POST-OCCUPANCY ENERGY PERFORMANCE OF THE NEW EDUCATION CENTER, UNIVERSITY OF MAINE FARMINGTON

LEED NC V2.1

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OVERVIEW

The University of Maine Farmington's 44,500SF Education Center was awarded a LEED-Silver rating in the fall of 2007, achieving 35 out of a possible 69 points. Six of those points were given for optimizing energy performance (out of a possible 10) representing a 42.46% increase in performance over ASHRAE 90.1-1999 requirements using LEED 2.1 Energy Cost Budget methodology.

The LEED award was based on final responses submitted by PDT Architects to the USGBC in September of 2007 for their determination and evaluation of level of achievement, including the results of energy modeling indicating proposed energy use. At that time the design team reported that the new Education Center would probably use 1,606 MBTUs per year.

Since occupancy in November of 2007, PDT Architects has been working with the Department of Facilities Management at UMF to monitor the building's total energy use. The first year of occupancy resulted in a total energy use of 1,296 MBTUs, almost 20% better than the 1,606 MBTUs projected and reported to the USGBC. This is 8.5 KWH/SF/YR for all energy use, including plug loads, equipment, heating, air conditioning, ventilation, and lighting.

WHAT DOES THIS MEAN?

The UMF campus comprises 40 buildings, a majority of which are load-bearing masonry buildings built in the early 1930s and 1940s and designed to burn fuel oil №2. Once Bob Lawrence, director of facilities management and I learned that the Education Center had performed so well relative to our own projections for its energy use, we decided to compare its performance to that of other buildings on campus.

The first building we compared it to was the Roberts Learning Center, a 41,600SF classroom and faculty office building on four floors, built in 1971, very similar to the new Education Center programmatically and in terms of size. For FY 2008 the Roberts Learning Center cost $50,894 for 370,880KWHs of electricity plus $71,925 for 29,227 gallons of fuel oil for a total of $2.95/SF/YR.

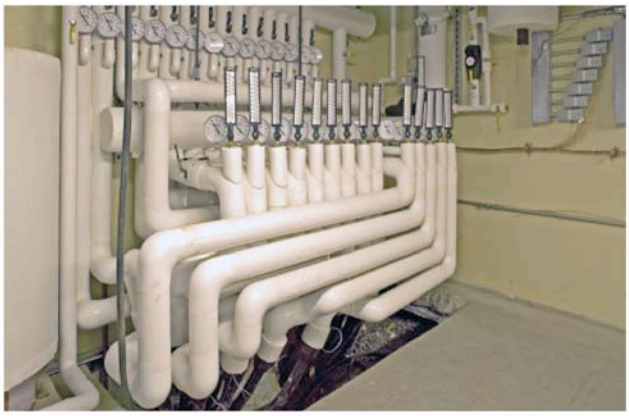
The second building we compared it to was the Computer Center, a 15,000SF classroom building on two floors that contained many desktop computers in 1991, when PDT Architects designed it. For FY 2008 the Computer Center cost $48,951 for 350,240KWHs plus $19,777 for 7,585 gallons of fuel oil and a total of $4.55/SF/YR. The Education Center cost $49,444 for 379,920KWHs and $1.11SF/YR.

We were surprised to find that the Computer Building was not performing better and are in the process of evaluating the envelope, building systems, and program demands. Present-day savings in utility costs, not including inflation, would equal $5,160,000 over a 100-year lifespan had the Computer Center performed at the same level as the Education Center.

HOW DID WE DO IT?

The operative word here is "we." As with any successful project, it takes a design team that is all pointed in the same direction. At UMF the idea of sustainability became fertile ground for their core mission and was championed by the administration, the Green Schools Coalition, students, faculty, and the community.

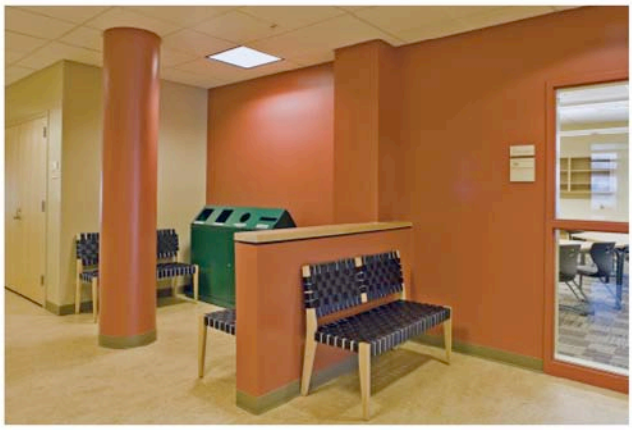
Early discussions about how the new facility would be sustainable, from carbon footprint and energy use to recycling and education, provided the essential framework for planning, design, and engineering decisions.



Specific sustainable features of the building include:

- Geothermal heatpumps with a geoexchange for heating and cooling
- Enthalpic heat recovery system
- Daylight harvesting in primary instructional spaces
- CO2 sensors with on-demand ventilation
- Continuous insulation and thermal envelope
- Air barrier
- Additional insulation in both walls and roof
- Reflective/high albedo roof
- Solar massing
- High-performance heatpumps and Energy Star rated motors
- Full commissioning
- Rapidly renewable interior finishes and furnishings with high post-consumer content (chairs with webbed seats and backs made from recycled airplane seatbelts)
- Water-saving toilets and sinks; energy-efficient hand dryers
- Interactive educational materials: PowerPoint presentations, displays, brochures, and diagrams

These are not all of the strategies but were the ones with the highest priority. At the time we registered the Education Center with the USGBC back in 2002, there was only one LEED-certified building in the State of Maine. Today Maine has close to 100 projects registered with the USGBC. Of those, 25 projects are certified, 13 of which are owned by colleges and universities, and 9 of those 13 are in the University of Maine System.



WHAT ARE THE BENEFITS?

The over-arching benefit is that UMF got a new high performance facility for $154/SF and one that operates at $1.11/SF/YR and burns no fossil fuels on site. The savings on carbon emissions and energy costs are fairly easy to calculate; the health benefits of better indoor and outdoor air quality are harder to quantify. Although there are studies indicating that students learn better in comfortable surroundings with daylighting, we are not yet able to measure those benefits, either.

But perhaps best of all, the building is a showcase for education in sustainable building. Made possible by a grant from the USGBC's Excellence in Green Building Curriculum, the University has been able to train pre-service teachers to conduct tours and use the new facility to educate elementary and middle school students as well as other educators and the general public about environmental stewardship.

LESSONS LEARNED

While it is difficult and perhaps unfair to compare buildings of dissimilar program use, construction technology, and performance criteria, evaluating energy use among campus buildings is a way of benchmarking successful projects and gaining a better understanding of the science of our buildings and their life cycle costs.