

Case study

Johnson Controls Headquarters

Glendale, Wisconsin



Johnson Controls global headquarters earns LEED® platinum certification, demonstrates triple-bottom-line excellence

Overview

A growing number of companies increasingly measure their performance using the triple-bottom-line indicators of economic, social and environmental impact. Johnson Controls, Inc. demonstrates these values in its products and services. The construction and expansion of its corporate campus in Glendale, Wisconsin provides a showcase for its efforts. The campus was awarded LEED Platinum certification in September 2010 by the U.S. Green Building Council, the highest such recognition possible. The Glendale campus represents the largest concentration of LEED Platinum buildings – four – on one site ever awarded.

The 33-acre complex involves 306,359 square feet of new and completely renovated office space. Two existing buildings with a combined 160,000 square feet were renovated for the corporate headquarters, and three new buildings were constructed: a 114,599 square-foot headquarters for its Power Solutions business; a 31,700 square-foot building that includes a cafeteria, meeting rooms and fitness center; and a new four-level parking structure for more than 400 vehicles including space for plug-in hybrids.





On the grounds, 1,452 solar photovoltaic panels make up one of the largest arrays in Wisconsin, delivering up to 250kW of electricity to the site.

Years of green building experience

Johnson Controls is no newcomer to green. On top of more than a century of making buildings energy efficient, a decade ago its Bregel Technology Center, in Milwaukee Wisconsin, was one of the first LEED-New Construction certified buildings in the world. It also was the first building in the world to be re-certified LEED-Gold for Existing Buildings.

"We've been involved in more than 100 of our customers' LEED-certified or registered projects around the world. We know what technologies provide the best financial investment while having the least impact on the environment, and at the same time create a productive workplace for employees," said Ward Komorowski, Johnson Controls director of facilities and building services.

"It's important that our employees, customers and the public understand every aspect of our commitment to the triple bottom line, and the new corporate campus helps that happen."

For instance, that means incorporating geothermal heat pumps, photovoltaic energy, under-floor heating and cooling. Skylights and bigger windows increase the use of natural light and reduce dependence on artificial illumination. Rainwater is collected and used to flush toilets. A parking lot surfaced with permeable pavers allows rain and snowmelt to filter through. And a diverse workforce trained in sustainable construction helped put it all together in a cost-effective way.

Modeling from the start

For any green project, it's vital to get the entire project team on board from the beginning. "LEED encourages everyone to be involved much sooner in the process because there is so much interconnection between the different environmental credits," according to Komorowski.

He said early planning was especially important at this site because of the use of Building Information Modeling (BIM), which involved three-dimensional, building modeling software to provide exact design and construction measurements that are shared by all project members.

Using BIM made it a more cost-effective project because it helped avoid costly mistakes that can happen in traditional construction. BIM also provides:

- **Financial security.** The system's technical accuracy means precise measurement and fewer change orders. That certainty allows for more automation when fabricating materials, which also saves money. It also reduces the financial variables on a project, as all the details are worked out early.
- **Condensed timetable.** Because of the automation, contractors can do a tremendous amount of off-site work in clean, dry factory environments, which reduces weather-related delays while other work is done on site.
- **Project satisfaction.** The 3-D modeling assures that the customer gets exactly what they want before construction begins.

"The team relied on the expert information from those who would be doing the work, rather than having one person lay out the design and another person doing installation. Using BIM also helped us avoid or resolve conflicts much sooner in the process," Komorowski explained.

Technical innovation

Debbie Vander Heiden, the Johnson Controls on-site project manager, said other planning technology was crucial to one innovative environmental element of the project: geothermal heat pumps.

The geothermal system relies on the constant temperature of the earth to help heat or cool the building. Some 272 wells were drilled to accommodate



Low flow fixtures and dual-flush toilets significantly reduce water use across the campus. Harvested rain water is used to flush most of the toilets on the campus.



About 12,000 square feet of green roof absorbs precipitation, which reduces runoff, insulates the building, and extends the life of the roof. Skylights reduce the need for lighting inside the buildings.

a closed-loop system that supplies the heat pumps in the building.

“The heat pumps reduce winter heating costs by about 29 percent versus current natural gas boilers. We’re using geothermal to remove condenser heat in summer and reduce chiller operating costs by 23 percent,” said Vander Heiden.

By using global positioning system navigation, the team could determine every geothermal well site along with the measurements for all the pipes. That meant the 180,000 feet of piping could be manufactured to precise specifications, a simpler and more cost-effective process than fabricating each one by hand.

Long-term energy costs key

Although sometimes concerns are voiced about the upfront cost of green projects, the financial benefits on this project are proof of sustainability’s value. While overall campus space doubled, the campus energy use actually declined by 21 percent.

- Solar generation produces the electricity needed in the new buildings while reducing greenhouse gas emissions by 827,000 pounds per year. A 1,330 sq. ft. solar thermal installation on the roof annually saves 2,837 therms of energy.
- Skylights and increased window space reduce the use of energy for indoor lighting.
- A 30,000-gallon cistern captures rainwater from all new roof surfaces for reuse, reducing potable water consumption for new bathroom fixtures by 77 percent or 595,000 gallons per year.
- A number of on-site recycling strategies are saving money and resources. Almost 90 percent of new construction waste and more than 75 percent of demolition waste from existing buildings was recycled.

Commitment to supplier diversity

The project included contracts with 35 diverse businesses in an effort to help the suppliers create green jobs, build expertise in sustainability, and develop the capacity to handle other major green contracts. The \$18.5 million in expenditures exceeded the company’s goal of spending at least 20 percent of its budget with firms that were owned, operated or controlled by minorities or women and certified either by the National Minority Supplier Development Council (NMSDC) or the Women’s Business Enterprise National Council (WBENC).

The diverse suppliers provided products and services such as:

- Site electrical services
- Green landscape services
- Low-voltage cable installation
- Aluminum glazing
- Deck installation
- Steel fabrication
- Liner installation and stone for pervious lots

“The contractors and subcontractors on the job were trained in sustainability practices that they can use with other LEED jobs. We’re creating the green collar workforce of tomorrow,” Komorowski said.

The project also provided economic development by using locally harvested and manufactured materials for more than 25 percent of project materials, including the raised floor, concrete, steel and limestone.

“We’ve learned the best practices developing green projects, making best use of contractors, and managing the process,” he said. “These are lessons we’re sharing with our partners on this project – and down the line, our customers and many others will benefit from our experience.”



More than 14,000 square feet of thin-film PV cells are laminated to the roofing membrane of one building to generate electricity.



Energy-efficient glass and skylights help capture as much natural light as possible. This reduces dependence on artificial illumination, thereby reducing energy consumption.



By capturing rainwater and snowmelt in this cistern, then cleaning and reusing it, municipal water use is reduced by 77 percent.



A Metasys® building management system coordinates all control activities across the facilities and provides a single point of access to the information required for optimizing efficiency, comfort and safety.



Runoff water is collected through permeable paving on the parking lots and directed to a detention pond, thereby reducing the environmental impact on groundwater and waterways.



Solar thermal systems supply more than 30 percent of the hot water needs for two buildings.

Security management

Vander Heiden noted that even the security features at the headquarters were developed with energy savings in mind.

The Johnson Controls P2000 security management system and Digital Vision Network provide protection throughout the headquarters campus. It's designed to use energy efficiently by integrating access control with lighting and HVAC systems.

Additionally, digital closed circuit TV cameras across the campus take advantage of advanced analytics to notify facilities operators of abnormal events, plus some 150 card access and biometric readers provide a high level of protection. A Johnson Controls Intelligent Fire Control system features full analog reporting from smoke detectors, along with digital voice evacuation functionality. Infrared camera technology is used at the solar array field to create an "electronic fence."

Building automation

Everything is tied together using the Johnson Controls Metasys® building management system to coordinate all activities across the facilities and provide a single point of access to performance indicators – the information required for optimizing building efficiency, comfort and safety.

"The integration of the building systems and the information technology infrastructure into one intelligent network is an important part of our strategy for sustainability," noted Komorowski, who leads the facilities management team. "Our Metasys Sustainability Manager provides a dashboard that delivers information, including greenhouse gas emissions estimations, to our management team who can make informed decisions that save energy and money and help the environment."

Powerful Statement

Johnson Controls hosted more than 6,000 visitors in the first 18 months that the facility was open, showcasing the energy efficient and sustainable building products and services that the company provides to customers worldwide.

"It is easier for our own customers to see value in this approach when we can show how well we're putting it into effect so well here at home – and how we're doing it cost effectively," Komorowski said.

"This campus is a powerful statement about how Johnson Controls is committed to sustainability. It's a showplace of excellent work environments, energy efficiency and facility management initiatives," he added. "We're looking forward to accommodating many years of business and employee growth."

The company began demolition in the fall of 2007 and had the facility's grand opening in the fall of 2009. The campus is a continuation of the Johnson Controls legacy that began in 1885. Three global businesses – Automotive Experience, Building Efficiency and Power Solutions – continue to drive the company toward its mission of creating a more comfortable, safe and sustainable world.



JOHNSON CONTROLS RANKED #1
in *Corporate Responsibility Magazine's*
12th annual "100 Best Corporate Citizens List"

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