Leadership in Energy & Environmental Design (LEED) Tools, Processes, and University Standards Internship Final Report

Sponsored by: IU Office of Sustainability

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Executive Summary

The Problem Defined

In 2008, the Indiana University Task Force on Campus Sustainability (Task Force) released the Campus Sustainability Report, identifying seven key areas of sustainability: (1) Academic Initiatives; (2) Energy; (3) Environmental Quality/Land Use; (4) Resource Use/Recycling; (5) Transportation; (6) Built Environment; and (7) Food. Within the Built Environment focus area, the Task Force identified a key sustainability objective for the University: “to promote campus sustainability through innovative building design and engineering principles that promote functionality, safety, and energy efficiency while respecting campus culture and heritage.” The Task Force recommended that IU use Leadership in Energy & Environmental Design (LEED)-certification for all new and renovated, major building projects to assess sustainable progress on the built environment. The Task Force believed that LEED could provide IU with a complete framework for meeting sustainability goals and assessing building performance through the U.S. Green Building Council's (USGBC’s) use of six performance categories: (1) Sustainable Sites; (2) Water Efficiency; (3) Energy and Atmosphere; (4) Materials and Resources; (5) Indoor Environmental Quality; and (6) Innovation and Design Process.

In 2010, in the Campus Master Plan, the University set LEED Silver certification for all building projects (both new construction and renovations) on the Indiana University campus. While IU has made much progress achieving LEED certification for building projects, there is work left to be done surrounding the efficiency and effectiveness of the certification process. While some buildings have successfully achieved Silver, or even Gold certification, some project teams on Indiana University’s campus have struggled to obtain certification. Recognizing a need to streamline the LEED certification process to improve certification efficiency and standardize the processes necessary for successful LEED projects, the IU Office of Sustainability created the LEED Tools, Processes, and University Standards internship for the summer of 2013. The internship was re-initiated for the summer of 2015. It has carried over from the Academic Year 2013-2014 to the Academic Year 2014-2015.

Past Internships in Green Building and LEED

There have been three past internships focusing on green building and LEED: one in Academic Year 2011-2012 (Mary Liang), one in Summer 2013 (Kayleen Glaser), and one in Academic Year 2013-2014 (Kayleen Glaser). During the Academic Year 2011-2012 internship, Mary Liang gathered data needed to create a LEED database. During the Summer 2013 internship, Kayleen Glaser used this data to create an online LEED resource for building contractors and consultants; the Summer 2013 internship also resulted in a Big Ten Green Building Comparison Report, which explored the green building environment in the Big Ten and identified current obstacles that prevent IU Building projects from achieving LEED certification. During the Academic Year 2013-2014, Kayleen Glaser
continued to build on the online LEED resource. She also created a white paper focusing on light pollution and help found the Green Cleaning Committee to update IU’s Green Housekeeping Policy.

**Internship Goals and Vision**

My primary goal for this internship involved streamlining the certification process. Secondary goals include adding to the LEED online resource, starting the Energy Star Portfolio for IU, and tying up loose ends from the Summer 2013 internship and Academic Year 2013-2014 internship. My goals for this internship changed and evolved as I progress through the year and met problems as they arose. In this Final Report, I will focus on what became my three main objectives for the internship.

*Academic Year Objectives*

1. Assistance on ongoing LEED Projects
2. Adding to the LEED online resource
3. Creation of the Energy Star Portfolio
4. Furtherance of the IU Green Cleaning Committee & Update of IU Green Housekeeping Policy
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Background

Green Building Defined
According to the Environmental Protection Agency (EPA), green building is “the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building’s life-cycle from siting to design, construction, operation, maintenance, renovation, and deconstruction.”¹ Green building practices complement classical building design concerns of “economy, utility, durability, and comfort.”² Synonyms for green building include: sustainable building, sustainable development/design, natural building, or green architecture.

Green buildings are a part of what is called the “built environment;” the built environment, the human-made surroundings that provide the setting for human activity (buildings, parks, neighborhoods, etc.), impacts our natural environment in many ways. While some of these impacts are positive, like increased activity from tourism and creation of centers of economic activity, many impacts have negative effects on humans and the natural world.³ Green buildings combat and prevent the negative effects of the built environment. A well-designed green building can reduce overhead costs, conserve energy, reduce the use of raw materials, and create healthier environments for people to live and work, as a result of higher quality air, natural daylight, and thermal comfort.⁴

What is LEED?
In 2000, the U.S. Green Building Council (USGBC) developed the LEED (Leadership in Energy and Environmental Design) green building certification system; LEED is a voluntary, consensus-based, national certification system for developing high-performance, sustainable buildings.⁵ It provides building owners with a framework for identifying and implementing practical and measurable green building design, construction, operations, and maintenance solutions.⁶ LEED is flexible enough to address all buildings types: new construction, commercial interiors, core and shell, operations and maintenance, homes, neighborhoods, and specific applications such as retail, multiple buildings/campuses, schools, healthcare, laboratories, lodging, etc.⁷

This system, a point-based rating system, rewards commercial, institutional, and residential projects for “stellar environmental and health performance.”⁸ LEED has become an extremely popular metric system within the green building industry; as of the end of 2008, more than 269.2 million square feet of commercial space was LEED certified.⁹ According to FacilitiesNet, a site dedicated to

¹ http://www.epa.gov/greenbuilding/pubs/about.htm 5/22/2013
² http://www.epa.gov/greenbuilding/pubs/about.htm 5/22/2013
³ http://www.epa.gov/greenbuilding/pubs/about.htm 5/22/2013
⁴ http://buildgreen.co.nz/definition.html 5/22/2013
⁵ http://www.usgbc.org/Docs/Archive/General/Docs4896.pdf p. 3
⁶ http://greenwisestrategies.com/sustainability-leed/what-is-leed
⁷ http://www.usgbc.org/Docs/Archive/General/Docs4896.pdf p. 3
⁸ http://www.usgbc.org/about/history 5/24/2013
⁹ http://www.usgbc.org/Docs/Archive/General/Docs4896.pdf p. 6
facility and maintenance management, “A project can certainly be green without being LEED certified, but if public recognition and acceptance of a project’s green building credentials are desired, LEED has become the consensus standard.”\textsuperscript{10} In this sense, LEED has become a valued and reliable standard for successful green building.

The LEED certification system offers four certification levels: Certified, Silver, Gold, and Platinum.\textsuperscript{11} These certification levels correspond to the number of points a building project earns during the course of certification.\textsuperscript{12}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{leed_certification_levels.png}
\caption{The Four LEED Certification Levels}
\end{figure}

\textsuperscript{10} http://www.facilitiesnet.com/green/article/How-To-Get-Your-First-LEED-Certified-Building--10056#
\textsuperscript{11} http://www.usgbc.org/Docs/Archive/General/Docs1095.pdf
\textsuperscript{12} http://www.usgbc.org/Docs/Archive/General/Docs1095.pdf
To organize the point system, LEED offers six main credit categories where buildings can achieve points towards certification:\(^\text{13}\)

**Table 1: LEED Credit Categories**

<table>
<thead>
<tr>
<th>Credit Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Sites</td>
<td>Encourages strategies that minimize the impact on ecosystems and water resources</td>
</tr>
<tr>
<td>Water Efficiency</td>
<td>Promotes smarter use of water, inside and out, to reduce potable water consumption</td>
</tr>
<tr>
<td>Energy &amp; Atmosphere</td>
<td>Promotes better building energy performance through innovative strategies</td>
</tr>
<tr>
<td>Materials &amp; Resources</td>
<td>Encourages using sustainable building materials and reducing waste</td>
</tr>
<tr>
<td>Indoor Environmental Quality</td>
<td>Promotes better indoor air quality and access to daylight and views</td>
</tr>
<tr>
<td>Innovation in Design/Operation**</td>
<td>BONUS CREDIT**: Addresses sustainable building expertise as well as design measures not covered under the five LEED credit categories</td>
</tr>
</tbody>
</table>

Within each of the LEED credit categories, projects must satisfy credit category prerequisites and earn points.\(^\text{14}\) The number of points a building project earns then determines its level of LEED certification.\(^\text{15}\)

**Why LEED?**

There are many reasons that a university, or any building owner, would want to construct a LEED certified building. Green buildings, specifically LEED certified buildings, are designed to reduce harmful greenhouse gas emissions, conserve energy, reduce water consumption, reduce waste sent to landfills, improve indoor air quality, and help make better building material choices.\(^\text{16}\) These benefits in turn help develop healthier and safer buildings for occupants.\(^\text{17}\) Building owners are required to use performance analysis systems, which helps building owners manage the building throughout its entire lifecycle. Additionally, these procedures allow building owners to measure the ongoing performance of the building, ensuring that energy, water, and cost savings are realized.\(^\text{18}\)

\(^{13}\) [http://www.usgbc.org/leed/rating-systems](http://www.usgbc.org/leed/rating-systems)  
\(^{14}\) [http://www.usgbc.org/leed/rating-systems](http://www.usgbc.org/leed/rating-systems)  
\(^{15}\) [http://www.usgbc.org/leed/rating-systems](http://www.usgbc.org/leed/rating-systems)  
\(^{16}\) [http://www.usgbc.org/leed/rating-systems](http://www.usgbc.org/leed/rating-systems)  
\(^{17}\) [http://greenwisestrategies.com/sustainability-leed/what-is-leed](http://greenwisestrategies.com/sustainability-leed/what-is-leed)  
Because LEED is a third-party certification system, LEED buildings owners are less likely to appear to be performing “green washing” or “green marketing” stunts, as a neutral, third party has evaluated the buildings.\textsuperscript{19} A commitment to LEED demonstrates an owner’s commitment to environmental stewardship and social responsibility.\textsuperscript{20} Other benefits from a business perspective include reduced overhead costs, increased property values, faster lease-up rates, tax rebates, and zoning allowances.\textsuperscript{21}

Last, but not least, LEED project developers must consider external factors like site placement within the pre-existing community, which helps create compact and walkable communities with good access to neighborhood amenities and transit.\textsuperscript{22} LEED principles protect natural resources and farmland by encouraging growth to be located in areas with existing infrastructure.\textsuperscript{23}

Part I – Assistance on Ongoing LEED Projects

Introduction
In the Summer 2013 internship, I noticed that some project teams had “LEED champions,” or members of the project team who were well-versed in the LEED certification process and credits; these teams excelled at LEED certification by either achieving certification in a timely manner with few hiccups or by earning a high rating (Gold!). On the other hand, other teams had little to no experience in the process, and this resulted in a more arduous certification process and lower ratings. It became apparent that project teams could benefit from a team member with LEED certification process knowledge, as well as specific knowledge of how LEED has worked on the IU campus. I began accompanying my mentor, Bill Brown, to various LEED project team meetings that were active on campus. My role was to listen in on the meetings and to offer any pertinent advice and research assistance during the design and construction phases. I additionally served as a research assistant to help project teams make any necessary appeals during the certification process.

Helping LEED Project Teams on Campus
Over the course of the Academic Year, I attended a variety of LEED project team meetings; I also met with or assisted project teams as well. My experiences are below:

Kelley School of Business
During the Academic Year 2013-2014, I attended two of the Kelley School of Business LEED project team meetings. At the first meeting, I helped identify an Innovation and Design (ID) credit the project team could pursue: Alternative Transportation, Exemplary Performance. The intent of the Exemplary Performance for Alternative Transportation credit is to quantifiably reduce automobile use by doubling the transit ridership, thereby achieving a higher environmental benefit.

\textsuperscript{19} \url{http://www.usgbc.org/leed/why-leed}
\textsuperscript{20} \url{http://greenwisestrategies.com/sustainability-leed/what-is-leed}
\textsuperscript{21} \url{http://www.usgbc.org/leed/why-leed}
\textsuperscript{22} \url{http://greenwisestrategies.com/sustainability-leed/what-is-leed}
\textsuperscript{23} \url{http://greenwisestrategies.com/sustainability-leed/what-is-leed}
Using the LEED online resource to look at past ID credits, I noticed that KSOB would be eligible for this credit almost automatically because another nearby building, the Multidisciplinary Science Building II, had achieved the credit. Because of where the building is situated on campus, it had already met the requirements of this credit.

I attended a follow up meeting on the KSOB project to offer any further support and assistance.

During Academic Year 2014-2015, in response to the USGBC Design Preliminary Review, I revised IEQc7.2 Thermal Comfort Verification to meet compliance. I used the recently certified IU Neuroscience Building’s Thermal Comfort survey as a template for KSOB. The survey is now available on the Physical Plant’s Survey Monkey Account.

**Best Practices**

Each project team has its own style and unique way to work through the LEED certification process; however, after observing several project teams, certain best practices have emerged that lead to a better certification process experience for project teams.

**LEED Project Checklist**

Perhaps the most effective and efficient way to tackle LEED certification is by having a detailed checklist (see below from BSA LifeStructures for the Kelley School of Business Project). The LEED project checklist should work through each credit and identify the likelihood of achieving the credit. The best LEED project checklists identify which party or parties will be responsible for documenting and submitting the credit. They also identify potential strategies for completing the credit.
**IU Automatic Credit Spreadsheet**

IU’s automatic credit spreadsheet (see below) identifies the credits that all LEED project on campus should automatically achieve based on IU’s campus policies. The spreadsheet also identifies credits that are normally pursued on campus. An effective strategy for LEED certification is to review the IU automatic credit spreadsheet early in the design process. This spreadsheet is helpful in giving project team’s direction for the LEED certification process; it also indicates to project team’s which credits will be simple to obtain and areas where the University has institutional knowledge to aid the team in the certification process.

IU Green Building Data Analysis

This Academic Year, I compiled credit achievement from all IU certified buildings. I inputted this information in a spreadsheet to calculate credit achievement rates on campus. The data also highlighted trends in credit achievement and drew a comparison between credits identified as “automatic” and those actually achieved. See the data below:
**Brief Update on IU LEED Buildings**

Over the course of Academic Year 2013-2014, IU certified two new buildings: Southeast Side Apartments (3rd and Union) and South Eastside Apartments (Rose Ave. Residence Hall). IU is now host to fourteen LEED certified buildings, eight of which are on the IU-Bloomington Campus. One is certified, seven buildings are rated silver, and six are rated gold. The tables below lists the LEED buildings:

<table>
<thead>
<tr>
<th>COMPLETED Buildings</th>
<th>LEED Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education and Arts Building (SB)</td>
<td>Certified</td>
</tr>
<tr>
<td>IU Research &amp; Teaching Field Lab</td>
<td>Silver</td>
</tr>
<tr>
<td>IU Innovation Center</td>
<td>Silver</td>
</tr>
<tr>
<td>Multidisciplinary Science Building II</td>
<td>Silver</td>
</tr>
<tr>
<td>Union Center (SB)</td>
<td>Silver</td>
</tr>
<tr>
<td>Tulip Tree</td>
<td>Silver</td>
</tr>
<tr>
<td>Science and Engineering Lab Building (IUPUI)</td>
<td>Silver</td>
</tr>
<tr>
<td>Rotary Building (IUPUI)</td>
<td>Silver</td>
</tr>
<tr>
<td>Glick Eye Institute (IUPUI)</td>
<td>Gold</td>
</tr>
<tr>
<td>Cyberinfrastructure Building</td>
<td>Gold</td>
</tr>
<tr>
<td>Jacobs School of Music Studio Bldg.</td>
<td>Gold</td>
</tr>
<tr>
<td>Southeast Side Apartments (3rd and Union)</td>
<td>Gold</td>
</tr>
<tr>
<td>Neurosciences Research</td>
<td>Gold</td>
</tr>
<tr>
<td>South Eastside Apartments (Rose Ave. Residence Hall)</td>
<td>Gold</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IN PROGRESS Buildings</th>
<th>LEED Certification GOAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union Center Housing</td>
<td>Silver</td>
</tr>
<tr>
<td>Kelley School of Business Addition</td>
<td>Gold</td>
</tr>
<tr>
<td>Global &amp; International Studies Bldg.</td>
<td>Gold</td>
</tr>
<tr>
<td>Forest Quad Dining Hall</td>
<td>Silver</td>
</tr>
<tr>
<td>IU School of Informatics</td>
<td>??</td>
</tr>
</tbody>
</table>
Part II – Adding to the LEED Online Resource

Introduction
In Summer 2013, I created the LEED Online Resource. The resource has five sections: Background, Green Building Projects, IU LEED Toolkit, IU LEED Map, and Light Pollution Reduction. I updated all sections of the webpage to reflect new LEED buildings.

Recommendations
In the future, IUOS should continue to update the webpage to reflect the newly LEED certified buildings; this will allow the webpage to remain relevant and as useful as possible to contractors and consultants.

Part III – Creation of IU Energy Star Portfolio

Introduction
IU is interested in tracking its data usage. The Office of Sustainability determined that a useful and transparent way to track energy usage would be through the utilization of the Energy Star Portfolio Manager.

Energy Star Portfolio Manager
The Environmental Protection Agency created the Energy Star Portfolio Manager to help building owners measure and track energy and water consumption, as well as greenhouse gas emissions. The Energy Star Portfolio Manager is the industry’s leading benchmarking tool; 40% of commercial building spaces in the United States uses the tool. The Portfolio Manager allows building owners to set a baseline, whether an individualized baseline or a baseline set by the EPA, and then to target and track goals and improvements in energy usage. Buildings meeting a certain target will receive an Energy Star score. The score compares the building’s energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means the building performs better than 75% of all similar buildings nationwide (and may be eligible for Energy Star Certification).

IU’s Energy Star Portfolio
I started with one building this academic year: the IU Data Center. I encountered several obstacles in entering the IU Data Center’s information into the portfolio. First, the data necessary for the Portfolio is not centralized. I needed information from several sources and initially had some trouble tracking down these sources. Additionally, once I entered the Data Center’s information, the program did not give the building an Energy Star score. I have yet to determine a remedy for this issue. As such, IU cannot compare the Data Center’s energy usage with other buildings nationwide.
**Recommendations**  
I recommend that IU continue to enter buildings into the Energy Star Portfolio Manager. Through adding more buildings, IU will create efficiencies in the data entry process; also, it may become apparent through adding more buildings why the Data Center has not received an Energy Star score.

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**Part IV – Update of IU Green Housekeeping Policy**

**Introduction / the Problem Defined**  
While working on Tulip Tree Apartment’s LEED appeal during Academic Year 2013-2014, I was asked to research Green Cleaning policies to help the project team get its green housekeeping policy past appeal. First, I used the updated LEED v 4 requirements to offer suggestions for an updated green cleaning/green housekeeping policy. The updates to the green housekeeping policy in part spurred the creation of a Green Cleaning Committee on IU’s campus (which will be addressed in the third section).

**Updates to Green Housekeeping**  
First, I worked to update the language of the actual policy to make the policy more unique to IU. Then, using the LEED v 4 guidelines, I worked to incorporate new language into the policy so that it would meet USGBC’s requirements. This Academic Year, the Green Cleaning Committee met to further review the document. The document is now completely revised. The Green Cleaning Committee will be using the document in the future to perform Green Cleaning audits in all IU buildings to determine compliance.

**Green Cleaning Committee**  
In February 2014, in conjunction with Raija Bushnell, intern for the Environmental Quality and Land Use Working Group, the Green Cleaning Committee was formed. Leah Thill and I continued to organize the Committee this academic year. The committee was formed to aid in the green cleaning effort at IU and in part to continue updating the Green Housekeeping policy. The Committee has met twice, and we have identified many obstacles to the Green Cleaning process at IU. We plan to create a website to educate students, faculty, staff, and interested parties about green cleaning. We also plan to push to have custodial closet standards added to University's building standards.

**Website**  
The website has not yet been created but should be through or linked to the Green Building page.

**Recommendations**  
I recommend that the website be created or continued in the future. I would also recommend the Green Cleaning Committee to continue to meet next year so that in the future, all buildings follow some type of green cleaning policy. The Committee should continue to focus on green cleaning audits, LEED compliance, and green purchasing.
Final Conclusion

Summary

In conclusion, I believe that this internship has been largely successful. I accomplished much of the work that I intended to accomplish this summer. Working the project teams was personally rewarding, as well as helpful to the teams. I am excited for the potential of the Energy Star Portfolio.

Overall Recommendations and the Future of LEED Internships at IUOS

I believe that it would be useful to make this internship a permanent position at IU. Currently, there is a dearth of knowledge on the campus on how to efficiently and effectively certify buildings. This is illustrated by the lack of LEED certified professional on campus. A Green Building Manager (or some position along these lines) would give contractors and consultants a point person for LEED buildings. Additionally, the University could see huge gains through the institutional knowledge this position could accumulate.

There is still work to be done to make the LEED certification process more effective and efficient. Several goals I had at the beginning of the semester, I was unable to accomplish because I ran out of time or because of unresponsive parties. The LEED Process Guidelines still need to be added to University Construction Standards. I still believe that classifying the credits and determining the amount of emphasis IU would like to place on achieving each LEED credit would be useful (and a helpful addition to the automatic credit spreadsheet). A hard look needs to be taken at the data in the Green Building Analysis spreadsheet before making these determinations. IU could develop a green building focused boilerplate Owner’s Project Requirement or update and revise the existing OPR. The Energy Star Portfolio Manager needs to be expanded.

Remaining Action Items

1. Continue to meet with relevant parties to fully integrate the light pollution reduction research into the campus culture (Board of Aeons, Campus Safety)
2. Add LEED Process Guidelines to the University Construction Standards
3. Create a committee to classify the LEED credits (and determine the amount of emphasis IU would like to place on achieving each credit)
   a. At the very least, update the automatic credit spreadsheet
4. Develop a green building/LEED focused boilerplate Owner’s Project Requirement (or update and revise the existing OPR)
5. Revise the Automatic Credits spreadsheet to reflect credit achievement trends (See Green Building Analysis spreadsheet)
6. Generally, continue to make green building/LEED process more transparent (perhaps, map out responsibilities and parties who will aid in achieving credits)
7. Develop Energy monitoring and Energy Star Portfolio tracking
1. Publicize the green housekeeping policy and use the policy to audit current practices
2. Develop website
a. Education and outreach
b. Help occupants more easily identify and contact building representative
c. Develop what footprint is associated with products.
d. Determine where the architectural standards fit into the process.