How much high performance buildings cost and whether they cost more than conventional construction are usually the first questions asked. While there are no straightforward answers to these questions since each project is unique, various studies have shown that green buildings typically have lower operation and management (O&M) costs; thus, the potential higher capital costs are offset in only a few years.

Many studies have been undertaken to quantify the price difference of a building with high performance features versus the building without these features.

A study done for the State of California looked at the cost of 33 green buildings compared to the conventional, non-green design of the same buildings (Kats et al. 2003). This study found that the average premium for a green building was less than 2% (or $3–5/square foot) more than the conventional design. This increase was mostly attributed to increased architectural and engineering support. The total life cycle savings (including energy, water, waste, and improved productivity and health) were found to be 10 times the average initial investment for design and construction.

In fact, new buildings designed to be energy efficient can operate on 20% of the energy used by corresponding older existing facilities (for corresponding energy savings of 80%) (Capehart et al. 2006). Older existing facilities can usually be retrofit to save around 30% of the existing energy used (Capehart et al. 2006). Clearly, adopting energy efficient design features into new building designs and retrofit projects will provide direct O&M cost savings and improved life cycle costs.

In 2004, Davis Langdon, a cost planning and sustainable design management firm, conducted an in-depth study and found that construction costs varied greatly within the same building type (academic buildings, laboratories, and libraries), but that there was no statistically significant difference between the construction cost of a LEED certified building and a non-LEED certified building (Matthiessen and Morris 2004). A follow-up study completed by the same authors in 2007 came to the same conclusion (Matthiessen and Morris 2007). A graph comparing the cost of non-LEED buildings to LEED buildings for their sample of laboratory buildings is shown in Figure 1. These results are indicative of their findings for other building types as discussed above.

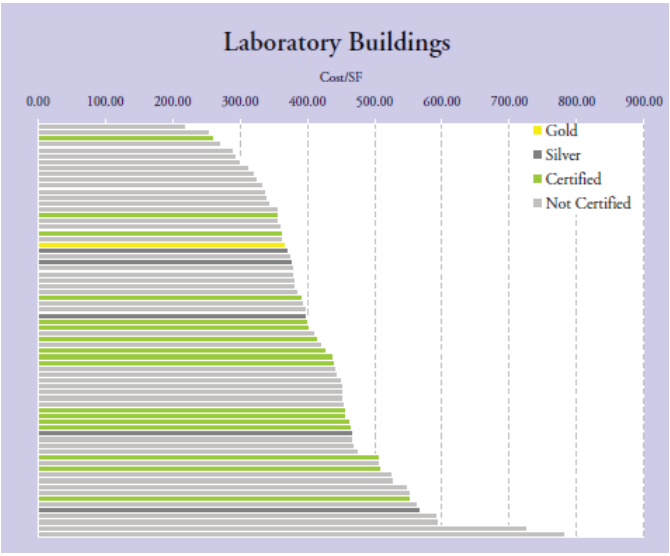

Figure 1. Cost comparison of non-LEED laboratory buildings to LEED laboratory buildings (Matthiessen and Morris 2007).

During the design and construction of the CAES building, a cost report was prepared to evaluate the additional cost of pursuing LEED certification. The total cost for LEED (documentation and certification fees) and high performance design and construction measures (design and process costs) are estimated to be $193,100; however, note that the contractor stated that they saw no additional costs associated with green building design strategies incorporated in the building. The current payback for the increased design and construction rigor is 3.2 years with a projected return on investment of 30% due to $58,854 in annual energy savings (Baker 2008).

There are two significant factors when determining the extent of whether high performance and/or LEED buildings will have a higher premium over conventional construction:

1. When the sustainable building goals are identified. Sustainable goals identified during a project's design phase (preferably during a design charrette with all of the stakeholders involved) can be integrated with little or no additional cost, while goals identified once the construction document phase has begun may require costly change orders.
2. The experience level of the design team. High performance buildings and the LEED certification process as a whole have a learning curve, which means an experienced design team using an integrated design process will succeed more often and with lower costs than an inexperienced team. (This is discussed further in Best Practices, Section 6, as well as Attachment C [Hiring the Right Team, Betterbricks, 2007] and D [Integrated Design Steps for Designers, Betterbricks]). As a result, INL staff members and contractors are encouraged to obtain sustainable design and/or LEED training.

Two significant benefits of high performance buildings that need to be considered when discussing their financial incentives are higher productivity and reduced absenteeism of the building occupants; high performance buildings that focus on indoor environmental quality features (see Section 5.2 for further discussion) provide a more comfortable and healthy work environment for their occupants. A study comparing the employee performance at two companies before and after they moved into LEED certified buildings observed an increase in employee productivity of 2% or nearly 40 hours per employee over a year (Singh & Syal 2009). This is an important payback to consider when evaluating the full life cycle cost of a high performance building since the salaries of the building occupants account for a much larger annual budget than the traditional O&M costs, and thus can greatly lower a building's return on investment. Occupancy comfort and health are also important considerations when the goal is to attract and retain the best people at INL.

Despite the potential of slightly higher capital costs, high performance buildings can yield O&M savings and improved employee productivity that can easily pay back this cost within a few years. This life cycle cost benefit is critical to the future of INL.

5. STRATEGY

This revised High Performance Building Strategy has been aligned with DOE O 430.2B, and employs two levels: the Guiding Principles and LEED Gold certification. The first level identifies the requirements of the Guiding Principles, and the second level recommends which credits should be met when LEED Gold certification is required.

The recommended review cycle for this document is annually or as needed to stay up to date with the most recent executive and DOE orders, as well as the latest versions of the Guiding Principles, LEED rating systems, and the relevant INL programs. If new guidance, including executive and DOE orders, is incorporated into INL's contract and this new guidance supersedes any of the contents in this document, then the new guidance should take precedence.

5.1 Guiding Principles

Per DOE O 430.2B, the "Guiding Principles for Sustainable New Construction and Major Renovations" (referred to as the Guiding Principles in this document) should be used for all new building construction and all leased building solicitations. (See Attachment A for a copy of the Guiding Principles [ISWG 2008].)

Many of the requirements for LEED can be met by implementing the Guiding Principles, but these should not be considered a replacement for LEED (and in corollary, attaining LEED certification does not guarantee that the Guiding Principles have been satisfied). A comparison of the Guiding Principles against LEED for New Construction (NC) 2009 showed that following the Guiding Principles will result in fulfilling a majority of the prerequisites (seven out of eight), as well as contributing 34 points towards LEED certification. The LEED Checklist in the next section includes a column (first on left) that identifies the LEED credits that are satisfied as a result of meeting the Guiding Principles.

5.2 LEED Gold

LEED certification is the industry standard for validating the design and construction of a green building, including the surrounding site. A number of LEED rating systems are available for specific buildings types and/or applications. The most applicable rating systems are discussed here, with the primary one being *LEED for New Construction*, and the secondary rating systems being *LEED for Existing Buildings: Operations and Maintenance, LEED for Core and Shell,* and *LEED for Commercial Interiors*.

The LEED NC rating system is intended for new construction and major renovations of commercial and institutional projects, with a focus on office buildings. Practitioners have also applied the system to data centers, manufacturing plants, laboratories, and many other building types. A copy of a blank checklist for LEED NC is contained in Attachment E.

LEED for Existing Buildings: Operations and Maintenance (EB O&M) is a system for maximizing best operational practices, monitoring systems' performance, and optimizing resources through exemplary maintenance. LEED EB O&M focuses primarily on operations and materials usage, but also includes building performance requirements. A copy of a blank checklist for LEED EB O&M can be found in Attachment F.

As the name implies, the LEED CS rating system focuses on a building's core and shell and is a good choice for buildings that will have larger internal process loads or uncertain occupancy and use (e.g., multiple occupants). Laboratories and fabrication facilities would be good candidates for LEED CS. This rating system would generally not apply for INL, but it may be applicable should INL lease a building

where INL does not have the primary occupancy and use. A copy of a blank checklist for LEED CS is contained in Attachment G.

The LEED for Commercial Interiors (CI) rating system is intended for tenant improvements to ensure green interiors are designed following sustainable principles. It can be used for buildings that have already been certified under LEED CS. A copy of a blank checklist for LEED CS is contained in Attachment H.

Each LEED rating system measures the building's sustainable performance by focusing on the following five areas of sustainable design:

- **Sustainable Sites.** Geared towards minimizing site disturbance; using responsible landscaping; promoting the use of commuting and alternative transportation such as bicycles, mass transit, and alternatively fueled vehicles; and reducing light pollution.
- **Water Efficiency.** Covers design features that reduce potable water consumption and/or wastewater treatment demand.
- **Energy and Atmosphere.** Promotes energy efficiency and renewable energy consumption.
- **Materials and Resources.** Calls for efficient material use through the specification of recycled, rapidly renewable, salvaged, and local building materials during design and the recycling of building waste during construction and occupancy. The goal is to minimize the demand for virgin materials and the harmful environmental effects associated with extracting and processing them, while lowering the total embodied energy content of the building.
- **Indoor Environmental Quality.** Promotes the health and productivity of building occupants by providing well-ventilated and thermally comfortable interior spaces, materials that do not off-gas, and daylight and views.

Two additional categories, Innovation in Design and Regional Priority, give the project team flexibility. The first category gives credit for exceeding an established LEED parameter or using sustainable building practices not yet recognized in LEED, and the second allows for additional points for green building strategies that address an environmental problem with regional significance such as water shortages (available points are based on the project location as determined by zip code).

Each category contains a number of subcategories or *credits*. One or more *points* are earned for each credit that is met; some credits are further divided to offer additional points for meeting a parameter(s) beyond, or in addition to, the initial measurable accomplishment. A total of 100 possible points is available for the five main categories of sustainable design with an additional 10 points possible from the two additional categories. There are four award levels for all LEED 2009 rating system certifications, including NC, CS, EB O&M, and CI:

- Certified (40% or 40–49 points)
- Silver (50% or 50–59 points)
- Gold (60% or 60–79 points)
- Platinum (80% or more than 80 points).

The USGBC considers a number of building practices essential to green building and has made them prerequisites for LEED certification. These prerequisites are baseline requirements for buildings pursuing LEED certification, and they do not add points towards certification.

The LEED NC checklist in Table 3 has been filled in as a recommended guide for buildings particular to INL. This checklist shall provide assistance in identifying the credits that are most easily and effectively captured for buildings in the southeast Idaho climate and energy region based on the existing services available, and INL's unique environmental challenges (i.e., water shortages). The checklist has been customized for this document to identify which LEED credits are satisfied as a result of meeting the Guiding Principles, as well as the recommended credits for buildings where LEED Gold is the goal. Refer to the comments (blue text) following each credit for more information. In addition, the following key (Table 2) will assist with understanding the headings used for the first four columns in the checklist below in Table 3.

Table 2. Key for Recommended LEED NC Checklist to use as a Guide at INL.

Strategy Level	Likelihood of Achieving Credit	Explanation
GP	Yes	This credit is required per the **Guiding Principles**.
LEED	Yes	This credit is required per the Guiding Principles, or considered very reasonable to achieve (low impact to project cost and/or design) and should therefore be used for satisfying **LEED** Gold. There are currently 60 points identified in this group, the minimum for LEED Gold. It is recommended that additional credits from the possible ("?") category be incorporated into the design in case changes are made that make achievement of some credits difficult or impossible.
LEED	?	The possibility of satisfying this credit's requirements will vary depending on the building location (Site, town, etc.), and the goals of the project team. Any points received from these credits would be added to the "Yes" category. It is recommended that additional credits from this category be achieved in order to ensure LEED Gold certification.
LEED	No	It is not likely to achieve this credit for a number of reasons including the building or location characteristics (i.e., not urban) and availability of services in this region, and the likelihood of a higher impact to the project cost and/or design.

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Project Scorecard

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Project Address: INL, Idaho Falls, ID

Table 3. Recommended LEED NC Checklist to use as a Guide at INL.

GP	LEED					
Yes	Yes	?	No			
0	11	10	5	**SUSTAINABLE SITES**		**26 Points**
Y	Y			Prereq 1	**Construction Activity Pollution Prevention**	**Required**
					This is called for in the Guiding Principles.	
	1			Credit 1	**Site Selection**	**1**
					Avoiding projects sites that are non-compliant typically has low associated costs	
			5	Credit 2	**Development Density and Community Connectivity**	**5**
					The density requirement will be difficult to satisfy based on current campus locations.	
		1		Credit 3	**Brownfield Redevelopment**	**1**
					The applicability of this credit will depend on the desired location of the building.	
		6		Credit 4.1	**Alternative Transportation -** Public Transportation Access	**6**
					Buildings at the INL Site will likely comply (due to INL bus system), but town buildings will not	
					unless additional public transportation options become available.	
	1			Credit 4.2	**Alternative Transportation -** Bicycle Storage and Changing Rooms	**1**
					This is a low impact credit when bike storage & changing rooms are incorporated during design.	
	3			Credit 4.3	**Alternative Transportation -** Low-Emitting and Fuel-Efficient Vehicles	**3**
					Preferred parking (Option 1) offers a low impact, reasonable approach.	
	2			Credit 4.4	**Alternative Transportation -** Parking Capacity	**2**
					Limiting the parking capacity (Options 1 or 3) offers a low (or decreased) impact approach.	
		1		Credit 5.1	**Site Development -** Protect or Restore Habitat	**1**
					This is a reasonable credit for bulding projects with sufficient site area.	
	1			Credit 5.2	**Site Development -** Maximize Open Space	**1**
					This is a reasonable credit, especially when considering the current INL campus locations.	
	1			Credit 6.1	**Stormwater Design -** Quantity Control	**1**
					This is a reasonable credit, especially when considering the current INL campus locations.	
	1			Credit 6.2	**Stormwater Design -** Quality Control	**1**
					This is a reasonable credit for bulding projects with sufficient site area.	
		1		Credit 7.1	**Heat Island Effect -** Nonroof	**1**
					This is a reasonable credit, with an economical strategy being to plant shade trees	
					in parking areas.	
		1		Credit 7.2	**Heat Island Effect -** Roof	**1**
					This is a reasonable credit, with an economical strategy being to specify a high emissivity	
					or cool roof.	
	1			Credit 8	**Light Pollution Reduction**	**1**
					This is reasonable with careful light selection during design.	

GP	LEED					
Yes	Yes	?	No			
6	6	4	0	**WATER EFFICIENCY**		**10 Points**
Y	Y			Prereq 1	**Water Use Reduction** (Reduce by 20%)	**Required**
					This reduction is called for in the Guiding Principles.	
2	2	2		Credit 1	**Water Efficient Landscaping**	**2 to 4**
					2 Reduce by 50%	2
					This reduction is called for in the Guiding Principles.	
					4 No Potable Water Use or Irrigation	4
					This credit is possible with careful landscape design and/or use of process water,	
					graywater or rainwater.	
		2		Credit 2	**Innovative Wastewater Technologies**	2
					Option 1 is a possibility with careful design and incorporation of technology.	
4	4			Credit 3	**Water Use Reduction**	**2 to 4**
					Reduce by 30%	2
					Reduce by 35%	3
					4 Reduce by 40%	4
					Use of low flow fixtures (labeled with EPA's WaterSense) is called for in the Guiding Principles,	
					EO 430.2B, and federal procurement regulations and will contribute to these reduction goals.	

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GP Yes	LEED Yes	LEED ?	LEED No	
18	18	11	6	**ENERGY & ATMOSPHERE** — **35 Points**

Y	Y			Prereq 1	**Fundamental Commissioning of Building Energy Systems**	**Required**
					This is called for in the Guiding Principles.	
Y	Y			Prereq 2	**Minimum Energy Performance** (Improve by 10% for New Buildings or 5% for Existing)	**Required**
					This is less than the amount called for in the Guiding Principles and 430.2B.	
Y	Y			Prereq 3	**Fundamental Refrigerant Management**	**Required**
					This is called for in the Guiding Principles.	
10	10	9		Credit 1	**Optimize Energy Performance**	**1 to 19**
					Improve by 12% for New Buildings or 8% for Existing Building Renovations	1
					Improve by 14% for New Buildings or 10% for Existing Building Renovations	2
					Improve by 16% for New Buildings or 12% for Existing Building Renovations	3
					Improve by 18% for New Buildings or 14% for Existing Building Renovations	4
					Improve by 20% for New Buildings or 16% for Existing Building Renovations	5
					Improve by 22% for New Buildings or 18% for Existing Building Renovations	6
					Improve by 24% for New Buildings or 20% for Existing Building Renovations	7
					Improve by 26% for New Buildings or 22% for Existing Building Renovations	8
					Improve by 28% for New Buildings or 24% for Existing Building Renovations	9
					10 Improve by 30% for New Buildings or 26% for Existing Building Renovations	10
					This is called for in the Guiding Principles.	
					Improve by 32% for New Buildings or 28% for Existing Building Renovations	11
					Improve by 34% for New Buildings or 30% for Existing Building Renovations	12
					Improve by 36% for New Buildings or 32% for Existing Building Renovations	13
					Improve by 38% for New Buildings or 34% for Existing Building Renovations	14
					Improve by 40% for New Buildings or 36% for Existing Building Renovations	15
					Improve by 42% for New Buildings or 38% for Existing Building Renovations	16
					Improve by 44% for New Buildings or 40% for Existing Building Renovations	17
					Improve by 46% for New Buildings or 42% for Existing Building Renovations	18
					Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19
1	1		6	Credit 2	**On-Site Renewable Energy**	**1 to 7**
					1 1% Renewable Energy	1
					This is called for indirectly in the Guiding Principles when it specifies meeting 30% of hot water demand with installation of solar hot water heaters. Since 4% of the average commercial building's energy use is for water heating, this yields an overall guideline for 1.2% renewable energy.	
					3% Renewable Energy	2
					5% Renewable Energy	3
					7% Renewable Energy	4
					9% Renewable Energy	5
					11% Renewable Energy	6
					13% Renewable Energy	7
2	2			Credit 3	**Enhanced Commissioning**	**2**
					This is called for in the Guiding Principles.	
2	2			Credit 4	**Enhanced Refrigerant Management**	**2**
					This is called for in the Guiding Principles.	
3	3			Credit 5	**Measurement and Verification**	**3**
					The Guiding Principles calls for installation of building level electricity meters (and meters for natural gas and steam where applicable). It also spells out benchmarking for a year, an additional criterion for this credit.	
		2		Credit 6	**Green Power**	**2**
					RECs could be purchased or assigned from current INL purchase. E. Fossum is POC.	

GP Yes	LEED Yes	LEED ?	LEED No	
0	3	9	2	**MATERIALS & RESOURCES** — **14 Points**

	Y			Prereq 1	**Storage and Collection of Recyclables**	**Required**
		3		Credit 1.1	**Building Reuse** - Maintain Existing Walls, Floors and Roof	**1 to 3**
					The potential for satisfying this credit will depend upon whether the projects involves the renovation of an existing building.	
					Reuse 55%	1
					Reuse 75%	2
					Reuse 95%	3

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		1		Credit 1.2	**Building Reuse -** Maintain Interior Nonstructural Elements	**1**
					The potential for satisfying this credit will depend upon whether the projects involves the renovation of an existing building.	
			2	Credit 2	**Construction Waste Management**	**1 to 2**
					Although there are organizations that will accept donations of materials, this credit will be difficult to satisfy until an option to recycle construction waste is available locally. Keep in mind that 50% diversion is called for in the Guiding Principles where markets & opportunities exist.	
					50% Recycled or Salvaged	1
					75% Recycled or Salvaged	2
		2		Credit 3	**Materials Reuse**	**1 to 2**
					This credit is possible with careful design incorporating salvaged and refurbished items.	
					Reuse 5%	1
					Reuse 10%	2
	2			Credit 4	**Recycled Content**	**1 to 2**
					This is a reasonable credit to achieve. Identified as a preference in Guiding Principles.	
					10% of Content	1
					20% of Content	2
	1	1		Credit 5	**Regional Materials**	**1 to 2**
					This is a reasonable credit to achieve.	
					10% of Materials	1
					20% of Materials	2
		1		Credit 6	**Rapidly Renewable Materials**	**1**
					This credit is possible with careful design. Identified as a preference in Guiding Principles.	
		1		Credit 7	**Certified Wood**	**1**
					This credit is possible with careful design. Identified as a preference in Guiding Principles.	

GP	LEED		
Yes	Yes	?	No
9	**14**	**1**	**0**

INDOOR ENVIRONMENTAL QUALITY — 15 Points

Y	Y			Prereq 1	**Minimum Indoor Air Quality Performance**	**Required**
					This is called for in the Guiding Principles	
Y	Y			Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	**Required**
					This is called for in the Guiding Principles. Furthermore, federal policy prevents smoking inside all owned, rented, or leased facilities.	
	1			Credit 1	**Outdoor Air Delivery Monitoring**	**1**
					This is a reasonable credit to achieve.	
		1		Credit 2	**Increased Ventilation**	**1**
					This can be a difficult credit to achieve depending on the building type.	
1	1			Credit 3.1	**Construction Indoor Air Quality Management Plan -** During Construction	**1**
					This is called for in the Guiding Principles	
1	1			Credit 3.2	**Construction Indoor Air Quality Management Plan -** Before Occupancy	**1**
					This is called for in the Guiding Principles	
1	1			Credit 4.1	**Low-Emitting Materials -** Adhesives and Sealants	**1**
					This is called for in the Guiding Principles	
1	1			Credit 4.2	**Low-Emitting Materials -** Paints and Coatings	**1**
					This is called for in the Guiding Principles	
1	1			Credit 4.3	**Low-Emitting Materials -** Flooring Systems	**1**
					This is called for in the Guiding Principles	
1	1			Credit 4.4	**Low-Emitting Materials -** Composite Wood and Agrifiber Products	**1**
					This is called for in the Guiding Principles	
	1			Credit 5	**Indoor Chemical and Pollutant Source Control**	**1**
					This is a reasonable credit to achieve.	
1	1			Credit 6.1	**Controllability of Systems -** Lighting	**1**
					This is called for in the Guiding Principles	
	1			Credit 6.2	**Controllability of Systems -** Thermal Comfort	**1**
					This is a reasonable credit to achieve.	
1	1			Credit 7.1	**Thermal Comfort -** Design	**1**
					This is called for in the Guiding Principles	
	1			Credit 7.2	**Thermal Comfort -** Verification	**1**
					This is a reasonable credit to achieve.	

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GP	LEED					
Yes	Yes	?	No			
1	1			Credit 8.1	**Daylight and Views -** Daylight	**1**
					This is called for in the Guiding Principles, although the measurement for daylight is slightly different.	
	1			Credit 8.2	**Daylight and Views -** Views	**1**
					This is a reasonable credit to achieve.	
GP	LEED					
Yes	Yes	?	No			
0	**6**	0	**0**	**INNOVATION IN DESIGN**		**6 Points**
	5			Credit 1	**Innovation in Design**	**1 to 5**
					It is quite reasonable for a project to achieve all 5 Innovation points.	
					1 Innovation or Exemplary Performance	1
					1 Innovation or Exemplary Performance	1
					1 Innovation or Exemplary Performance	1
					1 Innovation	1
					1 Innovation	1
	1			Credit 2	**LEED® Accredited Professional**	**1**
					It makes good practical design sense to include a LEED AP on the integrated design team.	
GP	LEED					
Yes	Yes	?	No			
1	**2**	3	**1**	**REGIONAL PRIORITY**		**4 Points**
1	2	3	1	Credit 1	**Regional Priority**	**1 to 4***
					*Although there are 6 possible regional priority credits to select from, only 4 total points are	
					allowed for regional priority. Regional priority credits are determined by the project's zip code.	
					All of INL's zip codes yield the same 6 possible credits.	
					1 Regionally Defined Credit Achieved: SSc5.1	1
					This credit is a possibility for LEED Gold.	
					1 Regionally Defined Credit Achieved: SSc7.1	1
					This credit is a possibility for LEED Gold.	
					1 Regionally Defined Credit Achieved: SSc5.2	1
					This was identified previously as a reasonable credit to achieve.	
					1 Regionally Defined Credit Achieved: WEc1, Opt. 2	1
					This credit is a possibility for LEED Gold.	
					1 Regionally Defined Credit Achieved: WEc3(40%)	1
					This credit is likely when following the Guiding Principles.	
					0 Regionally Defined Credit Achieved: EAc2(5%)	1
					This credit is not considered likely.	
GP	LEED					
Yes	Yes	?	No			
34	**60**	38	**14**	**PROJECT TOTALS (Certification Estimates)**		**110 Points**
				Certified: 40-49 points Silver: 50-59 points Gold: 60-79 points Platinum: 80+ points		

Note: All blue text has been added as comments applicable to the INL Green Building Strategy and has not been endorsed by the USGBC.

6. BEST PRACTICES

This section attempts to summarize a number of best practices for achieving success when designing, acquiring, and/or operating high performance buildings. It is not all encompassing, but it does feature a number of key areas, and contains recommendations from a number of sources, including the external reviewers of this document, Kath Williams, Kevin Van Den Wymelenberg, and Gunnar Gladics:

- Utilize an integrated design process. An example of integrated design success is installing right-sized heating, ventilation, and air conditioning (HVAC) and lighting equipment to supplement passive comfort strategies; the resultant building will be much more cost effective over its life and may even have reduced capital costs for design and construction. It should be noted that this is also a requirement of the Guiding Principles. Refer to Attachment D (Integrated Design Steps for Designers) for further discussion on what this means during each stage of the design and construction process. The following should be considered along with Attachment D:
  - Require building simulation results for energy use at each design phase. This report should highlight load reductions for each design alternative and energy efficiency measure. During Schematic Design these calculations will be valuable in relative terms rather than absolute terms.
  - Require daylight simulation results (physical or digital models) for critical functional spaces as part of the Schematic Design and Design Development packages.
- Use the design-build contract mechanism for high performance buildings, which is recommended by General Services Administration (GSA). Information on the Two-Phase Design Build Selection Process, Federal Acquisition Regulation (FAR) 36.3, can be found at: www.acquisition.gov/far/html/Subpart%2036_3.html.
- Carefully select the design team based on their interview responses, references, and proven experience. Refer to Attachment C, "Hiring the Right Team," for further discussion.
- Calculate life cycle costs to compare capital and projected O&M costs and utilize these results to make informed decisions during the design process.
- Certain technologies should always be included despite the building type or project cost. These include efficient lighting (T-8s for general office areas, and CFLs and LEDs for task lighting and exit signs as appropriate), and occupancy sensors (general area lighting control system for larger office buildings), as well as set-back thermostats and economizer cycles for HVAC equipment. In addition, right-sized HVAC and lighting equipment should be installed to supplement passive comfort strategies.
- Carefully consider the following high performance building strategies for this geographical area of Southeastern Idaho, including daylighting with controls, night flush cooling, high insulation levels (for winter), evaporative cooling, and careful entry way design (to combat the high winds in spring and fall). When including daylighting in the design, continue to check the implications of design decisions using physical or digital daylight testing to ensure success. This will also assist with achieving daylight credits in LEED if this is a goal; projects that only perform one daylight test at the beginning of design may not be able to achieve this credit.
- Do not just use an energy model for achieving the LEED energy efficiency prerequisite and credits; use the model throughout the design process for making decisions on everything from building orientation to window types and window treatments.
- Require Building Information Modeling (BIM) as a standard. This technology supports integrated design and also offers potential cost savings. BIM will also benefit the continued operations and management of the facilities including Measurement and Verification (M&V) and benchmarking.

- As part of the M&V required under the Guiding Principles, protocol should include a simple one-page monthly report delivered to appropriate building personnel illustrating whole building Energy Use Index for the reporting period, and end-use break downs for heating, cooling, lighting, and plug loads at a minimum, and possibly fans.
- Consider utilizing a Post Occupancy Evaluation (staff survey) to be completed for a new building at the end of Year 1, Year 2, Year 5, and every 5 years to follow in order to evaluate thermal and visual comfort, as well as other indoor environmental quality attributes. These results should then be made available to the public to share lessons learned.
- During design, clearly state what type of lighting control is acceptable in a particular space type. Suggestions include demanding that daylight harvesting systems use dimming (or step dimming) ballasts in offices, classrooms, labs, and any other regularly occupied spaces, while step switching should only be allowed in spaces with less-critical visual tasks like medium and high bays, and corridors.

7. RESOURCES

The process of creating a high performance building may be unfamiliar to some readers, but it has been experienced by many others. The best recommendation is to take advantage of those who are more experienced since this will help to save both time and money. There are a number of resources available within INL including LEED Accredited Professionals and particular organizations, as well as valuable resources available locally and nationally. The most useful resources are described in the following subsections.

7.1 INL Resources

7.1.1 LEED Accredited Professionals

A LEED Accredited Professional (AP) has demonstrated knowledge in green building design and the LEED rating system and passed an exam. The LEED AP credential process has changed recently to be more in line with other professional accreditations, and is now administered by the Green Building Certification Institute (GBCI) rather than the USGBC. The new process requires demonstrating one's eligibility through education or experience and taking a series of two exams: the LEED Green Associate, which covers general green building knowledge, and a specialty exam based on one of the LEED rating systems. Additional information is available on the GBCI Web site (www.gbci.org).

Building projects that include a LEED AP on the design team will earn a point towards certification. But more importantly, as discussed in the previous section on Financial Incentives, the LEED AP designation indicates depth of knowledge and familiarity with green building; therefore, the presence of LEED APs on the project team will benefit the project's budget, and contribute to the overall success towards meeting the DOE requirements.

INL has several LEED APs that can help with initial design specifications, work scope development, LEED Credit evaluations, project review, and submittal documentation.

LEED APs at INL (as of January 18, 2010):

- Actively involved: Matthew Hammond, Ernest Fossum, Jennifer Morton
- Not actively involved, but could be used as a reference: Cheryl O'Brien, Bill Richins, Jeff Lacy.

Several INL employees have indicated they will sit for the LEED AP exams in the near future. For the current list, refer to the GBCI Web site (www.gbci.org).

7.1.2 USGBC Membership

INL is a USGBC member, which allows for discounts when registering and certifying buildings, as well as purchasing training (workshops) and reference guides. Membership status also allows for access to additional material on the USGBC and GBCI Web sites.

INL's membership is under Battelle Corporate. Contact Ernest Fossum for the Corporate Identification number.

7.1.3 INL Organizations

Many organizations at INL are available to assist with the areas covered in this document including leasing new office or laboratory space, designing a new building, or making recommendations for renovating an existing building. These organizations and the appropriate contact include:

- REC Engineering – Tracy Langenwalter
- Procurement Services – Michelle Wiest
- Project Management Office – Robert Miklos
- Sustainable INL – Chris Ischay.

7.2 General Resources

Many resources are available within professional organizations as well as from other DOE laboratories that have successfully implemented green building projects on numerous facilities. The following resources, arranged alphabetically, are recommended for more information on designing, constructing, operating, and leasing high performance buildings:

ASHRAE, www.ashrae.org

Published various design documents including ASHRAE 90.1-2007, as well as guides for achieving a 30% reduction in energy use as compared to ASHRAE 90.1 (e.g., Advanced Energy Design Guide for Small Office Buildings). Most standards and guidelines are available for purchase as either hard copy or are downloadable; the Advanced Energy Design Guide series are available for free download.

DOE O 430.2B, "Departmental Energy, Renewable Energy and Transportation Management," www.directives.doe.gov/pdfs/doe/doetext/neword/430/o4302b.pdf

Web site shows DOE Order.

Guiding Principles, "Guiding Principles for Sustainable New Construction and Major Renovations," www.wbdg.org/references/sustainable_eo.php

Web site offers technical guidance, including Frequently Asked Questions (FAQs).

EO 13423, "Strengthening Federal Environmental, Energy, and Transportation Management," www.fedcenter.gov/programs/eo13423/

This Web site includes the EO text, implementing instructions, and additional information including guidance on particular areas. The EO fact sheet is also included as Attachment B in this document.

EO 13514, "Federal Leadership in Environmental, Energy, and Economic Performance," www.fedcenter.gov/programs/eo13514/

This Web site includes the EO text, overview, and crosswalk to EO 13423. Additional information will likely be added in the near future, including implementing instructions and guidance on particular areas.

Federal Green Construction Guide for Specifiers, www.wbdg.org/design/greenspec.php

The Environmental Protection Agency (EPA) partnered with the Office of the Federal Environmental Executive (OFEE) and the Whole Building Design Guide to provide a comprehensive procurement guide for obtaining green building products and construction services within the federal government. The objective of the guide is to help federal agencies meet their project-specific environmental goals and mandates.

Green Building Certification Institute, GBCI Web site, www.gbci.org

This is the certifying body for LEED and the accreditation body for LEED APs, and therefore is the location where a project can register and certify under the various LEED rating systems, and where to find information on LEED Professional Credentials, including becoming or locating a LEED AP.

Laboratories for the 21st Century (Labs21), www.labs21century.gov

This resource is co-sponsored by the EPA and DOE and it is recommended when designing and/or constructing laboratory space. The Environmental Performance Criteria is a rating system based on LEED, and designed specifically for laboratory facilities: www.labs21century.gov/toolkit/epc.htm.

LEED Reference Guides, available for purchase at www.usgbc.org

Every member of a project's design team is encouraged to have a copy of the applicable reference guide (available for different LEED rating systems). For each LEED credit, this essential resource details the standards, suggested strategies and technologies, and required documentation. (Reference guides are available for purchase as e-books or hard copies.)

University of Idaho Integrated Design Lab - Boise, www.idlboise.com

The Integrated Design Lab in Boise (IDL) is dedicated to the development of high performance energy efficient buildings in Idaho and Eastern Oregon. This is approached through research, education, and outreach efforts with students, owners, and professional design and construction teams to transform design and construction practice and keep pace with the milestones of the 2030 Challenge. Those who utilize the resources available through the IDL will design and construct buildings that are more comfortable for people, require less energy to maintain and operate, and enhance the health and productivity of building tenants. IDL offers daylighting and whole building energy design consultation and analysis.

USGBC Web site, www.usgbc.org

Green building resources including LEED checklists and other guidance for the various LEED rating systems, information, and sign-up for courses and workshops.

Whole Building Design Guide, www.wbdg.org

This resource from the National Institute of Building Sciences offers a great deal of information including guidance on the integrated design process.

8. SUMMARY

This High Performance Building Strategy provides a guide for sustainable design at INL. Following the recommendations and requirements outlined will assist with obtaining the most sustainable, efficient, and healthy buildings possible for INL.

Including high performance and sustainable technical and functional requirements early in the facility development process will result in the maximum sustainability possible for the least amount of capital outlay. If performed correctly, the resultant building will be more life-cycle cost effective and may even reduce the initial capital cost for design and construction.

Providing healthy sustainable buildings is the key for INL's future in attracting the best and brightest minds to support INL's mission.

The recommended review cycle for this document is annually or as needed to stay current with the most recent executive and DOE orders, as well as the latest versions of the Guiding Principles, LEED rating systems, and the relevant INL programs.

9. REFERENCES

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ATTACHMENTS

Attachment A, Guiding Principles

Attachment B, Executive Order 13423 Fact Sheet, “Strengthening Federal Environmental, Energy, and Transportation Management”

Attachment C, Hiring the Right Team

Attachment D, Integrated Design Steps for Designers

Attachment E, Checklist for LEED for New Construction

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Attachment G, Checklist for LEED for Core and Shell

Attachment H, Checklist for LEED for Commercial Interiors

Attachment A

Guiding Principles

Attachment A

Guiding Principles

GUIDING PRINCIPLES FOR SUSTAINABLE NEW CONSTRUCTION AND MAJOR RENOVATIONS

I. Employ Integrated Design Principles

Integrated Design. Use a collaborative, integrated planning and design process that

- Initiates and maintains an integrated project team as described on the Whole Building Design Guide <http://www.wbdg.org/design/engage_process.php> in all stages of a project's planning and delivery
- Integrates the use of OMB's A-11, Section 7, Exhibit 300: *Capital Asset Plan and Business Case Summary*
- Establishes performance goals for siting, energy, water, materials, and indoor environmental quality along with other comprehensive design goals and ensures incorporation of these goals throughout the design and lifecycle of the building
- Considers all stages of the building's lifecycle, including deconstruction.

Commissioning. Employ commissioning practices tailored to the size and complexity of the building and its system components in order to verify performance of building components and systems and help ensure that design requirements are met. This should include an experienced commissioning provider, inclusion of commissioning requirements in construction documents, a commissioning plan, verification of the installation and performance of systems to be commissioned, and a commissioning report.

II. Optimize Energy Performance

Energy Efficiency. Establish a whole building performance target that takes into account the intended use, occupancy, operations, plug loads, other energy demands, and design to earn the ENERGY STAR® targets for new construction and major renovation where applicable. For new construction, reduce the energy use by 30 percent compared to the baseline building performance rating per the American National Standards Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., (ASHRAE)/Illuminating Engineering Society of North America (IESNA) Standard 90.1-2007, Energy Standard for Buildings Except Low-Rise Residential. For major renovations, reduce the energy use by 20 percent below pre-renovations 2003 baseline. Laboratory spaces may use the Labs21 Laboratory Modeling Guidelines. Use ENERGY STAR® and FEMP-designated Energy Efficient Products, where available.

On-Site Renewable Energy. Per the Energy Independence and Security Act (EISA) Section 523, meet at least 30% of the hot water demand through the installation of solar hot water heaters, when lifecycle cost effective.

Per Executive Order 13423, implement renewable energy generation projects on agency property for agency use, when lifecycle cost effective.

Measurement and Verification. Per the Energy Policy Act of 2005 (EPAct) Section 103, install building level electricity meters in new major construction and renovation projects to track and continuously optimize performance. Per EISA Section 434, include equivalent meters for natural gas and steam, where natural gas and steam are used.

Benchmarking. Compare actual performance data from the first year of operation with the energy design target, preferably by using ENERGY STAR® Portfolio Manager for building and space types covered by ENERGY STAR®. Verify that the building performance meets or exceeds the design target, or that actual energy use is within 10% of the design energy budget for all other building types. For other building and space types, use an equivalent benchmarking tool such as the Labs21 benchmarking tool for laboratory buildings.

III. Protect and Conserve Water

Indoor Water. Employ strategies that in aggregate use a minimum of 20 percent less potable water than the indoor water use baseline calculated for the building, after meeting the EPAct 1992, Uniform Plumbing Codes 2006, and the International Plumbing Codes 2006 fixture performance requirements. The installation of water meters is encouraged to allow for the management of water use during occupancy. The use of harvested rainwater, treated wastewater, and air conditioner condensate should also be considered and used where feasible for nonpotable use and potable use where allowed.

Outdoor Water. Use water efficient landscape and irrigation strategies, such as water reuse, recycling, and the use of harvested rainwater, to reduce outdoor potable water consumption by a minimum of 50 percent over that consumed by conventional means (plant species and plant densities). The installation of water meters for locations with significant outdoor water use is encouraged.

Employ design and construction strategies that reduce storm water runoff and discharges of polluted water offsite. Per EISA Section 438, to the maximum extent technically feasible, maintain or restore the predevelopment hydrology of the site with regard to temperature, rate, volume, and duration of flow using site planning, design, construction, and maintenance strategies.

Process Water. Per the Energy Policy Act of 2005 Section 109, when potable water is used to improve a building's energy efficiency, deploy lifecycle cost effective water conservation measures.

Water-Efficient Products. Specify EPA's WaterSense-labeled products or other water conserving products, where available. Choose irrigation contractors who are certified through a WaterSense labeled program.

IV. Enhance Indoor Environmental Quality

Ventilation and Thermal Comfort. Meet ASHRAE Standard 55-2004, Thermal Environmental Conditions for Human Occupancy, including continuous humidity control within established ranges per climate zone, and ASHRAE Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality.

Moisture Control. Establish and implement a moisture control strategy for controlling moisture flows and condensation to prevent building damage, minimize mold contamination, and reduce health risks related to moisture.

Daylighting. Achieve a minimum daylight factor of 2 percent (excluding all direct sunlight penetration) in 75 percent of all space occupied for critical visual tasks. Provide automatic dimming controls or accessible manual lighting controls, and appropriate glare control.

Low-Emitting Materials. Specify materials and products with low pollutant emissions, including composite wood products, adhesives, sealants, interior paints and finishes, carpet systems, and furnishings.

Protect Indoor Air Quality during Construction. Follow the recommended approach of the Sheet Metal and Air Conditioning Contractor's National Association Indoor Air Quality Guidelines for Occupied Buildings under Construction, 2007. After construction and prior to occupancy, conduct a minimum 72-hour flush-out with maximum outdoor air consistent with achieving relative humidity no greater than 60 percent. After occupancy, continue flush-out as necessary to minimize exposure to contaminants from new building materials.

Environmental Tobacco Smoke Control. Implement a policy and post signage indicating that smoking is prohibited within the building and within 25 feet of all building entrances, operable windows, and building ventilation intakes during building occupancy.

V. Reduce Environmental Impact of Materials

Recycled Content. Per Section 6002 of the Resource Conservation and Recovery Act (RCRA), for EPA-designated products, specify products meeting or exceeding EPA's recycled content recommendations. For other products, specify materials with recycled content when practicable. If EPA-designated products meet performance requirements and are available at a reasonable cost, a preference for purchasing them shall be included in all solicitations relevant to construction, operation, maintenance of or use in the building. EPA's recycled content product designations and recycled content recommendations are available on EPA's Comprehensive Procurement Guideline web site at <www.epa.gov/cpg>.

Biobased Content. Per Section 9002 of the Farm Security and Rural Investment Act (FSRIA), for USDA-designated products, specify products with the highest content level per USDA's biobased content recommendations. For other products, specify biobased products made from rapidly renewable resources and certified sustainable wood products. If these designated products meet performance requirements and are available at a reasonable cost, a preference for purchasing them shall be included in all solicitations relevant to construction, operation, maintenance of or use in the building. USDA's biobased product designations and biobased content recommendations are available on USDA's BioPreferred web site at <www.usda.gov/biopreferred>.

Environmentally Preferable Products. Use products that have a lesser or reduced effect on human health and the environment over their lifecycle when compared with competing products or services that serve the same purpose. A number of standards and ecolabels are available in the marketplace to assist specifiers in making environmentally preferable decisions. For recommendations, consult the Federal Green Construction Guide for Specifiers at <www.wbdg.org/design/greenspec.php>.

Waste and Materials Management. Incorporate adequate space, equipment, and transport accommodations for recycling in the building design. During a project's planning stage, identify local recycling and salvage operations that could process site-related construction and demolition materials. During construction, recycle or salvage at least 50 percent of the non-hazardous construction, demolition and land clearing materials, excluding soil, where markets or onsite recycling opportunities exist. Provide salvage, reuse and recycling services for waste generated from major renovations, where markets or onsite recycling opportunities exist.

Ozone Depleting Compounds. Eliminate the use of ozone depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with either the Montreal Protocol and Title VI of the Clean Air Act Amendments of 1990, or equivalent overall air quality benefits that take into account lifecycle impacts.

GUIDING PRINCIPLES FOR SUSTAINABLE EXISTING BUILDINGS

I. Employ Integrated Assessment, Operation, and Management Principles

Integrated Assessment, Operation, and Management. Use an integrated team to develop and implement policy regarding sustainable operations and maintenance.

- Incorporate sustainable operations and maintenance practices within the appropriate Environmental Management System (EMS)
- Assess existing condition and operational procedures of the building and major building systems and identify areas for improvement
- Establish operational performance goals for energy, water, material use and recycling, and indoor environmental quality, and ensure incorporation of these goals throughout the remaining lifecycle of the building
- Incorporate a building management plan to ensure that operating decisions and tenant education are carried out with regard to integrated, sustainable building operations and maintenance
- Augment building operations and maintenance as needed using occupant feedback on work space satisfaction.

Commissioning. Employ recommissioning, tailored to the size and complexity of the building and its system components, in order to optimize and verify performance of fundamental building systems. Commissioning must be performed by an experienced commissioning provider. When building commissioning has been performed, the commissioning report, summary of actions taken, and schedule for recommissioning must be documented. In addition, meet the requirements of EISA 2007, Section 432 and associated FEMP guidance.

Building recommissioning must have been performed within four years prior to reporting a building as meeting the *Guiding Principles*.

II. Optimize Energy Performance

Energy Efficiency. Three options can be used to measure energy efficiency performance:

- Option 1: Receive an ENERGY STAR® rating of 75 or higher or an equivalent Labs21 Benchmarking Tool score for laboratory buildings,
- Option 2: Reduce measured building energy use by 20% compared to building energy use in 2003 or a year thereafter with quality energy use data, or

- Option 3: Reduce energy use by 20% compared to the ASHRAE 90.1-2007 baseline building design if design information is available.

Use ENERGY STAR® and FEMP-designated Energy Efficient Products, where available.

On-Site Renewable Energy. Per Executive Order 13423, implement renewable energy generation projects on agency property for agency use, when lifecycle cost effective.

Measurement and Verification. Per the Energy Policy Act of 2005 (EPAct2005) Section 103, install building level electricity meters to track and continuously optimize performance. Per the Energy Independence and Security Act (EISA) 2007, the utility meters must also include natural gas and steam, where natural gas and steam are used.

Benchmarking. Compare annual performance data with previous years' performance data, preferably by entering annual performance data into the ENERGY STAR® Portfolio Manager. For building and space types not available in ENERGY STAR®, use an equivalent benchmarking tool such as the Labs21 benchmarking tool for laboratory buildings.

III. Protect and Conserve Water

Indoor Water. Two options can be used to measure indoor potable water use performance:

- Option 1: Reduce potable water use by 20% compared to a water baseline calculated for the building. The water baseline, for buildings with plumbing fixtures installed in 1994 or later, is 120% of the Uniform Plumbing Codes 2006 or the International Plumbing Codes 2006 fixture performance requirements. The water baseline for plumbing fixtures older than 1994 is 160% of the Uniform Plumbing Codes 2006 or the International Plumbing Codes 2006 fixture performance requirements, or

- Option 2: Reduce building measured potable water use by 20% compared to building water use in 2003 or a year thereafter with quality water data.

Outdoor Water. Three options can be used to measure outdoor potable water use performance:

- Option 1: Reduce potable irrigation water use by 50% compared to conventional methods, or

- Option 2: Reduce building related potable irrigation water use by 50% compared to measured irrigation water use in 2003 or a year thereafter with quality water data, or

- Option 3: Use no potable irrigation water.

Measurement of Water Use. The installation of water meters for building sites with significant indoor and outdoor water use is encouraged. If only one meter is installed,

reduce potable water use (indoor and outdoor combined) by at least 20% compared to building water use in 2003 or a year thereafter with quality water data.

Employ strategies that reduce storm water runoff and discharges of polluted water offsite. Per EISA Section 438, where redevelopment affects site hydrology, use site planning, design, construction, and maintenance strategies to maintain hydrologic conditions during development, or to restore hydrologic conditions following development, to the maximum extent that is technically feasible.

Process Water. Per EPAct 2005 Section 109, when potable water is used to improve a building's energy efficiency, deploy lifecycle cost effective water conservation measures.

Water-Efficient Products. Where available, use EPA's WaterSense-labeled products or other water conserving products. Choose irrigation contractors who are certified through a WaterSense-labeled program.

IV. Enhance Indoor Environmental Quality

Ventilation and Thermal Comfort. Meet ASHRAE Standard 55-2004 Thermal Environmental Conditions for Human Occupancy and ASHRAE Standard 62.1-2007: Ventilation for Acceptable Indoor Air Quality.

Moisture Control. Provide policy and illustrate the use of an appropriate moisture control strategy to prevent building damage, minimize mold contamination, and reduce health risks related to moisture. For façade renovations, Dew Point analysis and a plan for cleanup or infiltration of moisture into building materials are required.

Daylighting and Lighting Controls. Automated lighting controls (occupancy/vacancy sensors with manual-off capability) are provided for appropriate spaces including restrooms, conference and meeting rooms, employee lunch and break rooms, training classrooms, and offices. Two options can be used to meet additional daylighting and lighting controls performance expectations:

- Option 1: Achieve a minimum daylight factor of 2 percent (excluding all direct sunlight penetration) in 50 percent of all space occupied for critical visual tasks, or

- Option 2: Provide occupant controlled lighting, allowing adjustments to suit individual task needs, for 50% of regularly occupied spaces.

Low-Emitting Materials. Use low emitting materials for building modifications, maintenance, and cleaning. In particular, specify the following materials and products to have low pollutant emissions: composite wood products, adhesives, sealants, interior paints and finishes, solvents, carpet systems, janitorial supplies, and furnishings.

Integrated Pest Management. Use integrated pest management techniques as appropriate to minimize pesticide usage. Use EPA-registered pesticides only when needed.

Environmental Tobacco Smoke Control. Prohibit smoking within the building and within 25 feet of all building entrances, operable windows, and building ventilation intakes.

V. Reduce Environmental Impact of Materials

Recycled Content. Per section 6002 of RCRA, for EPA-designated products, use products meeting or exceeding EPA's recycled content recommendations for building modifications, maintenance, and cleaning. For other products, use materials with recycled content such that the sum of postconsumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost or weight) of the total value of the materials in the project. If EPA-designated products meet performance requirements and are available at a reasonable cost, a preference for purchasing them shall be included in all solicitations relevant to construction, operation, maintenance of or use in the building. EPA's recycled content product designations and recycled content recommendations are available on EPA's Comprehensive Procurement Guideline web site at <www.epa.gov/cpg>.

Biobased Content. Per section 9002 of FSRIA, for USDA-designated products, use products with the highest content level per USDA's biobased content recommendations. For other products, use biobased products made from rapidly renewable resources and certified sustainable wood products. If these designated products meet performance requirements and are available at a reasonable cost, a preference for purchasing them should be included in all solicitations relevant to construction, operation, maintenance of or use in the building. USDA's biobased product designations and biobased content recommendations are available on USDA's BioPreferred web site at <www.usda.gov/biopreferred>.

Environmentally Preferable Products. Use products that have a lesser or reduced effect on human health and the environment over their lifecycle when compared with competing products or services that serve the same purpose. A number of standards and ecolabels are available in the marketplace to assist specifiers in making environmentally preferable decisions. For recommendations, consult the Federal Green Construction Guide for Specifiers at <www.wbdg.org/design/greenspec.php>.

Waste and Materials Management. Provide reuse and recycling services for building occupants, where markets or on-site recycling exist. Provide salvage, reuse and recycling services for waste generated from building operations, maintenance, repair and minor renovations, and discarded furnishings, equipment and property. This could include such things as beverage containers and paper from building occupants,

batteries, toner cartridges, outdated computers from an equipment update, and construction materials from a minor renovation.

Ozone Depleting Compounds. Eliminate the use of ozone depleting compounds where alternative environmentally preferable products are available, consistent with either the Montreal Protocol and Title VI of the Clean Air Act Amendments of 1990, or equivalent overall air quality benefits that take into account lifecycle impacts.

Attachment B

Executive Order 13423 Fact Sheet

Attachment B

Executive Order 13423 Fact Sheet

OFFICE OF THE FEDERAL ENVIRONMENTAL EXECUTIVE
1200 PENNSYLVANIA AVENUE, NW MAIL CODE 1600S WASHINGTON, DC 20460
(202) 564-1297 WWW.OFEE.GOV TASK_FORCE@OFEE.GOV

PROMOTING SUSTAINABLE ENVIRONMENTAL STEWARDSHIP THROUGHOUT THE FEDERAL GOVERNMENT

FACT SHEET
Executive Order
Strengthening Federal Environmental, Energy, and Transportation Management

The new Executive Order requires Federal agencies to lead by example in advancing the nation's energy security and environmental performance by achieving these goals:

- **VEHICLES:** Increase purchase of alternative fuel, hybrid, and plug-in hybrid vehicles when commercially available.
- **PETROLEUM CONSERVATION:** Reduce petroleum consumption in fleet vehicles by 2% annually through 2015.
- **ALTERNATIVE FUEL USE:** Increase alternative fuel consumption at least 10% annually.
- **ENERGY EFFICIENCY:** Reduce energy intensity 30% by 2015.
- **GREENHOUSE GASES:** Reduce greenhouse gas emissions through reduction of energy intensity by 3% annually or 30% by 2105.
- **RENEWABLE POWER:** At least 50% of current renewable energy purchases must come from new renewable sources (in service after January 1, 1999).
- **BUILDING PERFORMANCE:** Construct or renovate buildings in accordance with sustainability strategies, including resource conservation, reduction, and use; siting; and indoor environmental quality.
- **WATER CONSERVATION:** Reduce water consumption intensity by 2% annually through 2015.
- **PROCUREMENT:** Expand purchases of environmentally-sound goods and services, including biobased products.
- **POLLUTION PREVENTION:** Reduce use of chemicals and toxic materials and purchase lower risk chemicals and toxic materials from top priority list.
- **ELECTRONICS MANAGEMENT:** Annually, 95% of electronic products purchased must meet Electronic Product Environmental Assessment Tool standards where applicable; enable Energy Star® features on 100% of computers and monitors; and reuse, donate, sell, or recycle 100% of electronic products using environmentally sound management practices.
- **ENVIRONMENTAL MANAGEMENT SYSTEMS:** By 2010, increase to at least 2,500 the number of Federal operations that implement environmental management systems, up from about 1,000 today.

The Executive Order consolidates and strengthens five executive orders and two memorandums of understanding and establishes new and updated goals, practices, and reporting requirements for environmental, energy, and transportation performance and accountability.

BACKGROUND ON EXECUTIVE ORDER GOALS AND COMPARISON WITH PAST AGENCY PERFORMANCE

- **Petroleum consumption**: Updates expired goals of E.O. 13149. The Federal government had reduced petroleum consumption by 70% (119 to 36 trillion Btu) from 1985-2005.
- **Energy efficiency**: The new 30% energy efficiency goal seeks to achieve in 10 years the same level of improvement that Federal agencies achieved in the last 20 years and is 50% more stringent than the goal in the Energy Policy Act of 2005. The Federal government improved energy efficiency 29.6% between 1985 and 2005.
- **GHG emissions**: Will be realized through other E.O. goals that will exceed the prior 30% goal (E.O. 13123). The Federal government reduced GHG emissions by 22.1% (14.9 to 11.6 MTCE) between 1990 and 2005, towards the E.O. 13123 goal of 30% by 2010.
- **Renewable power**: The Energy Policy Act of 2005 sets a renewable energy goal but does not require that any percentage come from new sources. The prior E.O. 13123 set a goal of 2.5% for renewable power purchases. The Federal government exceeded that goal with purchases totaling 6.9% during the period 2000-2005.
- **Water consumption**: Prior orders did not include such a goal. However, good environmental practices reduced water consumption by 19.6% from 2000-2005.
- **Procurement**: The new E.O. and guidance require agencies to integrate four existing disparate purchasing requirements into an integrated Federal purchasing effort that applies to all types of acquisitions of goods and services. Federal purchasing of energy efficient, recycled content, biobased, and environmentally preferable products will increase as a result. The E.O. also continues the requirement that agencies purchase office paper containing 30 percent postconsumer fiber.
- **Buildings**: The order makes mandatory the elements of the High Performance Buildings MOU signed by 19 agencies in January 2006. From 1985 to 2005, on average, building energy use decreased 12.9%, or 16.3% energy intensity (Btu/gross sq. ft).
- **Electronics**: The order makes mandatory the elements of the 2004 Federal Electronics Stewardship MOU signed by 12 agencies and the Executive Office of the President. The Federal government spends approximately $60 billion annually on IT-related purchases.
- **Toxics**: The order requires agencies to reduce their purchase and use of hazardous and toxic chemicals.

Attachment C

Hiring the Right Team

Attachment C

Hiring the Right Team

THE HIGH PERFORMANCE PORTFOLIO:

HIRING THE RIGHT TEAM – INTEGRATED DESIGN SERVICES

BETTERBRICKS
Bottom line thinking on energy.

Designing and creating high performance buildings is a maturing discipline. Many practices and strategies differ significantly from traditional development, requiring new skills and technical expertise to deliver projects at their optimum level of energy performance. Further, development of high performance buildings require a fundamental shift in management style – an innovative, collaborative, multi-disciplinary approach – which can prove difficult to master. Owners and developers seeking architectural, engineering, and construction services should re-examine the process for securing qualified firms, and focus on finding those that either have experience in integrated design or can quickly come up to speed.

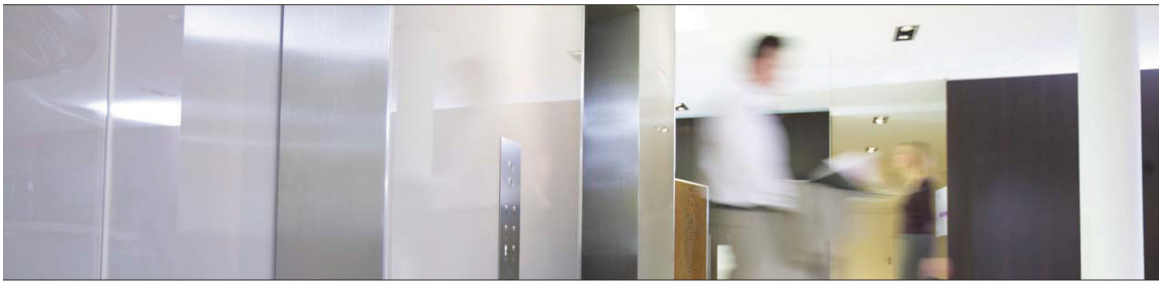
IN DEPTH:

The practice of integrated design (and high performance buildings as a whole) is rapidly evolving. Many architects and designers are still developing and refining their skills in these areas. Ideally, seek an experienced design team that has had success managing an integrated design process.

However, it may prove difficult to locate the exact qualifications you need. If that's the case, consider ways to allow for "on-the-job training" among team members. Even with an experienced group, allocate time and resources for the team to research innovative strategies and techniques – a consideration unique to integrated design services, given their cutting-edge nature. This doesn't necessarily translate to additional time or cost. Firms eager to boost their expertise and professional reputation might be willing to adjust their negotiated fee or the timing of that fee in order to build their knowledge base.

When evaluating a design team, consider their familiarity with the following concepts and techniques:

- Employing a holistic approach to building systems, materials, design, and operations to maximize efficiency, occupant comfort, and cost-effectiveness
- Conducting energy modeling
- Minimizing building energy loads
- Implementing efficient lighting strategies, integrated with daylighting
- Employing natural ventilation



- Assessing alternative mechanical system strategies
- Training building staff on enhanced operations & maintenance procedures
- Assessing life-cycle costs of building systems
- Using building information models (BIM) as a tool for team integration
- Working collaboratively early in the design process with multiple stakeholders

The firm should not only be technically proficient, but also possess excellent management skills…

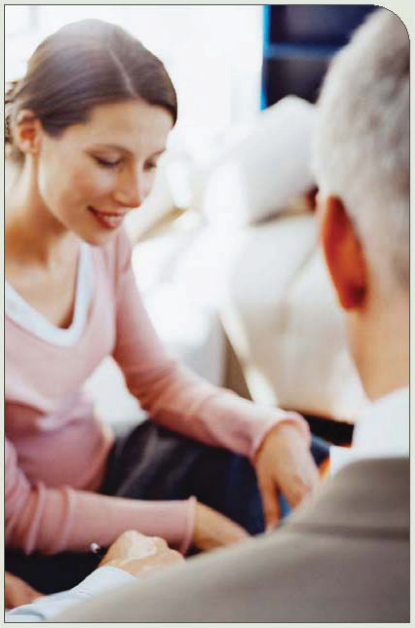
The firm should not only be technically proficient, but also possess excellent management skills, which are essential for the highly collaborative integrated design process. Gauge the firm's management style, and see if they have the flexibility to break away from the silos of traditional design. Team members must be able to effectively communicate design details and solicit input from an expanded circle of professionals, such as owners, developers, architects, engineers, contractors, proposed occupants, commissioning agents, O&M staff, energy consultants, mixed-use experts, and others. In particular, look for personnel that are fluent in managerial issues, cross-functional teams, and the other concepts associated with integrated design.

The selected design team must be familiar with and supportive of value the commissioning agent brings to the process. Integrated design incorporates commissioning from the earliest stages, and the design team must be prepared to work with third-party commissioning agents at multiple touch-points.

Check references carefully, and broaden the scope of your interviews to explore integrated design qualifications. Ask questions of potential team members. For example, find out whether the firm utilizes an integrated approach only in the early phases of design or throughout the entire process. Also, be sure to understand what their definition of integrated design really is – it might not necessarily meet your criteria.

AIA RESOURCES

The American Institute of Architects (AIA) has recognized that integrated design represents a shift in the traditional design process, and is currently preparing reference materials for use by the development community to promote the adoption of this practice. The *AIA Integrated Project Delivery: A Guide* is expected to be released in November of 2007. Also, *AIA Contract Documents for Integrated Project Delivery* – contract templates for use by design teams - will be released in conjunction with the AIA national convention in the spring of 2008.



Even if you've found a team with the necessary skills, don't assume the architects, designers, and engineers know everything. If necessary, bring in additional expertise and consultants to supplement the team. For example, "green building" or sustainability consultants can play an important role in the development of high-performance buildings, often running charrettes or guiding developers through green building certification programs. Specialists in energy, site sustainability, lighting, green materials, or new technologies might also be required.

Some architectural firms have these experts on staff; others bring on external consultants for each project. Find out whether potential design teams plan to bring in special consultants, and if not, include provisions for this in the contract. Or you might consider hiring sustainability consultants first, and then working with them to search for architects, engineers, contractors, and other experts.

As an additional way of maximizing expertise, encourage a cross-functional mindset. Though it's important to involve specialists in all areas, the team should foster a climate of contribution. For example, the water expert can come up with HVAC solutions; the HVAC expert can come up with building envelope solutions. Seek and welcome input from a wide array of views, as opposed to a traditional hand-off process from architect to engineer to contractor.

When you're ready to secure the firm, pay attention to several contractual issues unique to integrated design:

- Integrated design is more time-intensive early in the process compared to a conventional project, with less time required during later design and construction stages. While design teams traditionally receive a percentage of the total fee during each phase of the project, the fees specified in contracts for integrated design services should reflect the timing of involvement and a greater effort in the early design stages.
- Typically, a mechanical engineer's fee is a percentage of the total mechanical equipment installed. This set-up makes less sense for high performance buildings, which aim for reduced loads and minimal equipment size. Establish a fee structure that rewards efficiency, not excess.

Establish a fee structure that rewards efficiency, not excess.

- Ensure that the architects have their team established early on, including all sub-consultants, engineers, and other experts. To gain confidence that the team has all the necessary skills and to ensure that all members can contribute in the pre-design phase, you'll need to know who they are before you sign the contract.
- Build energy performance goals into contracts for all sub-contractors and consultants, in addition to the architectural firm's contract.
- Finally, remember that integrated design can result in a lower overall project cost. Potentially higher up-front costs will be recovered later during construction.

THE BOTTOM LINE:

- Seek an experienced design team with a proven track record, but acknowledge that some on-the-job training will be required
- Evaluate teams' familiarity with innovative integrated design methodologies, energy modeling, life-cycle cost analysis, and building operator training
- The design team should possess the fundamental management skills necessary to lead in a collaborative team environment
- Bring in additional expertise and consultants to supplement the team as necessary, and encourage a cross-functional mindset to maximize expertise
- Fully integrate the commissioning agent's role throughout the integrated design process.
- Contracts may need to be re-examined to set proper expectations about project milestones, payment schedules, and performance criteria

LEARN MORE:

The High Performance Portfolio Framework
www.betterbricks.com/office/framework

Sample RFP for Integrated Design Services
www.betterbricks.com/office/briefs

BetterBricks Design & Construction Resources
www.betterbricks.com/design

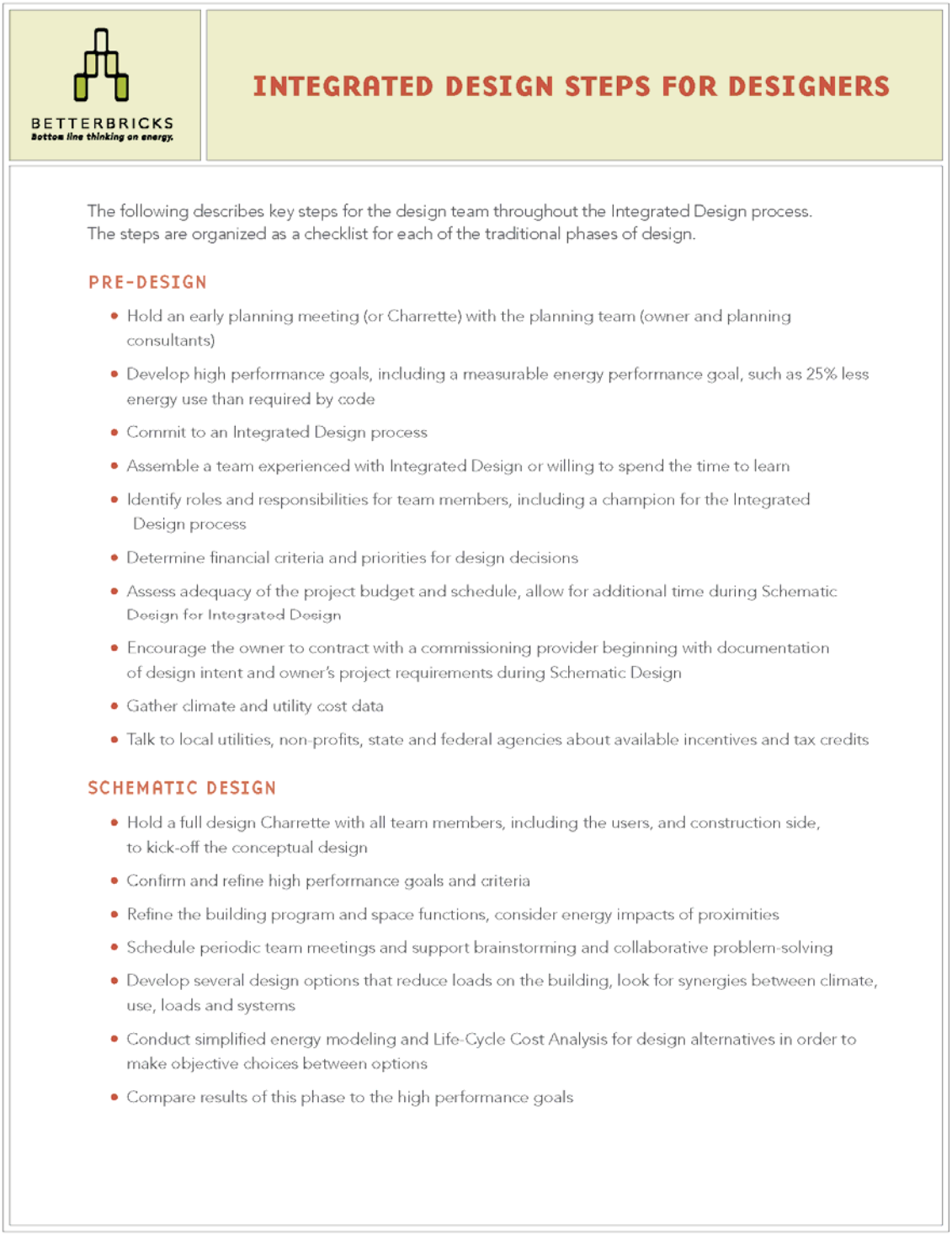
BETTERBRICKS
Bottom line thinking on energy.

Attachment D

Integrated Design Steps for Designers

Attachment D

Integrated Design Steps for Designers



BETTERBRICKS
Bottom line thinking on energy.

INTEGRATED DESIGN STEPS FOR DESIGNERS

The following describes key steps for the design team throughout the Integrated Design process. The steps are organized as a checklist for each of the traditional phases of design.

PRE-DESIGN

- Hold an early planning meeting (or Charrette) with the planning team (owner and planning consultants)
- Develop high performance goals, including a measurable energy performance goal, such as 25% less energy use than required by code
- Commit to an Integrated Design process
- Assemble a team experienced with Integrated Design or willing to spend the time to learn
- Identify roles and responsibilities for team members, including a champion for the Integrated Design process
- Determine financial criteria and priorities for design decisions
- Assess adequacy of the project budget and schedule, allow for additional time during Schematic Design for Integrated Design
- Encourage the owner to contract with a commissioning provider beginning with documentation of design intent and owner's project requirements during Schematic Design
- Gather climate and utility cost data
- Talk to local utilities, non-profits, state and federal agencies about available incentives and tax credits

SCHEMATIC DESIGN

- Hold a full design Charrette with all team members, including the users, and construction side, to kick-off the conceptual design
- Confirm and refine high performance goals and criteria
- Refine the building program and space functions, consider energy impacts of proximities
- Schedule periodic team meetings and support brainstorming and collaborative problem-solving
- Develop several design options that reduce loads on the building, look for synergies between climate, use, loads and systems
- Conduct simplified energy modeling and Life-Cycle Cost Analysis for design alternatives in order to make objective choices between options
- Compare results of this phase to the high performance goals

DESIGN DEVELOPMENT

- Discuss potential building systems and identify high efficiency options
- Conduct whole-building energy modeling to confirm the design meets the high performance goals, and to confirm eligibility for rating systems, incentives and tax credits
- Verify, with the owner, that the design documents at this stage contain the strategies to meet the performance goals
- Ask the whole team to help assess the preliminary cost model
- During value engineering, vigorously defend the value of high performance features as being integral to the whole building design and function

CONSTRUCTION DOCUMENTS

- Invite the commissioning provider, and maintenance and operations staff to conduct a document review of building systems
- Hold frequent coordination meetings to keep communication flowing among team members
- Update the cost model and schedule with input from the team
- Request documentation from the team that indicates how the project compares to the high performance goals set in Pre-Design
- Verify that the construction documents contain the strategies to meet the performance goals (consider asking the commissioning provider and contractor, to conduct this review)

CONSTRUCTION

- Conduct a construction kick-off meeting with the contractors and subcontractors to secure their commitment to the high performance goals before construction starts
- Review submittals and substitution requests for impact on the performance goals
- At the end of construction and prior to occupancy, allow time for the commissioning provider to complete functional testing and O&M training
- Review the commissioning report with the owner and have the contractor address any recommended repairs or alterations

OCCUPANCY

- Assist the owner and facility team to establish an ongoing energy management program, including training and periodic re-commissioning
- After the warranty period shakedown, verify that high performance goals were met, assess occupant satisfaction, and share feedback with the whole team

Attachment E

Checklist for LEED for New Construction

Attachment E
Checklist for LEED for New Construction

LEED 2009 for New Construction and Major Renovation
Project Scorecard

Project Name:
Project Address:

Yes	?	No			
			SUSTAINABLE SITES		**26 Points**
Y			Prereq 1	**Construction Activity Pollution Prevention**	**Required**
			Credit 1	**Site Selection**	**1**
			Credit 2	**Development Density and Community Connectivity**	**5**
			Credit 3	**Brownfield Redevelopment**	**1**
			Credit 4.1	**Alternative Transportation -** Public Transportation Access	**6**
			Credit 4.2	**Alternative Transportation -** Bicycle Storage and Changing Rooms	**1**
			Credit 4.3	**Alternative Transportation -** Low-Emitting and Fuel-Efficient Vehicles	**3**
			Credit 4.4	**Alternative Transportation -** Parking Capacity	**2**
			Credit 5.1	**Site Development -** Protect or Restore Habitat	**1**
			Credit 5.2	**Site Development -** Maximize Open Space	**1**
			Credit 6.1	**Stormwater Design -** Quantity Control	**1**
			Credit 6.2	**Stormwater Design -** Quality Control	**1**
			Credit 7.1	**Heat Island Effect -** Nonroof	**1**
			Credit 7.2	**Heat Island Effect -** Roof	**1**
			Credit 8	**Light Pollution Reduction**	**1**
Yes	?	No			
			WATER EFFICIENCY		**10 Points**
					4
Y			Prereq 1	**Water Use Reduction**	**Required**
			Credit 1	**Water Efficient Landscaping**	**2 to 4**
				Reduce by 50%	2
				No Potable Water Use or Irrigation	4
			Credit 2	**Innovative Wastewater Technologies**	2
			Credit 3	**Water Use Reduction**	**2 to 4**
				Reduce by 30%	2
				Reduce by 35%	3
				Reduce by 40%	4
			ENERGY & ATMOSPHERE		**35 Points**
Y			Prereq 1	**Fundamental Commissioning of Building Energy Systems**	**Required**
Y			Prereq 2	**Minimum Energy Performance**	**Required**
Y			Prereq 3	**Fundamental Refrigerant Management**	**Required**
			Credit 1	**Optimize Energy Performance**	**1 to 19**
				Improve by 12% for New Buildings or 8% for Existing Building Renovations	1
				Improve by 14% for New Buildings or 10% for Existing Building Renovations	2
				Improve by 16% for New Buildings or 12% for Existing Building Renovations	3
				Improve by 18% for New Buildings or 14% for Existing Building Renovations	4
				Improve by 20% for New Buildings or 16% for Existing Building Renovations	5
				Improve by 22% for New Buildings or 18% for Existing Building Renovations	6
				Improve by 24% for New Buildings or 20% for Existing Building Renovations	7
				Improve by 26% for New Buildings or 22% for Existing Building Renovations	8
				Improve by 28% for New Buildings or 24% for Existing Building Renovations	9
				Improve by 30% for New Buildings or 26% for Existing Building Renovations	10
				Improve by 32% for New Buildings or 28% for Existing Building Renovations	11
				Improve by 34% for New Buildings or 30% for Existing Building Renovations	12
				Improve by 36% for New Buildings or 32% for Existing Building Renovations	13
				Improve by 38% for New Buildings or 34% for Existing Building Renovations	14
				Improve by 40% for New Buildings or 36% for Existing Building Renovations	15
				Improve by 42% for New Buildings or 38% for Existing Building Renovations	16
				Improve by 44% for New Buildings or 40% for Existing Building Renovations	17
				Improve by 46% for New Buildings or 42% for Existing Building Renovations	18
				Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19
			Credit 2	**On-Site Renewable Energy**	**1 to 7**
				1% Renewable Energy	1
				3% Renewable Energy	2
				5% Renewable Energy	3
				7% Renewable Energy	4
				9% Renewable Energy	5
				11% Renewable Energy	6
				13% Renewable Energy	7
			Credit 3	**Enhanced Commissioning**	**2**
			Credit 4	**Enhanced Refrigerant Management**	**2**
			Credit 5	**Measurement and Verification**	**3**
			Credit 6	**Green Power**	**2**
Yes	?	No			
			MATERIALS & RESOURCES		**14 Points**

Y	Prereq 1	**Storage and Collection of Recyclables**	**Required**
	Credit 1.1	**Building Reuse** - Maintain Existing Walls, Floors and Roof	**1 to 3**
		Reuse 55%	1
		Reuse 75%	2
		Reuse 95%	3
	Credit 1.2	**Building Reuse -** Maintain Interior Nonstructural Elements	**1**
	Credit 2	**Construction Waste Management**	**1 to 2**
		50% Recycled or Salvaged	1
		75% Recycled or Salvaged	2
	Credit 3	**Materials Reuse**	**1 to 2**
		Reuse 5%	1
		Reuse 10%	2
	Credit 4	**Recycled Content**	**1 to 2**
		10% of Content	1
		20% of Content	2
	Credit 5	**Regional Materials**	**1 to 2**
		10% of Materials	1
		20% of Materials	2
	Credit 6	**Rapidly Renewable Materials**	**1**
	Credit 7	**Certified Wood**	**1**

Yes	?	No		
			INDOOR ENVIRONMENTAL QUALITY	**15 Points**

Y	Prereq 1	**Minimum Indoor Air Quality Performance**	**Required**
Y	Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	**Required**
	Credit 1	**Outdoor Air Delivery Monitoring**	**1**
	Credit 2	**Increased Ventilation**	**1**
	Credit 3.1	**Construction Indoor Air Quality Management Plan -** During Construction	**1**
	Credit 3.2	**Construction Indoor Air Quality Management Plan -** Before Occupancy	**1**
	Credit 4.1	**Low-Emitting Materials -** Adhesives and Sealants	**1**
	Credit 4.2	**Low-Emitting Materials -** Paints and Coatings	**1**
	Credit 4.3	**Low-Emitting Materials -** Flooring Systems	**1**
	Credit 4.4	**Low-Emitting Materials -** Composite Wood and Agrifiber Products	**1**
	Credit 5	**Indoor Chemical and Pollutant Source Control**	**1**
	Credit 6.1	**Controllability of Systems -** Lighting	**1**
	Credit 6.2	**Controllability of Systems -** Thermal Comfort	**1**
	Credit 7.1	**Thermal Comfort -** Design	**1**
	Credit 7.2	**Thermal Comfort -** Verification	**1**
	Credit 8.1	**Daylight and Views -** Daylight	**1**
	Credit 8.2	**Daylight and Views -** Views	**1**

Yes	?	No		
			INNOVATION IN DESIGN	**6 Points**

	Credit 1	**Innovation in Design**	**1 to 5**
		Innovation or Exemplary Performance	1
		Innovation or Exemplary Performance	1
		Innovation or Exemplary Performance	1
		Innovation	1
		Innovation	1
	Credit 2	**LEED® Accredited Professional**	**1**

Yes	?	No		
			REGIONAL PRIORITY	**4 Points**

	Credit 1	**Regional Priority**	**1 to 4**
		Regionally Defined Credit Achieved	1
		Regionally Defined Credit Achieved	1
		Regionally Defined Credit Achieved	1
		Regionally Defined Credit Achieved	1

Yes	?	No		
			PROJECT TOTALS (Certification Estimates)	**110 Points**

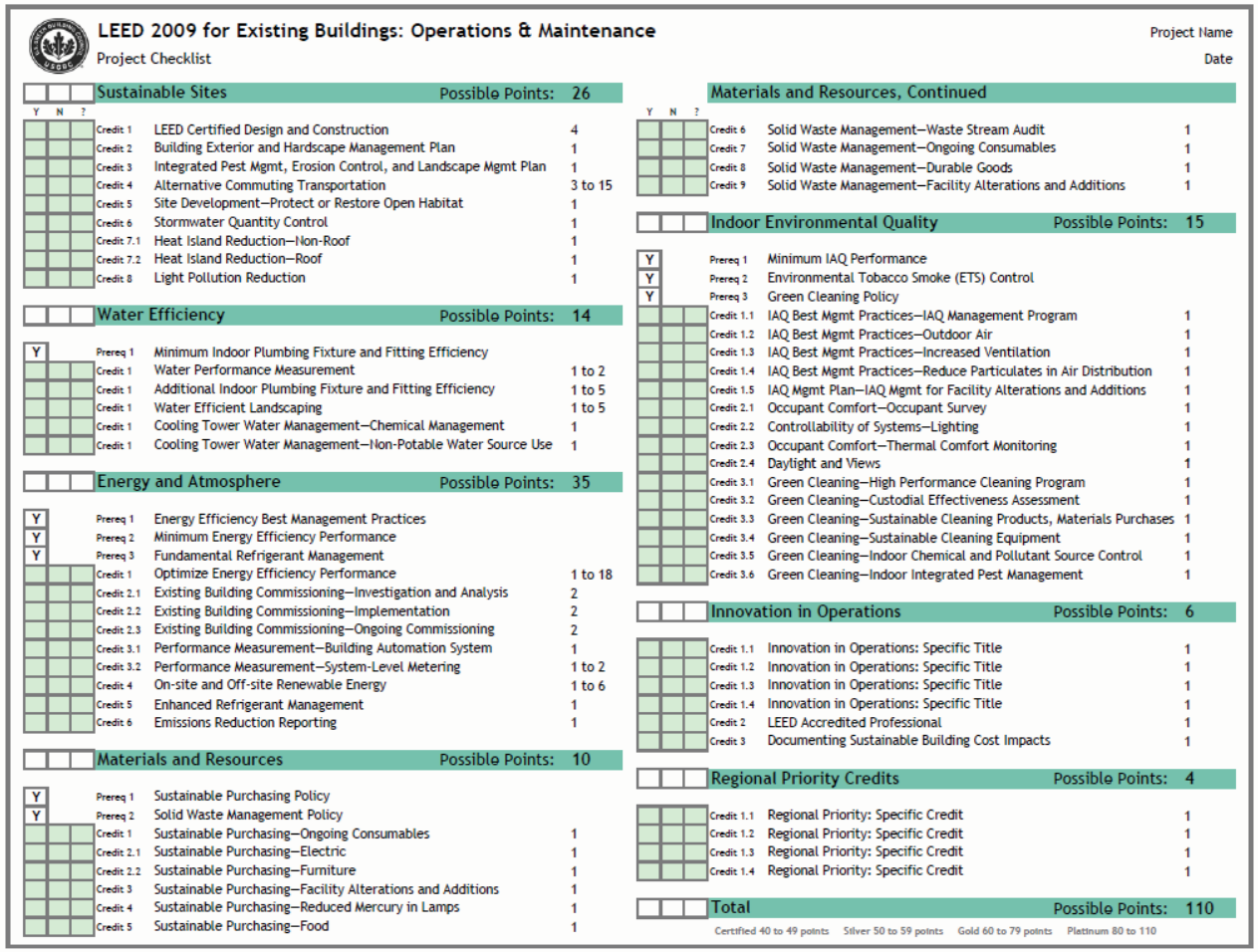
Certified: 40-49 points Silver: 50-59 points Gold: 60-79 points Platinum: 80+ points

Attachment F

Checklist for LEED for Existing Buildings: Operations & Maintenance

Attachment F

Checklist for LEED for Existing Buildings: Operations & Maintenance



LEED 2009 for Existing Buildings: Operations & Maintenance

Project Checklist

Project Name

Date

Sustainable Sites — Possible Points: 26

Y	N	?			
			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 Mgmt Plan	1
			Credit 4	Alternative Commuting Transportation	3 to 15
			Credit 5	Site Development—Protect or Restore Open Habitat	1
			Credit 6	Stormwater Quantity Control	1
			Credit 7.1	Heat Island Reduction—Non-Roof	1
			Credit 7.2	Heat Island Reduction—Roof	1
			Credit 8	Light Pollution Reduction	1

Water Efficiency — Possible Points: 14

Y	N	?			
Y			Prereq 1	Minimum Indoor Plumbing Fixture and Fitting Efficiency	
			Credit 1	Water Performance Measurement	1 to 2
			Credit 1	Additional Indoor Plumbing Fixture and Fitting Efficiency	1 to 5
			Credit 1	Water Efficient Landscaping	1 to 5
			Credit 1	Cooling Tower Water Management—Chemical Management	1
			Credit 1	Cooling Tower Water Management—Non-Potable Water Source Use	1

Energy and Atmosphere — Possible Points: 35

Y	N	?			
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
			Credit 2.1	Existing Building Commissioning—Investigation and Analysis	2
			Credit 2.2	Existing Building Commissioning—Implementation	2
			Credit 2.3	Existing Building Commissioning—Ongoing Commissioning	2
			Credit 3.1	Performance Measurement—Building Automation System	1
			Credit 3.2	Performance Measurement—System-Level Metering	1 to 2
			Credit 4	On-site and Off-site Renewable Energy	1 to 6
			Credit 5	Enhanced Refrigerant Management	1
			Credit 6	Emissions Reduction Reporting	1

Materials and Resources — Possible Points: 10

Y	N	?			
Y			Prereq 1	Sustainable Purchasing Policy	
Y			Prereq 2	Solid Waste Management Policy	
			Credit 1	Sustainable Purchasing—Ongoing Consumables	1
			Credit 2.1	Sustainable Purchasing—Electric	1
			Credit 2.2	Sustainable Purchasing—Furniture	1
			Credit 3	Sustainable Purchasing—Facility Alterations and Additions	1
			Credit 4	Sustainable Purchasing—Reduced Mercury in Lamps	1
			Credit 5	Sustainable Purchasing—Food	1

Materials and Resources, Continued

Y	N	?			
			Credit 6	Solid Waste Management—Waste Stream Audit	1
			Credit 7	Solid Waste Management—Ongoing Consumables	1
			Credit 8	Solid Waste Management—Durable Goods	1
			Credit 9	Solid Waste Management—Facility Alterations and Additions	1

Indoor Environmental Quality — Possible Points: 15

Y	N	?			
Y			Prereq 1	Minimum IAQ Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
Y			Prereq 3	Green Cleaning Policy	
			Credit 1.1	IAQ Best Mgmt Practices—IAQ Management Program	1
			Credit 1.2	IAQ Best Mgmt Practices—Outdoor Air	1
			Credit 1.3	IAQ Best Mgmt Practices—Increased Ventilation	1
			Credit 1.4	IAQ Best Mgmt Practices—Reduce Particulates in Air Distribution	1
			Credit 1.5	IAQ Mgmt Plan—IAQ Mgmt for Facility Alterations and Additions	1
			Credit 2.1	Occupant Comfort—Occupant Survey	1
			Credit 2.2	Controllability of Systems—Lighting	1
			Credit 2.3	Occupant Comfort—Thermal Comfort Monitoring	1
			Credit 2.4	Daylight and Views	1
			Credit 3.1	Green Cleaning—High Performance Cleaning Program	1
			Credit 3.2	Green Cleaning—Custodial Effectiveness Assessment	1
			Credit 3.3	Green Cleaning—Sustainable Cleaning Products, Materials Purchases	1
			Credit 3.4	Green Cleaning—Sustainable Cleaning Equipment	1
			Credit 3.5	Green Cleaning—Indoor Chemical and Pollutant Source Control	1
			Credit 3.6	Green Cleaning—Indoor Integrated Pest Management	1

Innovation in Operations — Possible Points: 6

			Credit 1.1	Innovation in Operations: Specific Title	1
			Credit 1.2	Innovation in Operations: Specific Title	1
			Credit 1.3	Innovation in Operations: Specific Title	1
			Credit 1.4	Innovation in Operations: Specific Title	1
			Credit 2	LEED Accredited Professional	1
			Credit 3	Documenting Sustainable Building Cost Impacts	1

Regional Priority Credits — Possible Points: 4

			Credit 1.1	Regional Priority: Specific Credit	1
			Credit 1.2	Regional Priority: Specific Credit	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1

Total — Possible Points: 110

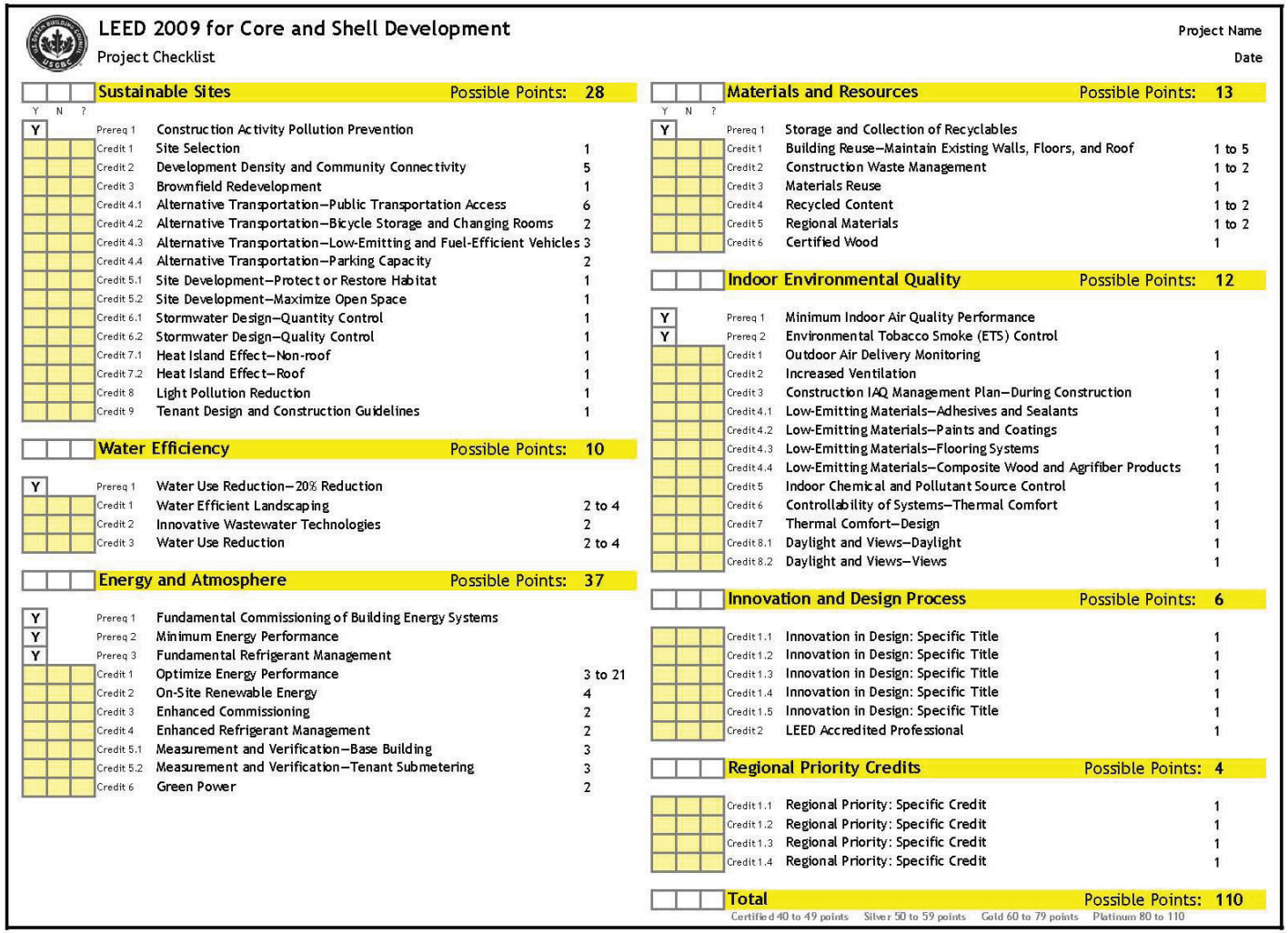
Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

Attachment G

Checklist for LEED for Core and Shell

Attachment G

Checklist for LEED for Core and Shell



LEED 2009 for Core and Shell Development

Project Checklist

Project Name

Date

Y	N	?			
			Sustainable Sites	**Possible Points:**	**28**
Y			Prereq 1	Construction Activity Pollution Prevention	
			Credit 1	Site Selection	1
			Credit 2	Development Density and Community Connectivity	5
			Credit 3	Brownfield Redevelopment	1
			Credit 4.1	Alternative Transportation—Public Transportation Access	6
			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	2
			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
			Credit 4.4	Alternative Transportation—Parking Capacity	2
			Credit 5.1	Site Development—Protect or Restore Habitat	1
			Credit 5.2	Site Development—Maximize Open Space	1
			Credit 6.1	Stormwater Design—Quantity Control	1
			Credit 6.2	Stormwater Design—Quality Control	1
			Credit 7.1	Heat Island Effect—Non-roof	1
			Credit 7.2	Heat Island Effect—Roof	1
			Credit 8	Light Pollution Reduction	1
			Credit 9	Tenant Design and Construction Guidelines	1
			Water Efficiency	**Possible Points:**	**10**
Y			Prereq 1	Water Use Reduction—20% Reduction	
			Credit 1	Water Efficient Landscaping	2 to 4
			Credit 2	Innovative Wastewater Technologies	2
			Credit 3	Water Use Reduction	2 to 4
			Energy and Atmosphere	**Possible Points:**	**37**
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
			Credit 1	Optimize Energy Performance	3 to 21
			Credit 2	On-Site Renewable Energy	4
			Credit 3	Enhanced Commissioning	2
			Credit 4	Enhanced Refrigerant Management	2
			Credit 5.1	Measurement and Verification—Base Building	3
			Credit 5.2	Measurement and Verification—Tenant Submetering	3
			Credit 6	Green Power	2

Y	N	?			
			Materials and Resources	**Possible Points:**	**13**
Y			Prereq 1	Storage and Collection of Recyclables	
			Credit 1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 5
			Credit 2	Construction Waste Management	1 to 2
			Credit 3	Materials Reuse	1
			Credit 4	Recycled Content	1 to 2
			Credit 5	Regional Materials	1 to 2
			Credit 6	Certified Wood	1
			Indoor Environmental Quality	**Possible Points:**	**12**
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
			Credit 1	Outdoor Air Delivery Monitoring	1
			Credit 2	Increased Ventilation	1
			Credit 3	Construction IAQ Management Plan—During Construction	1
			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
			Credit 5	Indoor Chemical and Pollutant Source Control	1
			Credit 6	Controllability of Systems—Thermal Comfort	1
			Credit 7	Thermal Comfort—Design	1
			Credit 8.1	Daylight and Views—Daylight	1
			Credit 8.2	Daylight and Views—Views	1
			Innovation and Design Process	**Possible Points:**	**6**
			Credit 1.1	Innovation in Design: Specific Title	1
			Credit 1.2	Innovation in Design: Specific Title	1
			Credit 1.3	Innovation in Design: Specific Title	1
			Credit 1.4	Innovation in Design: Specific Title	1
			Credit 1.5	Innovation in Design: Specific Title	1
			Credit 2	LEED Accredited Professional	1
			Regional Priority Credits	**Possible Points:**	**4**
			Credit 1.1	Regional Priority: Specific Credit	1
			Credit 1.2	Regional Priority: Specific Credit	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1
			Total	**Possible Points:**	**110**

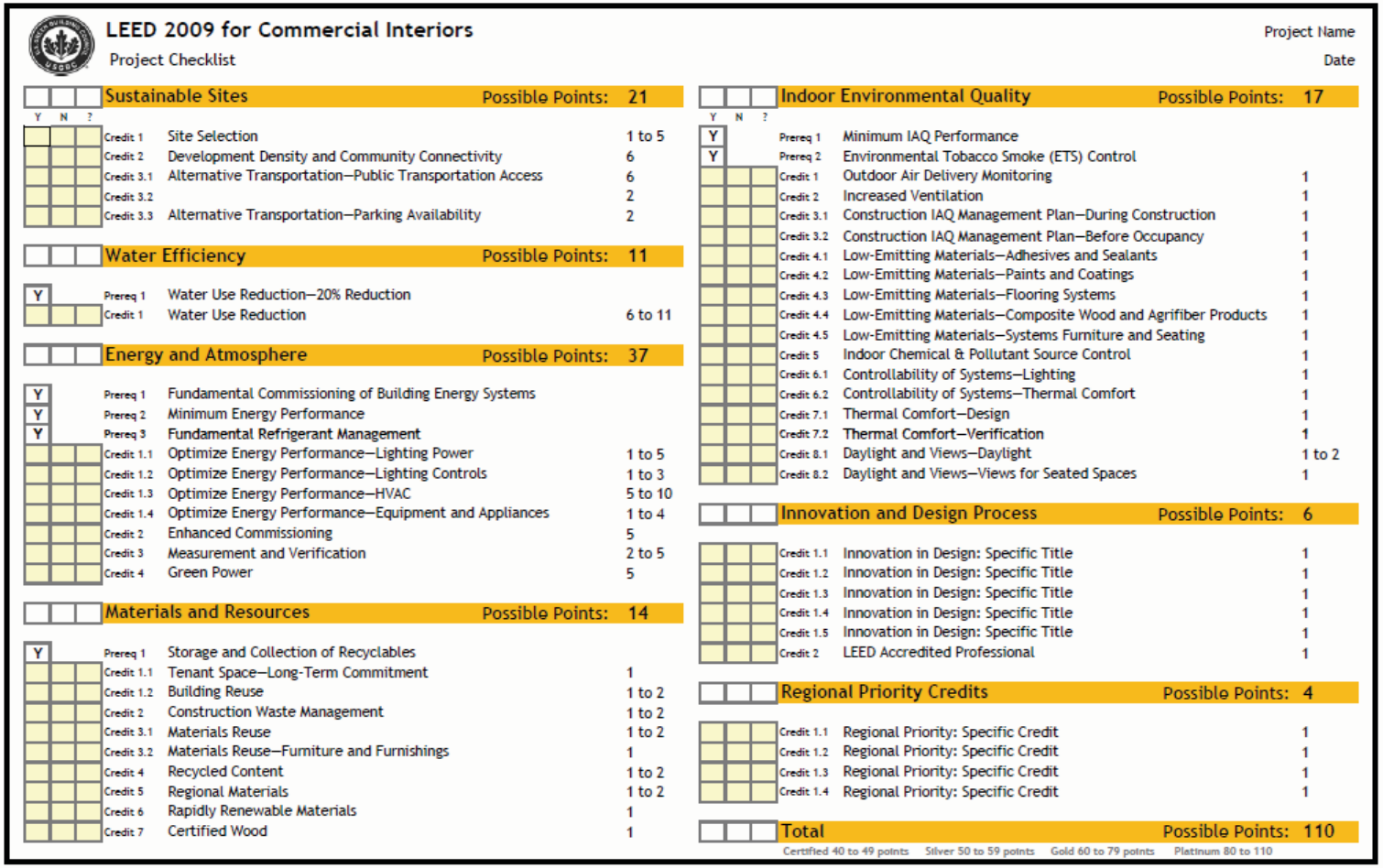
Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

Attachment H

Checklist for LEED for Commercial Interiors

Attachment H

Checklist for LEED for Commercial Interiors



LEED 2009 for Commercial Interiors

Project Checklist

Project Name

Date

Y	N	?			
			Sustainable Sites	**Possible Points:**	**21**
			Credit 1	Site Selection	1 to 5
			Credit 2	Development Density and Community Connectivity	6
			Credit 3.1	Alternative Transportation—Public Transportation Access	6
			Credit 3.2		2
			Credit 3.3	Alternative Transportation—Parking Availability	2
			Water Efficiency	**Possible Points:**	**11**
Y			Prereq 1	Water Use Reduction—20% Reduction	
			Credit 1	Water Use Reduction	6 to 11
			Energy and Atmosphere	**Possible Points:**	**37**
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
			Credit 1.1	Optimize Energy Performance—Lighting Power	1 to 5
			Credit 1.2	Optimize Energy Performance—Lighting Controls	1 to 3
			Credit 1.3	Optimize Energy Performance—HVAC	5 to 10
			Credit 1.4	Optimize Energy Performance—Equipment and Appliances	1 to 4
			Credit 2	Enhanced Commissioning	5
			Credit 3	Measurement and Verification	2 to 5
			Credit 4	Green Power	5
			Materials and Resources	**Possible Points:**	**14**
Y			Prereq 1	Storage and Collection of Recyclables	
			Credit 1.1	Tenant Space—Long-Term Commitment	1
			Credit 1.2	Building Reuse	1 to 2
			Credit 2	Construction Waste Management	1 to 2
			Credit 3.1	Materials Reuse	1 to 2
			Credit 3.2	Materials Reuse—Furniture and Furnishings	1
			Credit 4	Recycled Content	1 to 2
			Credit 5	Regional Materials	1 to 2
			Credit 6	Rapidly Renewable Materials	1
			Credit 7	Certified Wood	1

Y	N	?			
			Indoor Environmental Quality	**Possible Points:**	**17**
Y			Prereq 1	Minimum IAQ Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
			Credit 1	Outdoor Air Delivery Monitoring	1
			Credit 2	Increased Ventilation	1
			Credit 3.1	Construction IAQ Management Plan—During Construction	1
			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
			Credit 4.5	Low-Emitting Materials—Systems Furniture and Seating	1
			Credit 5	Indoor Chemical & Pollutant Source Control	1
			Credit 6.1	Controllability of Systems—Lighting	1
			Credit 6.2	Controllability of Systems—Thermal Comfort	1
			Credit 7.1	Thermal Comfort—Design	1
			Credit 7.2	Thermal Comfort—Verification	1
			Credit 8.1	Daylight and Views—Daylight	1 to 2
			Credit 8.2	Daylight and Views—Views for Seated Spaces	1
			Innovation and Design Process	**Possible Points:**	**6**
			Credit 1.1	Innovation in Design: Specific Title	1
			Credit 1.2	Innovation in Design: Specific Title	1
			Credit 1.3	Innovation in Design: Specific Title	1
			Credit 1.4	Innovation in Design: Specific Title	1
			Credit 1.5	Innovation in Design: Specific Title	1
			Credit 2	LEED Accredited Professional	1
			Regional Priority Credits	**Possible Points:**	**4**
			Credit 1.1	Regional Priority: Specific Credit	1
			Credit 1.2	Regional Priority: Specific Credit	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1
			Total	**Possible Points:**	**110**

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110