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Energy Performance Contracting at the Museum of Science

In 2008, the Museum's Environmental Sustainability Committee recommended the Museum consider a Performance Contracting Initiative in order to reduce energy costs, provide capital upgrades, increase the energy efficiency and the reliability of the Museum's mechanical and electrical systems, and to maintain or increase occupant comfort and well-being. Performance contracting finances the installation of energy conservation measure from the future cost savings from reduced energy consumption. Projections suggested that the Museum could save nearly $280,000 annually by improving and modernizing its building infrastructure with more energy efficient equipment.
In 2009, the Museum undertook a detailed audit of its energy usage in coordination with Johnson Controls as part of a performance contracting initiative. The process identified improvements to building, infrastructure and operations to deliver water and energy savings and, in turn, conserve resources, reduce emissions, improve sustainability and help address tight budgets through reduced energy consumption.

Johnson Controls was contracted to make improvements and modernize heating, cooling, building envelope and lighting systems throughout the Museum. The audit identified 22 measures to significantly reduce our energy usage, and we undertook the majority of them (The Museum ultimately chose not to carry out 5 of the recommended measures as a combination of the complexity of our distribution system and the technology available at the time did not meet our criteria for the payback period of 14 years.)

As a result of the Performance Contracting Initiative, the Museum has invested over $3.5 million and implemented 17 of the recommendations, including:

- Replaced an inefficient chiller with a 660-ton energy efficient chiller
- Replaced four PCB-containing transformers with two dry-type transformers, which are more efficient and reliable
- Replaced of our largest cooling tower with a more modern and energy efficient system
- Installed window films on select windows to decrease solar gain while improving insulation properties of the windows
- Caulked, installed weather-stripping and sealed roof-wall joints to prevent infiltration and improve insulating properties to improve the building envelope
- Optimized controls to the Museum's natural-gas fired boilers to improve efficiency, resulting in a 16% reduction in fuel usage
- Installed variable frequency drives on supply and exhaust of multi-zone air handling units
- Installed a 30KW photovoltaic system on the Museum's roof to capture and convert solar radiation to direct electrical current

As a result of these measures, and other energy efficiency efforts, we have significantly reduced our use of natural gas, electricity and water over the last five years. While differing weather conditions make it difficult, at best, to measure savings precisely, we estimate that we have reduced energy consumption at least 19%.

Compressed Air System

Chiller System

PV Alternative Energy Source

PV Alternative Energy Source

The Performance Contracting effort was initiated by the Museum's Environmental Sustainability Committee, and initial audit and planning funds were provided by William Schawbel and Judy Samelson, Museum of Science board members passionate about green initiatives. Their support has helped to support sustainability projects at the Museum of Science for a number of years.

Both William and Judy have been part of the Museum family since 1996 and are members of the Museum's Chairman's Circle of donors. William has been serving as a Trustee Emeritus since 2009, and Judy has been serving on the Board of Overseers for the Museum since 2008 and as a key member of our Environmental Sustainability Committee since 2006.

Their generous gifts to the Museum have also funded a study of the Museum's window glazing systems, identifying how to reduce energy consumption through changes to the Museum's windows along the Charles River.