2020

OSU Green Build Standards

In Response to OSU's Current LEED System

AEDECON 4567: Assessing Sustainability

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Executive Summary

The goal of this project is to make recommendations to The Ohio State University on a new green building standard. The recommendations made in this project will push Ohio State to be a leader in sustainability among other universities while also helping the university move away from the current LEED accreditation building requirement. The current LEED system may not be helping OSU meet its sustainability goals as well as a different, more customized green build standard might.

LEED is a green building standard that attributes points in six categories based on different aspects of a building. All major construction or renovations at the university must achieve a LEED silver rating. However, our research found that many of the points that new buildings earn through the LEED system come from existing infrastructure. Due to this, and other flaws in the standard, the LEED system is not pushing Ohio State's sustainability initiative in a productive direction.

In order to rectify this, we propose that The Ohio State University create its own green building standard. In order to make relevant recommendations to this standard, we have researched LEED's failures, Ohio State's sustainability goals, other building accreditations, and other universities' green building standards. This research reinforced the idea that to reach its sustainability goals, Ohio State needs to step away from the LEED system.

Our research also indicated that the sustainability goal Ohio State struggles with the most is ecosystem services. This is because, under the current LEED system, this aspect of building is ignored in favor of selecting easier points to achieve an acceptable rating. The new building standard Ohio State puts in place must incorporate ecosystem services into the building process from the very beginning of the design process.

Our recommendations include reductions in embodied carbon, a pre-design site assessment of ecosystem services, energy reduction requirements, and stormwater management specifications, among others. While there are recommendations from all aspects of the building, we emphasize the importance of ecosystem services. We also recommend that through these standards, Ohio State transforms itself into a living lab. This will allow the university to educate individuals and other businesses on sustainability and the importance of ecosystem services. This form of transparency will also keep Ohio State accountable in its sustainability journey.

Introduction

Ohio State has been requiring all major construction or renovations to achieve LEED silver since 2008. While LEED has helped Ohio State to be more sustainable, it is not doing enough to help the university reach its sustainability goals. Ohio State is looking to create green building standards that are specifically focused on OSU and will be required for all new builds, not just projects over a certain price. These standards will be specific to Ohio State's needs and will help the university create better-performing buildings while also reaching its sustainability goals. The core of this project's motivation lies with the university's sustainability goals. As shown in **Figure 1**, OSU has a set of impressive sustainability goals which touch a wide set of topics. We want to help Ohio State reach these goals through recommendations for new green build standards. Another motivation for this project is to push Ohio State to be a leader in sustainability among other universities. We want to push the university to be a pioneer and an example for other universities to follow.

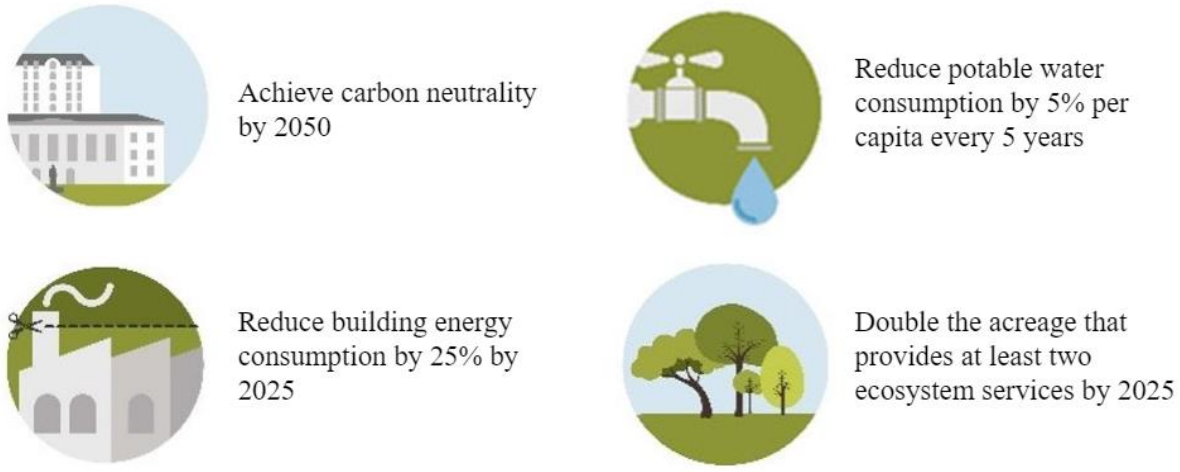

Figure 1: The Ohio State University Sustainability Goals

In order to achieve our goals of helping to separate Ohio State from LEED and recommending standards, we had three main objectives:

A. **Objective I:** Better understand the current LEED system and how (or whether) it is failing Ohio State University
B. **Objective II:** Gather information from other green build certifications
C. **Objective III:** Compare OSU's Green Build Policy with other universities

In completing these objectives, we have discovered the importance of ecosystem services in the building process. The summation of our research leads to a final objective:

D. Objective IV: Provide OSU with recommendations on embodied carbon, ecosystem services, energy and water reductions, user experience, and the final recommendations about paths forward among various options.

Research Methods

Our research was intended to identify ways to improve upon Ohio State's current Green Build Policy. To gain the best insight into industry standards, we found it crucial to explore a plethora of green building certifications that would help fill the sustainability gaps that LEED currently causes for the university. We performed benchmarking of green build standards at similar universities to discern the best and most innovative practices among OSU's peers. Through this research, we were able to create an informed set of green build standard suggestions for Ohio State. Along with enabling the university to meet its goals, these new standards will allow Ohio State to become a sustainability leader for universities across the United States.

Our selected research methods and tasks for all of our project objectives are outlined below:

A. **Objective I:** Better understand the current LEED system and the extent to which it might be failing Ohio State University

A.1. Research Tasks

- Learn the different requirements for a building to become LEED certified
- Research Ohio State's current sustainability goals
- Determine which LEED requirements are failing to help The Ohio State University meet their goals

A.2. Research Methods

- Use LEED's website and certified buildings for determining requirements
- Use Ohio State's website to learn about its sustainability goals
- Read Ohio State's Sustainability report to decide where LEED is failing
- Compare LEED requirements and sustainability goals to determine LEED failures

B. Objective II: Gather information from other green build certifications

B.1. Research Tasks

- Determine alternative certifications to LEED
- Research the alternative certifications that are found
- Compare alternatives to LEED and compile the best features from each

B.2. Research Methods

- Use the websites of LEED, WELL, SITES, Green Globe, and National Green Building Standard to determine their requirements
- Use the information found to compare these alternative certifications to LEED and determine where they can help Ohio State where LEED was failing

C. Objective III: Compare OSU's Green Build Policy with other Universities

C.1. Research Tasks

- Find Universities to compare with Ohio State's Green Build Policy
- Compare the Universities to Ohio State to consolidate best practices

C.2. Research Methods

- Pinpoint the best sustainably driven universities in the United States
- Study Slippery Rock University, Oberlin College, and Western Kentucky University
- Identify exemplary key green buildings on comparable universities' campuses
- Compare Ohio State against these universities and decide if Ohio State could benefit from adopting similar projects or policies

D. **Objective IV:** Provide OSU with recommendations on embodied carbon, ecosystem services, energy and water reductions, user experience, and the final recommendations about paths forward among various options.

D.1: Research Tasks:

- Conduct expert informant interviews with key OSU stakeholders and professors
- Prioritize top recommendations for each standard category

D.2 Research Methods

- Interview Tony Gillund and Dr. Maria Conroy to gain outside perspectives on the current build standards and the direction of possible future standards
- Integrate findings from objectives a, b, and c to develop recommendations for OSU green build standards

Research Findings

A. LEED Research

A.1. Overview

The Leadership in Energy and Environmental Design (LEED) accreditation system created by the U.S. Green Building Council (USGBC) is the most widely used standard of its kind in the world. The system employs a point-based scorecard in which construction projects are awarded points in eight categories of contributions to green architecture and sustainable development (USGBC, 2020). These categories include location and transportation, materials and resources, sustainable sites, indoor environmental quality, water efficiency, energy and atmosphere, innovation, and regional priority, each of which is further separated into specific tasks and considerations by which points can be earned. In July of 2019 LEED was updated to its current

form, version 4.1, which primarily reconsidered the section on materials and resources, making awardable points in the category stricter overall (USGBC, 2020).

Ohio State's current Green Build Policy employs the LEED accreditation system for its on-campus construction. According to the policy, a rating of LEED silver or above is required for all building and construction projects costing $200,000 or more, including new constructions and renovations (The Ohio State University, 2019). The purpose of this policy was to further the university's attempts toward achieving its sustainability goals. The document specifically calls for LEED points to be earned toward energy performance optimization, enhanced refrigerant management, construction waste management, low-emitting materials, indoor air quality assessment, and thermal comfort for all applicable construction projects (The Ohio State University, 2019).

A.2. Advantages

The LEED standard is a popular, world-renowned accreditation system that has been lauded for its success over the past decade. According to the USGBC, 61% of business leaders see sustainability as a financial boon, and LEED is a symbol of investment in that sustainability (USGBC, 2020). Undoubtedly, this growing consensus combined with the widespread acknowledgment of LEED gives its ratings a considerable amount of sway and veneration. Beyond this, the USGBC claims staggering results for LEED accredited buildings. Nearly $2 billion in savings have been attributed to reductions in energy, water, maintenance, and waste costs for LEED rated buildings between 2015 and 2018 (USGBC, 2020). Similarly, LEED buildings have enjoyed substantial reductions in emissions, resource consumption, energy usage, and waste production (USGBC, 2020).

A.3. Disadvantages

Despite the benefits garnered by the LEED system, many organizations and businesses, including Ohio State, have found the system to be lacking. Post-occupancy studies of LEED accredited facilities have found the cost savings and waste reductions to vary greatly across buildings (Alborz & Berardi, 2015). Additionally, these studies have shown LEED ratings to bear little weight on the behaviors of occupants. This is due in large part to the point-based system on which LEED is founded. Alborz and Berardi (2015) found that the underlying issue with green construction standards develops from the non-holistic nature of the rating process (Alborz & Berardi, 2015). By allotting points for specific, small-scale improvements, systems like LEED encourage a back-ended approach, applying LEED points toward the end of the construction process through superfluous measures. To effectively contribute to sustainability measures, green standards must be integrated into the design process in a more comprehensive way, which ultimately LEED fails to do.

Ohio State has seen LEED fall short in its own Green Build Policy through the specific points earned by buildings on campus. The policy requires a rating of LEED silver, which can be awarded by achieving 50-59 points on the LEED scorecard (USGBC, 2020). However, when looking at the individual scorecards for each LEED accredited building on campus, it becomes apparent that many of these points are redundant. Curl Hall is one of Ohio State's most recent LEED endeavors and was awarded LEED silver status in 2015 (USGBC, 2019). After careful analysis of the scorecard awarded to Curl Hall, we noticed that 15 points awarded to the building under the sustainable sites category were granted based on access to low-emission transit, access to green space, and walkability, all point categories awarded simply for constructing a building on Ohio State's campus. While these are indicators of a well-established sustainable

development, they are not newly implemented features of the building, and so do not serve to improve sustainability at OSU. They instead only serve to increase Curl Hall's LEED rating. These are points that are easily accessible by all buildings on Ohio State's campus. Similarly, many of the waste reduction points earned are redundant and are already required as part of the standard clean up during a construction process. All this points to the reality that the current Green Build Policy is only obligating new buildings themselves to about 40 points of LEED credits, which does not add to sustainability at OSU nearly as much as implied by a "silver" rating.

With these disadvantages in mind, we see that the LEED system by itself is not an effective means by which OSU can achieve its sustainability goals. One of the areas the university has historically struggled with is its goal to increase ecosystem services on campus (University Panel on Ecosystem Services, 2018). Considering the point requirements under the current Green Build Policy and the non-integrated nature of LEED's point system, OSU has little incentive or structure to improve its ecosystem services. Even if OSU were to require buildings to achieve gold or platinum LEED ratings, there is still little incentive to improve ecosystem services with the ease of earning points in other categories. Requiring a higher rating would also increase costs yet provide minimal progress toward achieving OSU's sustainability goals. Successful green building requires heavy investment, integrated design, and substantial research prior to construction. A point system that focuses on small parts rather than a comprehensive approach to construction will never be able to accomplish this. To best achieve a holistic green building method and OSU's sustainability goals, we need to find or create a standard geared toward OSU's specific needs.

B. Other Accreditations

To contrast LEED and to gain a deeper understanding of industry norms on green building we researched other green building accreditations. We selected a handful of the industry's most well-known and widely used accreditation systems to identify best practices which would help Ohio State meet their sustainability goals. Specifically, the accreditations we researched included WELL, SITES, Green Globe, The Living Building Challenge, The National Green Building Standard, and The International Green Construction Code.

B.1.WELL

The WELL Building Standard focuses on the effects of spaces on individuals, specifically the health and wellness of building occupants. WELL's system offers 100 performance metrics, design strategies, and policies that can be implemented by key actors in the building process. In order to achieve the requirements of the WELL Building Standard, the space in question must undergo an on-site assessment and performance testing by a third party. WELL is organized into seven categories of wellness called "concepts": Air, Water, Nourishment, Light, Fitness, Comfort and Mind (International Well Building Institute, 2016). Though these concepts are important considerations when designing buildings for spaces like those at Ohio State, we question the relevance of WELL's standards in relation to a green build policy for the university. The standards we are recommending center around addressing and helping Ohio State fulfill its sustainability goals and ultimately WELL does not fully help to achieve this purpose.

B.2. SITES

The SITES rating system introduces standards that work to protect ecosystems and enhance the benefits they provide to communities. Rather than prescribing direct practices, SITES provides

performance measures that everything on a site, except for the building, must meet. The SITES and LEED rating systems are complementary but can be used independently. Certified SITES landscapes help to reduce water demand and storm water runoff, reduce energy consumption, provide wildlife habitat, improve air quality, improve human health, and increase outdoor recreation opportunities. Much like LEED, the SITES certification is based on a point system. The number of points a project obtains determines the level of certification it receives; the levels range from certified to platinum (SITES Rating System, 2020). As one of Ohio State's sustainability goals focuses on ecosystem services, our proposed standards will pull from the SITES rating system. SITES' credits dealing with pre-design assessments, water, vegetation, materials selection, and education can help form Ohio State's green build standard.

B.3. Green Globes

The Green Globes Certification is unlike many of the other accreditations we explored during our research. The Green Globes system provides its customers with in-depth personalized assistance on a project-to-project basis in sustainable design, construction, and operations. This flexible system allows building owners to select which sustainability features best fit their building and its occupants. The projects must meet at least 35% of a possible 1,000 available points to be recognized by Green Globe (Green Building Initiative, n.d.). As Green Globes is less open about their certification categories, our recommendations for Ohio State do not draw heavily on the Green Globe system.

B.4. Living Building Challenge

The Living Building Challenge (LBC) is a certification that works to imitate the efficiency of nature into its buildings. It has 7 "petals" or categories that it works to enhance: place, water,

energy, health and happiness, materials, equity, and beauty (Living Building Challenge 4.0, 2019). As can be seen through these categories, the LBC covers many aspects of the building, including ecosystem services and occupants of the building. This certification is less in-depth than others that are mentioned in this report. While this is the case, it offers flexibility that other certifications do not offer. The LBC allows certification under one category, as part of the Living Building certification or as part of the Living Community certification (Living Building Challenge 4.0, 2019). As this certification has many different categories and options that fit well with Ohio State's needs, we have used many of its requirements in our recommendations for the green building standard.

B.5. National Green Building Standard

The National Green Building Standard was created as a national standard for the United States by the National Association of Home Builders, so it is more focused on homes than commercial buildings. In a similar fashion to LEED, this is a point system in which a project can receive points for elements of the building. Projects can be certified Bronze, Silver, Gold, or Emerald. The categories for this standard are lot development, resource efficiency, energy efficiency, water efficiency, indoor environmental quality, and homeowner education (National Green Build Standard, 2016). This standard is more in-depth than others we researched and has specifics on systems in the building such as HVAC systems. Since this is a standard more focused on home buildings, our recommendations do not rely on this standard.

B.6. International Green Construction Code

The International Green Construction Code focuses on multiple aspects of the building including site sustainability, water and energy efficiency, indoor environment requirement, and materials

and resources. This standard also has a section dedicated to operations plans (2018 International Green Construction Code, 2019). This means a certified building will have a plan for how to be operated sustainably after the building is completed. This is different from most accreditations and will apply to Ohio State's standards in keeping the university accountable and sustainable.

C. Benchmarking Other Universities

To further our research, we elected to benchmark universities and individual buildings to determine successful best practices that might be implemented at OSU. We looked for green building techniques within similar climates to generate appropriate recommendations that would be valuable to OSU. Specifically, we looked at Slippery Rock University in Western Pennsylvania, the Adam Joseph Lewis Center at Oberlin University in northern Ohio, and Ogden College Hall at Western Kentucky University.

C.1. Slippery Rock University

We met with OSU's Maria Conroy, a professor at the Knowlton School, who recommended we investigate Slippery Rock University, due to its dedication to sustainability on campus (Dataset #1). SRU has a long history of sustainable actions, starting with the founding of the school in 1889. More recently in 2012, they created a climate action plan in the hopes to achieve their goals to become carbon neutral by 2037. In this plan, they created a list of strategies that describe their specific efforts in more detail. We found this list to be a positive example to look to for our potential plan for OSU. Efficiency is a key part of their plan; starting with infrastructure, they are looking to study their central plant and individual buildings to look for opportunities to increase efficiencies. They want to diversify their energy portfolio by replacing coal with biomass, installing solar projects, using biodiesel processing equipment, and using geothermal technology

for the necessary buildings' heating and cooling. They are also looking at ways to reduce their transportation emissions by trimming the fleet, providing alternative options, and offsetting air travel emissions. Bringing sustainability into SRU's campus is also a matter of building the knowledge and support for it with all stakeholders. Creating engagement with students and faculty as well as the community around the university is important for future support of projects. This kind of support especially increases participation in the numerous zero-waste projects around campus (Deemer, 2012). Many of the elements of SRU's campus plan are suggestive of OSU's own green building plans.

C.2. Adam Joseph Lewis Center

The Adam Joseph Lewis Center for Environmental Studies at Oberlin University is a building that was designed from the natural laws expounded by Paul Hawken in his book, *The Ecology of Commerce* (Building Systems, 2019). His book is centered on creating a restorative economy and is focused on eight laws and ideas to do so. The Adam Joseph Lewis Center was designed focused on several of these natural laws, with four specific building systems: Photovoltaic Systems, Landscape, Living Machine, and Materials (Building Systems, 2019). With the use of a photovoltaic system, the AJLC can produce all its electricity needed from two on-site solar arrays. Along with this, some of the key features used to create such an energy-efficient building that can be valuable for OSU are its applications of passive solar design, natural lighting, high-efficiency electrical lighting, natural lighting, and many others (Building Systems, 2019). The landscape system design for this building incorporates an extensive amount of biodiversity and a living ecosystem around the building. The aspects of this system include stormwater management and storage design, a wide variety of plants native to the region, and on-site food cultivation (Building Systems, 2019). The living machine system allows the AJLC to recycle

70% of the building's water use and go through a process to purify and clean it, then reuse it back within parts of the building and for the outside landscape and ecosystem (Building Systems, 2019). Finally, the materials system is focused on reducing embodied energy and enhancing sustainability. Some of the criteria focused on these products are recycled and reused, locally constructed, and many others (Building Systems, 2019).

The AJLC incorporates an integral design of sustainable frameworks, with a large focus on a living machine, ecosystem services, and biodiversity. This example could help inspire OSU to enhance its standards to meet the criteria we are looking for. The AJLC has received many awards for its outstanding construction including being named one of the top 10 sustainable buildings in the world in 2014, being named one of the 30 Milestone Buildings of the 20th Century by the US Department of Energy, and many others (AJLC, 2020). The AJLC, as a truly visionary sustainable building, was a hugely expensive project that required grants and outside funding to become a reality. Due to these facts, it may stand as more of an aspirational and inspirational building that any university would want to have (one like it) on its campus, rather than a model for every new building on campus. On the other hand, now that these building technologies are more established, it is conceivable that by aspiring to the standard of the AJLC, OSU could truly advance its sustainability goals while providing bold leadership to other universities who will follow suit in the future.

C.3. Ogden College Hall

Additionally, we looked at Ogden College Hall at Western Kentucky University. Ogden College Hall is a science facility that received WELL Gold certification for their sustainable design as they were ultimately focused on the wellness of the occupants of the building, along with their health and safety (Western Kentucky University, 2018). With the optimal air quality of the

building, it is a healthy environment for lab spaces, meeting rooms, and collaboration among individuals. Healthy air quality is very significant in chemistry and biology laboratories, especially with other offices in the same building. In order to achieve such effective air quality standards, they lowered their fume hoods to a 12" sash height, which also led to a 50% reduction in the building's energy consumption (Western Kentucky University, 2018). Along with this, education is a big aspect incorporated into the building environment. From informational displays to healthy choices in the vending products, Ogden College Hall is striving for excellence in staff and student well-being. This building provides a nice model for some improvements that OSU can also consider in its new buildings.

D. Research Barriers

While performing our research for the new green build standard, we ran into some barriers in fulfilling parts of our research goals. Most of these barriers centered around a lack of available public information. In regard to accreditation research, many of the certification sites provided free copies of their rating systems. These tended to include all categories and the exact standards by which they rate buildings. Unfortunately, the Green Globes accreditation only released brief overviews of their criteria by which they rate buildings rather than all the possible points that could be earned. This is most likely due to the nature of Green Globes and its customizable format. Along with Green Globes, other accreditations push for membership before releasing their full criteria to prevent the use of their criteria without the correct certification process. Thus, our research may not have uncovered all of the relevant criteria and standards that could be considered in our analysis. Similar to researching alternative building standards, we also hit a barrier in lacking public information from other universities on diverting from their current green build standards. While we found buildings on other campuses that are certified with an

accreditation that is not LEED, we were unable to find information on a campus-wide change from the LEED system. Specifically, we were not able to find information on a university proposing or an example of a university that has already created its own standard.

Recommendations

A. Site Sustainability
A pre-design assessment of the identified site and community must take place to identify baseline habitats and ecosystem functions ▪ Consult with local experts and the community to help evaluate existing site conditions and form sustainable design strategies (sustainable design review panel)
Create and implement an erosion and sedimentation control plan for all construction activities associated with the project
All projects must avoid building on sensitive sites, pristine greenfield, wilderness, prime farmland or in a floodplain
During the site selection process, give preference to developing sites that do not contain aquatic ecosystems (wetlands or deep-water habitats)
Projects must demonstrate that they contribute positively to the ecology of their place and restore/enhance the ecological performance of the site
Invasive plants will not be planted on the project site
At least 20% of the project site must be a vegetation area such as bio-retention areas, rain gardens, filter strips, grass swales, constructed wetlands, or vegetated level spreaders, planters, or open spaces with plants
At least 60% of the vegetated area must be made from biodiverse native plants that are not turf grass
There will be no use of toxic (to either humans or other living creatures or the environment) pesticides or fertilizers on the project site
B. Water Efficiency
All projects must not use potable water for irrigation
All necessary irrigation must be drip irrigation
Install permanent water meters that measure the total potable water use for the building and associated grounds
Data must be compiled into annual summaries to inform water reduction goals
All projects functioning on a Combined Sewer system, or in a floodplain must incorporate storm water detention and avoid sheet flow off the site
All projects must assess the ability to address grey and black water through on-site treatment and management through reuse, a closed-loop system, or infiltration
All toilets must be high efficiency and have a maximum flush volume of 1.28 gallons

▪ Where applicable, recycled greywater or harvested rainwater must be utilized for toilets
Public restroom faucets flow rate must not exceed 0.5 gallons per minute
Water bottle filling stations must be installed as part of all water fountains
C. Energy Efficiency
All projects must meter energy used by the project
Projects must achieve a reduction in total net annual energy consumption by 50% for new buildings and 35% for existing buildings (compared to a typical existing building with comparable climate, size, use, and occupancy)
All projects must be designed with an ability for onsite renewable energy systems and necessary infrastructure
Buildings must have measuring devices that record energy consumption data for all energy supplied to the building
D. User Experience
The project must include a baseline consideration and enhancement of pedestrian routes that would interact with the site
Provide views outside and daylight for 75% of regularly occupied spaces
All projects must provide a connection to nature in both the interior and exterior of the building
Design the site with protective windbreaks, awnings, and other sources of shade where necessary
Locate desirable and accessible spaces on-site to enable and encourage physical activity
Provide secure, weather-protected storage for human-powered vehicles (bikes)
Provide 5% preferred parking for green vehicles with accompanying EV chargers (if parking is included in site design)
Incorporate all projects into the university's Living Lab efforts, striving to allow students and community members to gain educational value from each project
Install interpretive signage that teaches visitors and occupants about the project.
E. Materials
Projects must demonstrate a 20% reduction in the embodied carbon of primary materials compared to an equivalent baseline of comparably sized projects
20% or more of the materials construction budget must come from within 400 miles of the construction site
All projects must source 80% or more of all wood, by cost or volume, as Forest Stewardship Council (FSC) certified or as salvaged
Projects must consider materials that reduce heat absorption by exterior surfaces
All projects must strive to reduce or eliminate the production of waste during design, construction, operation, and end of life (80% minimum diversion rate)
All projects must avoid materials that are toxic to living creatures, including humans, and the environment

F. Project Management and Commissioning
An integrative design process is required: project team members of diverse disciplines (natural systems, design, construction, and maintenance) must engage with each other and local/university experts
A team must be created to develop a “punch list” that details communication and accountability between team members and ensures that all standards are met throughout construction.

Other Possible Directions

It is possible that Ohio State may decide to adhere to an existing standard instead of creating its own. If this is the case, we recommend the Living Building Challenge. It offers the flexibility for Ohio State to certify a single building with the Living Building Challenge or as a community, with the Living Community Challenge. We have found that this is the standard that will be the most successful in helping the university reach all its sustainability goals.

If Ohio State wants to hold off on moving away from LEED, the university could instead add SITES to its current policy. As stated previously in subsection “B.2. SITES,” LEED and SITES are formed to work together in tandem. By adding SITES to the university ’s current policy, ecosystem services could have greater consideration in the building process. This inclusion would help Ohio State meet its sustainability goals of reducing potable water consumption and doubling the acreage that provides ecosystem services.

Limitations of Current Analysis

Though our group worked to thoroughly assess and formulate proper standards for use by Ohio State for a new green build standard, there are limitations to our report. Traditional green build standards, like LEED or the Living Building Challenge, have an exhaustive list of criteria that go into minute details in relation to technical building and construction specifics. As our project

group does not include any architects or construction professionals, we felt that we did not hold enough knowledge to make extremely detailed suggestions for the university's standard. Due to this limitation, the standards set forth in this report do not cover the full construction and building process like other more robust accreditations do.

Along with this limit to industry knowledge, our research into benchmarking against other universities was limited by a lack of public information. No universities have publicly announced that they are moving away from LEED. Due to this lack of information, we had to transition our benchmarking research towards specific green buildings on university campuses which went beyond LEED certifications.

Further Research

In making recommendations for a new green building standard, we must also recommend that Ohio State do further research into possible project sites. To avoid building on sensitive sites, pristine greenfields, wilderness, prime farmland or in a floodplain, Ohio State should build on certain sites. These include brownfields, greyfields, or infill sites. More research should be done into the availability of these sites on Ohio State University land and the ability to use these sites for future buildings.

In our recommendations, we suggest Ohio State incorporate all projects into the university's Living Lab efforts. This recommendation is to increase the education of students and the community while also holding the university accountable in its sustainability journey. More research needs to be done into how to facilitate this sharing of knowledge and how Ohio State can help other universities to create their own building standards.

Conclusion

From our research outlined in this report, we have compiled a set of key standards to allow for Ohio State to effectively meet and build upon their sustainability goals. We found that the university's current green build policy utilizing LEED does not function fully to help Ohio State meet its sustainability goals. Subsequently, we found that assessing and pulling from a plethora of accreditations' criteria to form a unique standard for the university allows these sustainability goals to be more positively impacted.

We recommend that Ohio State follow the standards criteria that we lay out in this report. These standards fall under six categories and act as a comprehensive scope for green building. The categories are site sustainability, water efficiency, energy efficiency, user experience, materials, and project management and commissioning. Along with this recommendation, we also realize that formulating a unique standard for Ohio State might be increasingly complex and time-consuming. Due to this, we recommend that if a personalized Ohio State green build standard is not applied, the university adds the SITES certification to their LEED requirement or that the university switches to the Living Building Challenge in place of LEED. By moving towards these other accreditations, Ohio State would be better equipped to meet its sustainability goals, especially the ecosystem services goal.

Taking on and formulating personalized green building standards at Ohio State might seem like a daunting task. Through this report, we hope to have simplified this process by outlining key standards that the university should strive to meet. By taking on its own green building standards, The Ohio State University will be better positioned to meet its sustainability goals on time. On top of that, the university will act as a leader in sustainable building for universities across the United States and the world.

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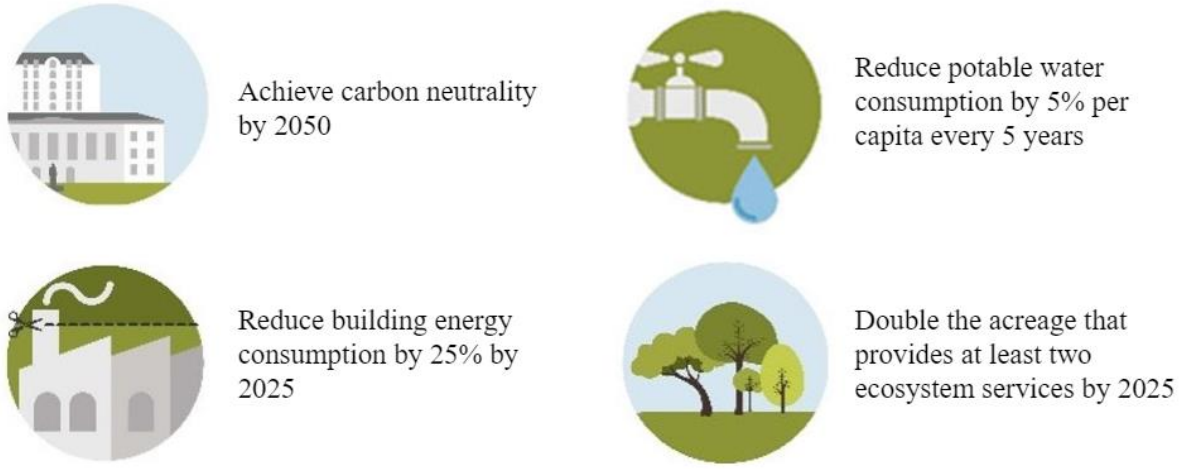
Appendix

Dataset #1: Dr. Conroy Interview Notes

Source: Maria Conroy, University Panel on Ecosystem Services Report Panel Chair – City & Regional Planning, Knowlton School, Email: conroy.36@osu.edu

Description: Notes from a conversation with Maria Conroy regarding ecosystem services on Ohio State's campus. Zoom video conversation took place on March 31, 2020.

Figure 1: The Ohio State Sustainability Goals



Source: Ohio State Sustainability Goals. (n.d.). Retrieved April 12, 2020, from https://www.osu.edu/assets/pdf/sustainability/SustainabilityGoalsSummary_Communicators.pdf

Description: Visual display of Ohio State's Sustainability Goals that are most relevant to possible green build standards.