Proposal Summary:

Funding the replacement of the windows in Campbell Hall is an outstanding opportunity for the Revolving Loan Fund to expand its assets and to facilitate the completion of a signature sustainability project that Physical Plant cannot undertake this year without the loan. The College will transfer $80,285 into the Revolving Loan Fund from a donation the College previously received from the Margret A. Cargill Foundation. The Revolving Loan Fund then loans this amount to Physical Plant in order to replace the worn-out, drafty windows in Campbell Hall with energy efficient, low-e windows. As discussed below, the Campbell Hall window project meets the funding criteria in the Revolving Loan Fund Charter, according to the work of two sets of Sustainability Fellows who independently studied the proposed project summer 2012, and summer 2013. This loan will be repaid from the deferred maintenance budget that is overseen by the Vice President for Human Resources and Operations. This loan will be repaid over five years at an interest rate of 2%.

Discussion:

Campbell Hall is the second oldest building on the Beloit College campus. It has played a long and varied role in the history of the College and is important still in the life of the College. Currently Campbell Hall houses: the Departments of Economics and Sociology, two of the most popular majors on campus; the Kemper Computer Lab, a teaching and learning space vital to both departments’ teaching; and Belmark Associates, a student-managed market research firm that has been putting the liberal arts into practice for more than twenty years.

Campbell Hall’s appearance is marred by its old windows, windows of an unknown vintage that now are non-functional in many cases while being very drafty with rotten sills and multiple other problems. The current windows increase the building’s heating and cooling costs, and decrease the usability of the building. On cold winter days, building users sitting near the windows often must wear gloves, run electric space heaters, and/or wear additional clothing in order to work.

Replacing the windows would greatly improve the appearance and functionality of the building, while also conserving energy, saving the College money and, indirectly, decreasing greenhouse gas (GHG) emissions.

Economic analysis typically shows that window replacement cannot be funded solely from money savings resulting from more energy-efficient windows. This is also true for Campbell Hall, even given the Campbell windows’ advanced state of decay. However, comprehensive analysis demonstrates that the multiple, annual benefits from replacing the windows exceed the initial cost under a wide range of assumptions. This is a project worth doing, a necessary component of the College’s campaign against deferred maintenance.

Campbell Hall has been the focus of careful analysis and study by Sustainability Fellows working in Physical Plant summer 2012 and summer 2013\(^1\) guided by Michael Brady from Physical Plant and Warren Palmer.

\(^1\) Sustainability Fellows Richea Smith and Logan Jacobson carefully analyzed the energy usage of Campbell Hall, Summer 2012. For a summary of their work see Richea Smith and Logan Jacobson: Beloit College Energy Efficiency in Campbell Hall; Sustainability Fellows Arianna Cocallas and Lydia Stensberg reviewed, revised and extended the analysis of Campbell Hall, Summer 2013.
Multiple benefits flow from the replacement of Campbell Hall windows.

- The College will save money on its utility bills because the new windows will decrease heating and cooling loads. First, the new windows will decrease air infiltration through and around the windows. Less cold air entering the building in the heating season will decrease natural gas consumption. Less hot, humid air entering the building in the cooling season will decrease electricity consumption for cooling. Second, the low-e windows will decrease radiant energy passing through the glass to the outside in the heating season, increasing the comfort of building users close to a window. In the cooling season, the low-e windows will decrease radiant energy entering the building through the window glass, decreasing the cooling load, thus saving electricity. The decreased air infiltration and decreased passage of interior radiant energy through the windows in the winter will likely decrease or eliminate the use of electric space heaters, saving electricity.
  - The Sustainability Fellows estimated heating and cooling loads with the current windows and with the replacement windows. Their models then projected the College’s cost savings from the decreased energy usage based on current electricity and natural gas prices. The Fellows tested their models with different values for the annual growth rate of utility prices. Campbell Hall has neither an electric meter nor a gas meter, so no data exists on actual usage of electricity and natural gas. Because the Sustainability Fellows lacked data on electric space heater use, their models excluded these savings.
- The decreased energy usage due to the new windows will decrease emissions of greenhouse gases (GHG). The Fellows estimated the decrease in GHG emissions caused by the decrease in energy usage, and then estimated the monetary value to society of these decreased emissions. The College essentially experiences none of these benefits: since GHG emissions create global harm, the benefits generated from the GHG emissions by this project are minute for any local area. Nevertheless, these values should be calculated since the Revolving Loan Fund exists to fund projects that generate positive environmental benefits both to the College and to the wider world.
- Users of Campbell Hall -- students, faculty and staff -- will be more comfortable after the new windows are installed. Models created by the Sustainability Fellows include modest monetary values for the increased comfort, which will also be manifested in increased productivity of students, faculty and staff who will spend less time coping with overly hot or cold teaching and learning spaces.
- The improved appearance of Campbell Hall will also provide benefits to the College. In their Campbell Hall offices, faculty meet with prospective students and their families, with current students, with alumni and with other members of the extended Beloit College community. Perhaps few people pass Campbell Hall or enter Campbell Hall and remark on the current decrepit windows. Nevertheless, the current windows and other deferred maintenance in the building undermine the message that the College wants to project: Beloit College, the oldest continuously operating institution of higher learning in Wisconsin, honors its past while successfully educating a diverse, bright, international group of students to create a positive present and future for all. Rotting window frames and cold, leaky windows undermine the message of success and good stewardship that the College desires to communicate. The Sustainability Interns’ models included modest
money values for the benefits provided by the improved appearance of Campbell Hall. The models also included parameters that allowed this value to decline over time.

- The models also included values for the publicity value of the Campbell Hall window project. There are multiple ways in which this project can help produce valuable, but low-cost publicity through press releases, sustainability reports and announcements in environmental publications. The models assign modest values to this publicity and limit this effect to one year following completion.

Model Results

The Excel models created by both sets of Sustainability Fellows are available upon request. The power of Excel in such modeling is to show the impact on the economic viability of the project in response to changes in the parameters that drive the results of the models. The models show that the project is worth doing even with very small values assigned to the value of increased comfort and improved appearance.

For example, consider a model with a discount rate of 5% and that includes the social benefit of decreased GHG emissions. The model conservatively estimates that the College will initially save $1,200 on natural gas and $500 on electricity. The model allows this saving to increase by 3% per year, an increase supported by past changes in energy prices. If no value is placed on improved comfort and appearance, then the present value of future benefits is $37,000 less than an initial estimated window installation cost of $85,000, confirming that the window replacement cannot be economically justified just on the basis of its projected energy savings, even including the estimated external social benefit from decreased GHG emissions. However, the model shows that assigning even modest values to the benefit of improved comfort and appearance makes the project economically viable. For instance, if each of these parameters has an annual value of $2,500, the project has a positive net present value of $37,000 and earns an estimated 8% annual rate of return on the investment in the windows.

Conclusion

At some point soon, the College must replace the windows in Campbell Hall simply to ensure the integrity of the building and to prevent water damage caused by the failure of the windows. Such decisions are typically made without the detailed environmental economic analysis performed by the Sustainability Fellows. What their work shows is that replacing the windows in Campbell Hall now, rather than later, is a good investment: The present discounted value of the future annual benefits exceeds the initial cost of the window replacement. This project is a worthy one for funding by the Beloit College Revolving Loan Fund.

Respectfully submitted,

Warren Palmer
Professor, Samuel Campbell Department of Economics
Addendum: Loam Amortization Schedule

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