Research Topic

LEED® Guide for Developers

Problem

Despite the ever-growing participation of development teams to the LEED® classification system, these individuals are not equipped with a user friendly guide for the successful implementation of LEED® points on their building(s). Making this type of guide or tutorial available to both inexperience and experienced development teams would not only gain interest into LEED®, but also set the team up for success in the LEED® system.

Goal

The goal is to provide a developer a guide that, if used from the start of design, can help them to understand the LEED® classification system and to develop buildings and areas that excel under LEED® criterion. I gained an interest in this because of my direct involvement with Hale Properties, who is the developer for Canton Crossing, which is the 60+ acre area in which the Canton Crossing Tower was built. Hale Properties just built the first building of 14+ from the Planned Unit Development (PUD) of Canton Crossing. If the LEED® system could have been introduced to them at the design phase, they could have implemented it into their entire PUD. By analyzing previous development projects and how they scored on the LEED® system, I will be able to educate future LEED® developers on ways to succeed. The guide I am developing will be a user friendly way for developers to be educated about the LEED® system and how to use it on their projects.

Research Techniques

1. Before I can develop a guide to educate individuals on the LEED® system, I must first gain an in-depth knowledge of the subject matter. Therefore, time must first be spent learning the system thoroughly, and its application to development specifically.

2. Identify four business models of developers and begin to research them and their LEED® success.

3. Research ten projects of each model, being sure there vary in location and certification level to keep the research unbiased.

4. After analyzing ten projects of each business model, begin to determine what LEED® categories are most important to each model.

5. Compare the four types of developers directly against one another to look for any obvious similarities or differences.

6. For my interest, I then will examine how Penn State's Office of Physical Plant's (OPP) LEED® point checklist compares to ten other universities throughout the country.

7. Finally I will compile all my results and create a LEED® point checklist for each of the different types of developers.

Tools

1. U.S. Green Building Council (USGBC) website (www.usgbc.org)

2. U.S. Department of Energy Federal Energy Management Program website (www.eere.energy.gov/)

3. LEED® Green Building Rating System for New Construction and Major

4. Renovations (LEED®-NC) Version 2.1

5. LEED® Green Building Rating System for Core and Shell Developement (LEED®-CS) Version 2.0

6. PSU LEED® Requirements – Distributed by Mike Prinkey – PSU OPP

7. Microsoft Excel

Types of Developers

  To narrow my research topic I decided to choose four different types of developers. Upon choosing my developers I wanted to be sure the four I chose would make an interesting comparison of LEED® scores from their own unique developing styles. The first developers I chose are those who develop with the intent on owning and occupy the building once it is built. Next are developers who plan on leasing or selling their building at its completion. The third developer is strictly core and shell development with tenant fit-out construction of the building. This is the type of construction that the Canton Crossing Tower was based upon. Finally, I thought it would be beneficial to analyze higher education developers. Not only did I compare

their values to the three developers mentioned above, but also with Penn State OPP's

LEED® point checklist to see where Penn State stands among the other ten universities.

An important thing to note is the core and shell developers will be investigated

using the LEED®-CS Version 2.0. The LEED®-CS program was created for developers of

core and shell and deals specifically with what the developer has direct control over. In

addition to LEED®-CS, USGC has created LEED®-CI (Commercial Interiors) to work in

unison with LEED®-CS. For this research, LEED®-CI will not be analyzed. The rest of

the developers were researched using LEED®-NC Version 2.1. The way the research

was conducted this will not effect the outcomes, but to be truthful it should be noted.

Project Selection

The project selection portion of my research was the most important. I wanted

to look at an ample amount of projects to really make these findings an accurate display

of LEED® scores. As I mentioned previously, I chose ten separate projects for each type

of development. The most important things when choosing the projects were LEED®

score and location. I wanted the four groups to all have a similar average LEED® score

between the ten of them. This goal was achieved rather precisely with the core and

shell (avg. 35), own and occupy (avg. 38.5), and build-sell/lease (avg. 35.3), and

higher education (avg. 34.3). The four group's averages put them all at the Silver

LEED® rating. As for location, I tried to vary it all through the nation with no major

tendencies or similarities. I felt these two topics were the best way to keep any bias out

of the research. Show below in *Table R1.1* is the project directory by developers.

Table R1.1

Core-Shell Projects			
Project	LEED Rating	Points Earned (Avg. = 35)	Project Location
Harborside Office Center	Silver	32	Port Huron, MI
Waterfront Technology Center at Camden	Gold	36	Camden, NJ
420 Delaware Drive	Silver	28	Ft Washington, PA
Abercorn Common	Silver	31	Savannah, GA
111 South Wacker Drive	Gold	36	Chicago, IL
Banner Bank Building	Platinum	36	Boise, ID
1 Crescent Drive	Platinum	46	Philadelphia, PA
Collaborative Innovation Center	Gold	40	Pittsburgh, PA
East Hills Center	Gold	35	Grand Rapids, MI
Main Street @ NorthField Stapleton	Silver	30	Denver, CO
Own/Occupy Projects			
Project	LEED Rating	Points Earned (Avg. = 38.5)	Project Location
Yukon Base Facility	Silver	35	Hawthorne, CA
Wind NRG Partners, LLC	Gold	44	Hinesburg, VT
Blue Cross Blue Shield of MA	Certified	31	Grand Rapids, MI
Pfizer Clinical Research Unit	Silver	33	New Haven, CT
Alberici Corporate Headquarters	Platinum	60	St.Louis, MO
Institute of EcoTourism	Gold	39	Sedona, AZ
Ampere Annex	Silver	36	Vancouver, WA
Stantec Centre Atrium Tower	Silver	38	Edmonton, AB
Sprint Building 14	Certified	26	Overland Park, KS
Winrock International New Office Building	Gold	43	Little Rock, AR
Build-Sell/Lease			
Project	LEED Rating	Points Earned (Avg. = 35.3)	Project Location
Public Health Sciences Building	Certified	26	Seattle, WA
Tumwater Office Building	Gold	41	Tumwater, WA
BCBSM/Steketees Building	Certified	27	Grand Rapids, MI
Michigan Alternative Renewal Energy Center	Gold	46	Muskegon, MI
ORNL E. Campus Private Dev.	Certified	27	Oak Ridge, TN
Town Center East Building II	Certified	28	Tumwater, WA
Two Potomac Yard	Gold	42	Arlington, VA
NAR DC Headquarters Building	Silver	33	Washington, DC
Carl T. Curtis Midwest Regional Headquarters	Gold	40	Omaha, NE
One Potomac Yard	Gold	43	Arlington, VA

Higher Education Projects			
Project	LEED Rating	Points Earned (Avg. = 34.3)	University
Center for Interdisciplinary Engineering	Silver	33	Duke University
Orr Admission and College Relations Bldg	Gold	39	Warren Wilson College
Skenandoa House	Silver	33	Hamilton College
Interdisciplinary Science & Technology I	Silver	35	University of Washington
Clemson University's Advanced Material	Silver	33	Clemson University
Central College Housing Phase 2	Gold	39	Central College
Innovation Center	Certified	31	University of Arkansas
Redmond Campus Facility	Silver	35	Lake Washington Tech College
Coffin Street Dormatories	Silver	36	Bowdoin College
John Mitchell Center at USM	Certified	29	University of Southern Maine

Developer Research Findings

The most efficient way I have found to analyze all of my results is by breaking them up into the separate LEED® point categories. I tallied up all of the points that the projects of each developer received in each category and then divided that number by the total possible points in that category. For example, the core and shell projects had 94 total points achieved in the Sustainable Sites category out of the total possible 160 points they could have received. Meaning between the ten projects researched, there were 94 LEED® points achieved between those ten projects in this category. The total possible points are the amount of LEED® points in a category multiplied by ten for the amount of projects there were. The percentage that group received in that category is then 59%. All of these percentages were then placed into a bar graph, which is shown below in *Graph R1.1.* In the Appendix section on pages 9-16 the charts are shown for each of the four groups to show how they performed individually.
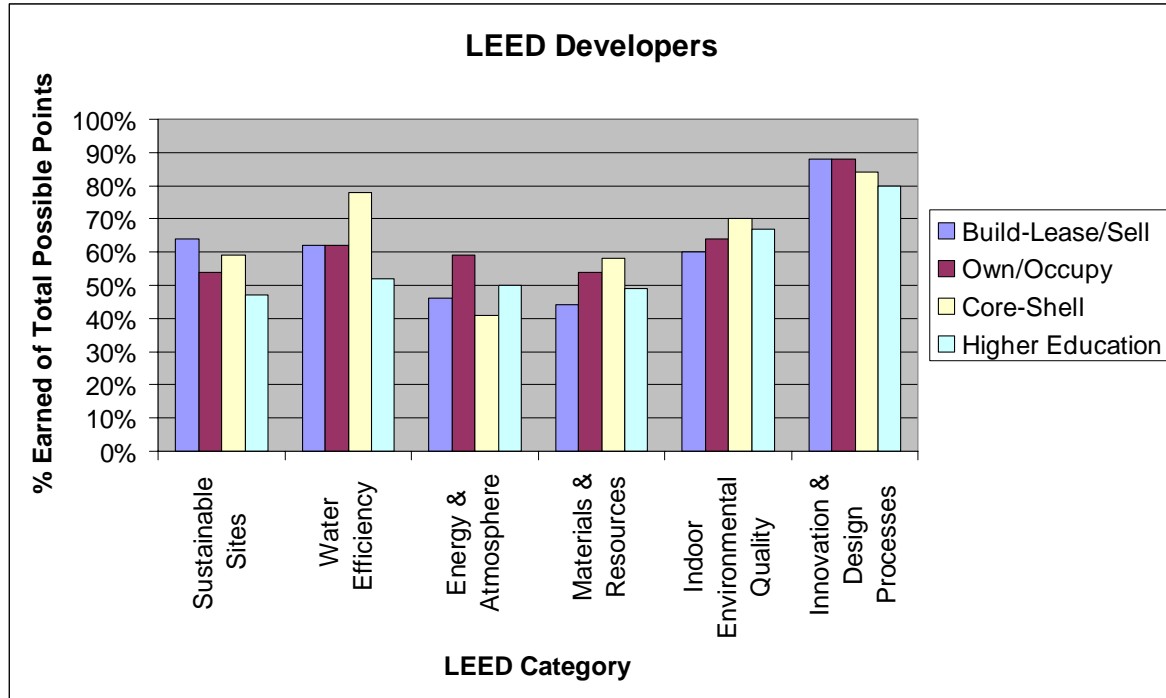
Graph R1.1

As for the interpretations of the results, once again it is easiest to break it into the separate categories, starting with Sustainable Sites. The rankings came in the following order; build-lease/sell, core and shell, own/occupy, and then higher education. I feel the biggest surprise out of this list is that higher education is the lowest. I would have assumed that they would be higher due to universities already having restrictions about their land that would be parallel with LEED® development.

The next category researched was Water Efficiency. The results were as follows; core and shell, a tie between build-lease/sell and own/occupy, and finally higher education. This outcome is not what I expected. The own/occupy developers are

undoubtedly going to pay their water bill, so I would assume they would pay closer attention to that function than those developers who will have help with the bills from tenants or buyers. This outcome would be expected if these developments were triple net, meaning the developer themselves pay the water bill. Then they would pay close attention to water usage.

The Energy & Atmosphere category results were own/occupy, higher education, build-lease/sell, and core and shell. I had a lot of the same assumptions for this category as I did the Water Efficiency and this time my theories held true. The own/occupy group won this category by a large margin. The results make sense, understanding this group has to pay the usage bills themselves.

The next category, Materials & Resources, is one that I did not have a valid assumption for in the beginning. This category, unlike the majority of the categories, does not directly affect the building's performance. The results were core and shell, own/occupy, higher education, and build-lease/sell. Although unpredictable, these results are interesting to see who is taking the initiative of building green.

The Indoor Environmental Quality was the most anticipated of the results of this research. At the start, I assumed that own/occupy would win this category outright because their workers are going to be the occupants of the building. Results have shown workers' sick days decrease, their production increases, and students learn better in green buildings. These facts have become the trademark positives to building green. The results of my research were core and shell, higher education, own/occupy, and build-lease/sell. I was surprised that core and shell won this category, but I am not

surprised that higher education came in a close second. The one thing that was as expected, this category had the highest average percentages over all of the groups.

Finally the Innovation & Design Processes category was even throughout the groups. The only revelation in this category was that higher education came in the lowest. As for the other three, each were only separated by 4%.

University Comparisons

I compared the ten higher education projects to the PSU LEED® Requirements checklist distributed to me by Mike Prinkey of PSU OPP. Penn State has created a checklist of that lists out each LEED® point and describes their effort of achieving it. They use three categories of effort, mandatory, significant effort, and minimal effort. From that they know where to focus their efforts for the design of new buildings on campus.

To be able to directly relate this checklist to my research outcomes of the other universities I set a number scale to Penn State's list. Mandatory effort was a two, significant effort was a one, and minimal effort was a zero. So on the LEED® point checklist, anywhere Penn State describes it as mandatory effort, I gave them two points. From there I added up their total points in each category, just as I did for the other universities. I then divided their total from the twos, ones, and zeros and divided that number by the total possible. The total possible was set by giving every single point in that category a "two". The interpretation of this assumption is that if Penn State would assign mandatory effort to every LEED® point on the list, then I can assume they would receive recognition of it every project. If they assign significant effort, then I am assuming they would get it half of the time. Finally, the minimal effort points are going to be received none of the time. The new percentage number I calculated gave me a way to accurately compare the other universities against Penn State. In the Appendix section on pages 17-18 a table is shown where you can see the calculations and the direct comparisons.

As you can see in *Graph R1.2*, Penn State is trailing the other universities in the first two categories, Sustainable Sites and Water Efficiency. After compiling research with Penn State, I found the reason behind this is that the site selection and landscape issues are all a portion of Penn State's Master Plan and are not negotiable at a project based level. From there you can see that Penn State begins to pull ahead of the other universities in the remaining categories. It is interesting to note the Energy & Atmosphere category where Penn State scored nearly 30% better than the competition. As the percentages for each category were looked at as a total LEED® score for both competitors, both schools scored Silver with Penn State coming in four points higher scoring a 46 (Silver) and the rest of the universities scored a 42 (Silver).
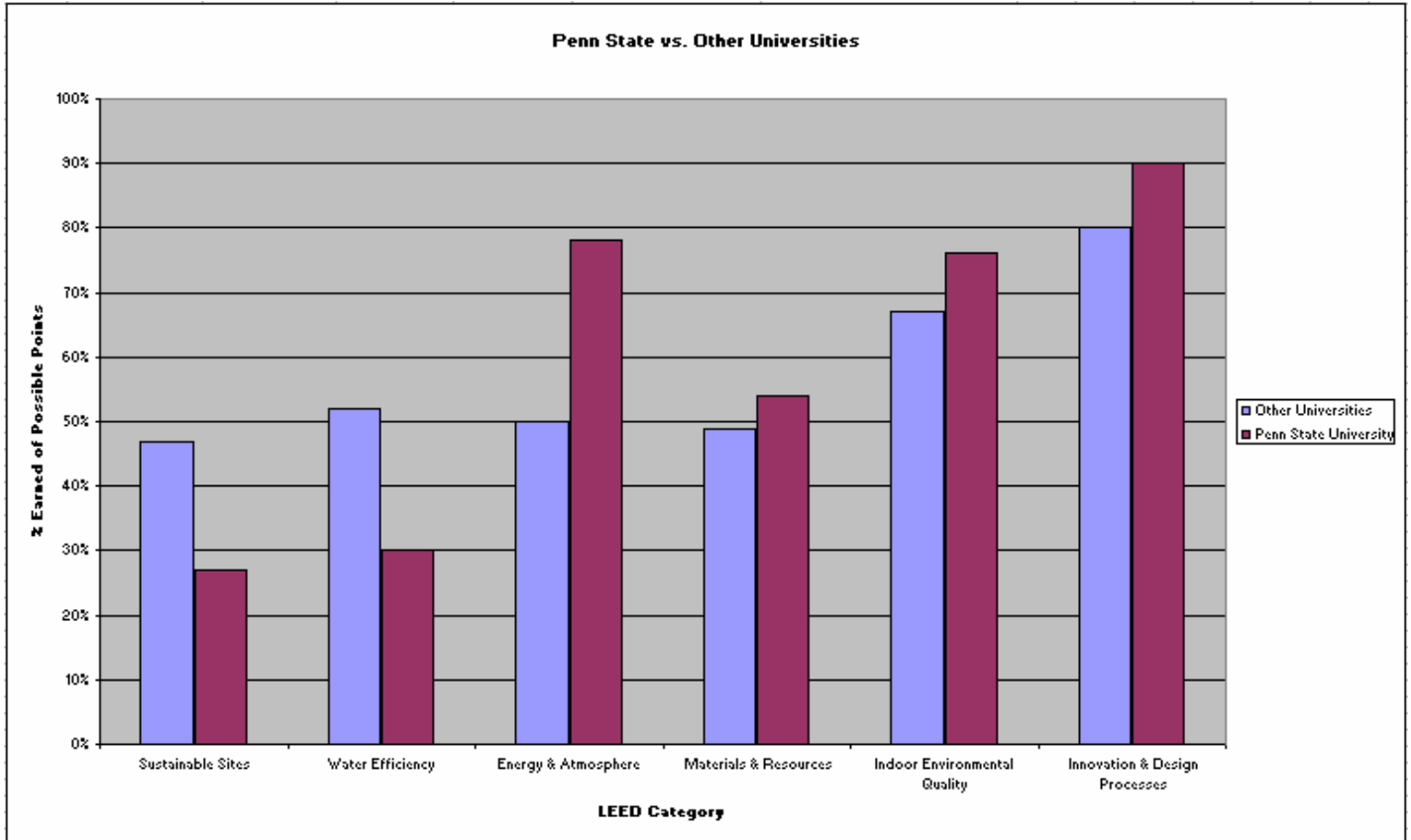
Graph R1.2

Developer Guides

I have created a simple guide that shows the points in which developers, of each type researched, should focus their attention on. After reviewing Penn States LEED® points checklist I have decided to use a similar rating system they have used. I feel it keeps the guide simple and easy to understand yet just as effective. The guide lists the effort that should be exerted to achieve that point in one of four ways; mandatory compliance, significant effort, adequate effort or minimal effort. The effort level that each point is assigned was based on the results from analyzing the ten projects. Any point that had 75% or more of the projects complying is mandatory compliance. After that level any point between 50-74% is significant effort, 25-49% adequate effort, and 0-24% is minimal effort. As I stated before, I purposely kept the guides rather simple and easy to use. In their current form they will be able to assist the intended audience, a developer who is not LEED® experienced. The LEED® guides for each developer are located in the Appendix section on pages 19-30.

Conclusion

I feel that informing and educating developers about the LEED® rating system is crucial for the success of LEED®. A large majority of buildings being built in some way have a tie to a developer. I chose four business models of developers to research, but there are still quite a few more models out there. The guides I developed are one of the first stepping stones to educating developers of the LEED® system. I am confident that these guides would be useful for developers at the early stages of a project, just as Penn

State OPP uses their similar LEED® guide. As for the Penn State portion of my research I feel that Penn State stood up against their competitors rather impressively. Excluding the categories in which a land grant university has no control over, they were superior in every category.

The LEED® system is beginning to take hold, but it will take individuals and companies like researched in this project to get LEED® everywhere. With the USGBC creating new categories like the Core and Shell scoring category, each and every construction project nationwide can be implementing LEED®. I also think as leaders in the research field, universities can help other developers gain confidence in the LEED® system.