Are Energy Use Intensity and LEED Certification Connected?  
A Pilot Study of UW System Buildings

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Introduction

Energy efficiency is a high priority for new-construction projects on university campuses nationwide. The University of Wisconsin System is no exception due to Executive Order 145 that established energy efficiency goals for new buildings on UW campuses based on the Leadership in Energy and Environmental Design (LEED) green building rating system. The law requires buildings to be constructed to LEED silver standards, but does not require post-construction LEED performance certification. Post-construction LEED certification is thought to ensure that buildings perform at expected levels. In this study, energy use intensity data from a sub-sample of UW System buildings were examined to see whether those buildings that did not undergo post-construction LEED certification performed as efficiently as those that were certified.

What Is Energy Star Portfolio Manager?

The U.S. Environmental Protection Agency’s Energy Star Portfolio Manager is a free online tool that can be used to track energy and water use as well as greenhouse gas emissions of a building or group of buildings. It compares performance across buildings of the same category using data from the U.S. Energy Information Administration’s Commercial Buildings Energy Consumption Survey. The metric used to quantify relative efficiency of a building is Energy Use Intensity (EUI). EUI equals a building’s annual kBtu usage divided by its gross square footage.

What Does Portfolio Manager Have to Do with LEED?

The U.S. Green Building Council’s Leadership in Environmental Energy and Design (LEED) creates environmentally rigorous design standards and awards certification to building projects that meet these standards. Various levels of certification correlate with how many design points a project earns. Points can be earned, for example, by providing access to quality rivers, reducing heat island effects, rainwater management, and optimizing energy performance. LEED certification pertains to the design process. We wanted to see if there was a relationship between LEED certification and ongoing performance measures based on the Energy Star Portfolio Manager.

Findings

1. The range of EUI scores for Student Centers is wide – with a LEED Silver building having the lowest EUI for its category (Elmwood Student Success Center at UW-Oshkosh with an EUI of 78.6) and the highest EUI for that category (W .R. Davies Student Center at UW-Eau Claire with an EUI of 93.9). In the middle is a non-LEED certified building (Davies Center at UW-Eau Claire with an EUI of 172.5) (See Figure 2).
2. Classroom buildings exhibit a much smaller range but the result is the same—a LEED Gold building has the lowest EUI in its category (Centennial Hall at UW-La Crosse with an EUI of 77.2) and a non-LEED-certified building has the highest EUI (Sage Hall at UW-Oshkosh with an EUI of 93.9). Again, in the middle is a non-LEED-certified building (Centennial Hall at UW-Eau Claire with an EUI of 88.8).

Conclusions & Recommendations

1. Performance associated with certification is not consistent – This may be due to the small sample size, however.
2. Portfolio Manager categories are too broad – We were unable to find building categories to match our buildings in Portfolio Manager. If there were more specific building categories, such as “College/University Student Union,” we would have a clearer picture of where the UW-System buildings fall nationally.
3. Yellow Jacket Union requires further investigation – We are curious as to what UW-Superior could do to increase the efficiency of their Student Union. This could not be deduced from the data we were provided for the purposes of this study.
4. Sub-meter – There were buildings that were not sub-metered because energy use data was not available for individual buildings. Having only data for a campus as a whole makes it difficult to assess individual building performance. UW-Stevens Point actively sub-meters all of its campus buildings.
5. Follow-up study – Conduct a large-scale study incorporating a greater number of buildings across additional campuses.

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References