CHRISTMAN SINCE 1894



# OVERVIEW

## Description

The Christman Building is the world's first triple platinum LEED project, adding LEED-EB to its CS and CI certifications.

This 1928 landmark building, on the National Register of Historic Places, is located in the heart of Lansing, Michigan, near the state Capitol. This grand old building's new lease on life was accomplished in a 2007 major renovation through a commitment to sustainable, green historic preservation.

In January 2009, The Christman Company committed to expanding current green housekeeping and recycling programs to a comprehensive green operations company-wide program using LEED-EB as a guide, and to certifying its national headquarters building.

### *Significant Environmental Aspects*

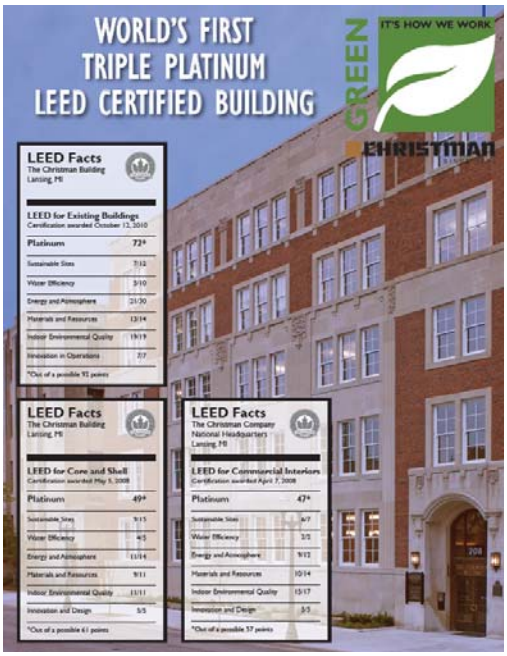
The goal of this LEED-EB effort was to manage and operate the building in an as environmentally sensitive a way as possible.

Given that the Christman Building had achieved the world's first double-platinum LEED certification, the bar was already set very high. The decision was made "to be as green as could be." The LEED-EB rating system was chosen as a guide to greening the headquarters building operations, and all company operations, and then to use the certification process as a test of success, with a goal of attaining a third platinum.

As the building was already LEED certified, significant progress had been made in the areas of sustainable sites, water efficiency and indoor environmental quality.

A major initial challenge was to implement the corporate culture shift needed to get staff, executive and tenant buy-in to the changes and practices required to move to a sustainable form of operations.

Going into the process, Christman knew that improvements could be made in materials purchasing, energy efficiency, carbon footprint management, and documentation of all sustainable building activities. Re-commissioning and other analyses conducted during the process revealed opportunities to adjust HVAC, lighting, IT equipment, snow removal, cleaning and other systems to maximize green performance.

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# DETAILS

## Process

### *Pre-Design*

Once the decision was made to implement the LEED-EB process, the "Greening The Christman Company Committee" was formed. It included the building operations manager, facility technician, facilities manager, vice president for information technology, and representatives from the accounting, marketing, and human resources departments. The committee began to develop policies, plans and standard operating procedures for the various LEED categories.

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### *Design*

Once the policies, plans and standard operating procedures (SOP) were developed, the team began meeting with contracted service providers to identify changes needed to comply with the SOPs. An extensive re-commissioning process was also developed to verify and fine tune the operation of all energy using systems. A level-II ASHRAE energy audit was conducted in-house to identify all low-and-no-cost energy saving measures as well as measures that required capital expenditure. All utility data was entered into the Energy Star Portfolio Manager in order to benchmark the building's energy use.

### *Construction*

The re-commissioning process was used to ensure that all components and the entire HVAC system were operating per the design. The process identified that many sensors and controls were either out of calibration or were not properly functioning. All controls were calibrated, their operation verified and thorough component and system level functional checks were completed. Fine tuning of schedules and sequences of operation were also implemented, such as reset schedules, a morning warm-up program, and optimum start-stop program. The server room cooling unit was identified as being over-sized due to recent IT equipment changes. Accordingly, the 10 ton unit was replaced with two 1.5 ton units. During re-commissioning, it was noted that some of the hot water piping in the under floor air distribution plenum space was not insulated, and this was corrected.

The lighting systems were investigated and unnecessary night lighting was eliminated. Lighting control schedules were refined to match actual occupancy. Occupancy sensors in private offices were reset to turn lights off after 8 minutes. Additional occupancy

sensors were installed in seven conference rooms and offices. The lights and exhaust fan in the elevators were programmed to turn off when the elevator was unoccupied. The IT department purchased a program that enabled central control of computers and monitors, allowing this equipment to be put into a verified sleep mode when not in use.

***Operations/Maintenance***

To implement the sustainable purchasing policies, materials with recycled content, rapidly renewable and regional origins were purchased whenever possible. Christman identified local food vendors who committed to supplying the building with locally grown and/or USDA Organic certified food for lunches and catered events. A fun taste-test was held to try out different fair trade coffees, and a decision was made to purchase a fair trade coffee grown in Guatemala.


Snow and ice removal operations were changed to replace the use of salt with magnesium chloride to reduce environmental impact. Snowfalls less than one inch in depth are also now cleared by in-house staff using a newly purchased ergonomic snowblower. These changes resulted in a reduction of $12,000 in annual operating costs.

Although a green cleaning program was already in place, the cleaning contractor was encouraged to move to the next level to comply with the even stricter standards set in the Christman Building Green Cleaning Policy.

An inventory of all lamps in the building was conducted. Replacement lamps with low mercury content were identified, incorporated into a lamp purchasing plan and purchased when necessary.

Staff members were encouraged to use alternative transportation to get to work by the addition of a carpooling parking spot in a preferred location, and to use the bike rack and changing rooms. A program put on by the local transportation authority provided information to building occupants on options available for carpooling and other alternative forms of transportation.

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***Commissioning***

In addition to the re-commissioning process, an ongoing three-month pre-performance period included an analysis of office supply purchases, food and coffee bean purchases, and supplies used for hardscape maintenance and housekeeping.
commissioning process was developed which included a comprehensive building operations manual and a structured ongoing commissioning plan. The ongoing commissioning program includes ongoing training, calibration, and preventive maintenance on all HVAC controls and structured functional checks on all equipment on a regular basis.

***Measurement and Verification/Post-Occupancy Evaluation***

The Energy Star Portfolio Manager is used for benchmarking natural gas, electricity and water use. The building currently has an Energy Star rating of 83, putting it in the top 17th percentile of office buildings in the country, a significant accomplishment for an historic building with minimal envelope insulation.

A detailed occupant survey was conducted and achieved a 63% response rate. The occupant survey identified areas of concern and satisfaction. A response plan was implemented to improve comfort, IAQ, maintenance, and housekeeping as identified.

***Financing***

**Summary of LEED-EB: O&M Project Quantified Costs, Benefits, and Payback**

This LEED EB project was financed with internally budgeted funds. Staff time required was incorporated into regular work schedules. The information below is summarized from IOc3: Documenting Sustainable Building Cost Impacts.

| | |
|---|---|
| Total Incremental Costs of Implementation ($) | $22,280 |
| Total LEED-EB: O&M Certification Process Costs ($) | $41,925 |
| Total LEED-EB: O&M Building Project Incremental Operating Costs ($) | $64,205 |
| Total Annual Net Savings ($) | $46,026 |
| Simple Payback of Total LEED-EB: O&M Building Incremental Operating Costs (Years) | 1.4 Years |
| Floor Area of LEED-EB Building ($ft^2$) | 64,190 $ft^2$ |
| Total LEED-EB: O&M Building Project Incremental Operating Costs per Square Foot ($/ft^2$) | $1.00 |
| Total Annual Net Savings per Square Foot ($/ft^2$ ) | $0.72 |
| Life Cycle Net Present Value ($) | $413,529 |
| Life Cycle Net Present Value per Square Foot ($/ft^2$) | $6.44 |

**Cost and Payback Description**

During this first LEED-EB effort, some consultants were used to assist with developing standard operating procedures and policies. In addition, a total of $22,000 in hard costs were expended to implement the energy saving measures identified. Internal staff costs amounted to $42,000 during this first performance period. The calculated projected cost savings are expected to be in the range of $50,000 per year, resulting in a simple payback of 1.4 years.

# PERFORMANCE


### *Land Use and Community*

The building is located in the heart of downtown, providing pedestrian access to community services, reducing the use of fossil fuel for transportation. Transportation alternatives include five bus lines connecting to all parts of the metropolitan area. Bike racks, showers and locker room facilities encourage occupants to walk, run or bike to work. A preferred reserved parking space for carpooling has been added to encourage this form of transportation. In addition, a preferred reserved parking space is provided for fuel efficient vehicles to encourage the transition to hybrid and other forms of fuel efficient personal transportation.

The building owner has made long-term lease commitments with its tenants to reduce the future environmental costs associated with turnover. Green guidelines have been prepared for building tenant fit-outs.

### *Site and Water*

The project is situated in a densely developed urban setting among office and retail space on the major street that passes in front of the nearby state capitol building.

The firm selected a previously developed brownfield site, a landmark building which had fallen into functional obsolescence and disrepair. This offered an excellent opportunity to showcase green historic preservation at a cost no greater than conventional design and construction practices.

The original building housed an insurance company that insured many of Michigan's grain mills. Numerous millstones from those mills had been incorporated in the sidewalk in front of the building. These were carefully extracted when the sidewalk was replaced and are now featured in the narrow band of landscaping along the front façade.

An exterior and hardscape maintenance plan was implemented to ensure that environmentally sensitive products are used when cleaning, painting, and maintaining the building site and hardscape.

An integrated pest management plan is in place to ensure that harmful chemicals are not used to control any pests.

The landscape management plan includes composting of all removed materials and the elimination of all turf grass.

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The 250-watt HID flagpole light was replaced with a solar powered LED directional fixture to reduce light pollution.

***Water Conservation and Use***

The carefully selected plumbing fixtures installed during building renovation continue to deliver substantial water savings. As part of the LEED-EB process, water meters were installed on the domestic hot water heaters and are read and charted on a weekly basis, as is the main building water meter. The building is currently using 45% less water than the LEED-EB baseline.

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***Energy Use and Conservation***

The original exterior brick walls of the building have been cleaned and tuck pointed to historic preservation standards. Due to these standards, insulation could not be added to the walls. The white roof and 6" of added insulation reduce the urban heat island effect and reduce energy use.

The building's original front façade windows frames have been meticulously restored and fitted with double-glazed glass to increase their energy efficiency. The building's side and rear exterior windows have been replaced with high efficiency aluminum windows.

Re-commissioning and ongoing commissioning of all HVAC, lighting and domestic water systems ensure that all systems operate as designed and are continually fine tuned.
The three-month pre-performance period included an analysis of office supply purchases, food and coffee bean purchases, and supplies used for hardscape maintenance and housekeeping.

The HVAC systems were designed and equipment selected to minimize energy use while providing individually controlled comfort conditions. The under floor air distribution system is more energy efficient than conventional ducted systems. All cooling equipment uses refrigerants that cause minimal damage to the environment.

The design took advantage of large perimeter windows to provide daylighting to 92% of occupied spaces building-wide and outside views to 90% of the occupants in the Christman headquarters. Additional background lighting is provided by high efficiency fixtures and T-5 fluorescent lamps with a very high color rendering index (CRI). All workstations have individually controlled multi-level task lighting. The lighting system energy savings are projected to be 27%. Use is controlled by occupancy sensors in private offices and stairways, and programmed control panels in common spaces.

The web-based building management system (BMS) BMS has several thousand control points that are used to operate the building

systems for maximum efficiency and comfort. Energy use is metered at the building and tenant levels to encourage conservation.

All appliances and office equipment, including copiers, fax machines and computers, are Energy Star rated.

The energy saving measures implemented during the first LEED-EB performance period is calculated to save 24,640 CCF of natural gas per year and 354,780kWh/year. The building's Energy Utilization Index (EUI) was reduced from122.0kBtu/SF/Yr to 65.9kBtu/SF/Yr. It is estimated that this should result in cost savings of approximately $49,000 per year, and a $CO_2$ pollution reduction of 380 MtCO2e/year.

Renewable Energy Certificates from clean wind energy were purchased to offset 100% of the electricity used for the entire Christman Building for two years. Over the next 2 years the 1,121,200 kWh still used will be offset, reducing $CO_2$ emissions by 569 MtCO2e/year, which is equivalent to planting 5,162 trees or reducing driving by 1,267,137 miles. In addition, 100% of remaining 2 year natural gas usage of 48,792 CCF/yr has been offset with American Carbon Registry verified emission reductions (VERs), resulting in an additional carbon offset of 291 MtCO2e/year.

## MATERIALS AND RESOURCES

A sustainable purchasing policy was developed and implemented by all tenants to cover ongoing consumables and durable goods in the form of electric and IT equipment, and furniture. A concerted effort was implemented to identify and purchase office supplies and paper products that met sustainable criteria, resulting in a weighted average of 164% for consumables purchasing.


A sustainable purchasing program for electric powered equipment and IT was implemented by all tenants resulting in a sustainable purchasing rate of 49%.

The furniture sustainable purchasing program resulted in a weighted average sustainable purchasing rate of 200%.

All of the building tenants participated in the sustainable purchasing program for food, resulting in a weighted average of 53% for combined food and beverage purchases that met applicable sustainability criteria, such as USDA certified organic, fair trade, and/or local production.

A lamp purchasing plan was developed that requires at least 90% of lamps purchased comply with low mercury standards. The project achieved a mercury performance level of 45.07 picograms/lumen-hour for lamps purchased during the LEED EB Performance Period.

During the performance period, a pipe leak resulted in water damage to a conference room on the first floor. The restoration of this historic space utilized materials that met one or more sustainable criteria, resulting in a weighted average of 317%.

Early on in the performance period, a waste stream audit ("dumpster diving") was conducted to identify all of the components in the waste stream and to ascertain whether improvements could be made to the building-wide, comprehensive recycling program that had been in place for a year. The waste materials that are recycled from the building's waste stream include white paper, mixed paper, cardboard, glass, plastic, pop cans and bottles, printer cartridges, batteries, lamps and wood. The total waste stream for the building for the performance period equaled 59,956 pounds. Of this, 72.98% was diverted from landfill for recycling or reuse.

Durable goods waste stream diversion included 100% of electric and IT equipment. Fifteen computer systems were refurbished and donated to needy families as part of the company's participation in the local Operation Santa program. The equipment that could not be refurbished was taken to Goodwill to use in its own recycling program.

***Waste***

During the demolition phase of the project, all carpet squares in the building were saved and donated to Habit for Humanity. All ceiling tiles were sent to Armstrong Industries for recycling into new ceiling tiles. Drywall was used as an additive for road construction projects. A comprehensive reclamation and recycling program during construction provided on-site recycling containers. The recycled materials were sent to specific recycling centers. These focused efforts diverted 77% of the CI project construction waste from the landfill.

## ENVIRONMENT

***Indoor Environment Approach***

An indoor air quality (IAQ) management program was developed and fully implemented based on the EPA's Indoor Air Quality Building Education and Assessment Model (I-BEAM). The program includes thorough periodic inspections of all HVAC and building components to identify and, if necessary, correct any issues that could impact the building IAQ.

The air flow monitoring stations on the air handling units are calibrated three times a year to ensure that the correct outdoor air volumes are maintained. The ventilation rates for the building are maintained at 30% above the minimum required by ASHRAE 62.1-2007. All air handling units are equipped with MERV 8 primary

filters and MERV 13 final filters that are changed on a regular basis as part of the building's comprehensive preventive maintenance program.

An IAQ Management Plan developed for facility alterations and additions requires the implementation of best management practices whenever construction occurs in the building.

In order to maximize occupant comfort, 98% of work stations have individual control of the lighting. The lighting in all multi-occupant spaces can be adjusted to meet the activity requirements.

Thermal comfort monitoring in the building occurs continuously with the measurement of air speed and radiant temperature measurement. Ninety-two percent of the building occupants have views and/or daylighting in their work spaces.


A high-performance green cleaning program was implemented to address appropriate staffing, training, use of chemical concentrates, use of sustainable cleaning materials, sustainable cleaning of carpet and hard surface floors, and the correct use of cleaning equipment. A sustainable purchasing program for cleaning products and materials was implemented, resulting in a purchasing rate of 93%. The sustainable cleaning equipment program requires the use of high efficiency ergonomic cleaning equipment and a comprehensive maintenance program for the equipment. A custodial effectiveness assessment was conducted in accordance with APPA Leadership in Educational Facilities "Custodial Staffing Guidelines" and achieved the outstanding score of 1.26.

Entryway systems in the form of walk-off mats that are replaced on a weekly basis serve as a pollutant source control.

Lastly, an integrated pest management system was developed and implemented to eliminate the use of harmful chemicals.

# RESULTS

***Lessons Learned***

The greening of the Christman Building operations and maintenance activities has been an interesting journey. The majority of building occupants, including The Christman Company staff and tenants, have wholeheartedly committed to the program, with outstanding results.

Using the LEED-EB rating system to guide the Christman Building's sustainability efforts and then measuring our performance with this third-party rating system has proven that the Christman Building truly operates in a sustainable, green way. The project achieved 72 out of a possible 92 points in the LEED-EB rating system.

Innovation in operations credits were achieved for exemplary performance in water efficiency, daylight and views, facility alterations, and lighting control. Additional areas of exemplary performance include sustainable purchasing of ongoing consumables, durable goods-furniture, reduced mercury in lamps, and food.

As part of the project, sustainable building cost impacts were quantified and showed that the net annual savings per square foot equals $0.72. The net present value of the building has increased by $413,500. The life cycle net present value per square foot has increased by $6.44.

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