When Owens Corning built a new headquarters campus in 1996, it sought a flexible, sustainable and high performing building that encouraged collaboration. Thirteen years later, the building demonstrates the long-term benefits of investing in good design.

The Owens Corning World Headquarters in Toledo, Ohio, received LEED for Existing Buildings 2.0 Silver certification 10 years after it was constructed. While the cost of electricity has increased since the building opened, annual spending on building electricity dropped 25% from 1997 to 2008.
The headquarters, home to more than 1,100 employees, received LEED for Existing Buildings 2.0 Silver certification 10 years after its opening in 2006. Data show continued performance improvement as the operations team drives for greater efficiency and reduced cost.

Two examples of these operational efficiencies are electricity expenses and the cost to move employees. While the average cost of electricity has increased about 6% since the first full year of building operations, electric expenses have been reduced as the operations team drives for greater efficiency and reduced cost.

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Top
Spaces such as this atrium provide informal meeting areas and encourage conversation.

Bottom
Glass-enclosed staircases that extend into the courtyard give occupants the sense of being outdoors. Employees sometimes go out of their way to use these staircases instead of the elevators or interior stairwells.

Welcome to the Family.

FLEXICOOL® Chilled Beams

SEMCO’s new line of chilled beam cooling products are designed for use in non-residential applications where there is a high cooling load and/or rooms that require individual temperature control. Flexicool chilled beams combine radiant cooling with conventional overhead ventilation to reduce energy usage, improve comfort levels, and reduce the architectural impact of ductwork and other mechanical systems. Welcome to the family. For additional pictures, case studies, and technical data, please visit www.semcocinc.com.
operation (according to the U.S. Department of Energy), annual energy costs have dropped more than 90% from about $8,000 per employee in the move to the new building. The facility has a total workspace of 700,000 square feet. Energy use and costs are compared to similar buildings based on the Annual Energy Cost Index (ECI) and Energy Use Intensity (UEI). A significant portion of the building’s energy savings is due to its efficient HVAC system. The building’s HVAC system is designed to use less energy by utilizing smaller, more efficient fans, which means less energy consumption. Controllable vents can be used to reconfigure the space without the need to rework ducting or other changes in HVAC.

### Key Sustainable Features

**Energy Use at a Glance**

- **Energy Use Intensity (UEI)**: 5.9 kBtu/ft²
- **Natural Gas**: 3.3 kBtu/ft²
- **Electricity**: 55.6 kBtu/ft²

**Annual Source Energy**: 185.6 kBtu/ft²

**Annual Energy Cost Index (ECI)**: $1.73/ft² - yr (gross)

**ENERGY STAR Rating**: 93 (as of 8/09)

- Excludes data center energy use.

### Building Envelope

- **Roof**: TPEFM membrane and dual layer of 2 in. FOAMULAR 400 insulation; covered with light colored rounded water-worn gravel
- **Overall R-value**: 22.5
- **Reflectivity**: 0.34

**Walls**

- **Type**: Curtain wall (glazing), brick
- **Overall R-value**: 12.51 (brick: 0.44, air infiltration barrier: 0.68, insulation: 11, drywall: 0.45)
- **Glazing percentage**: 65%

**Foundation**

- Slab edge insulation R-value: R-16 (4 in. Thermaflex insulation)
- Under slab insulation R-value: R-10 (2 in. FOAMULAR 250)

**Windows**

- **U-value**: 0.29 in winter, 0.28 in summer
- **Solar Heat Gain Coefficient (SHGC)**: 0.37
- **Visual Transmittance**: 70%

**Location**

- **Latitude**: 41° 40’ N
- **Orientation**: North to South

**Ventriculation and Daylight**

The two examples of the best features are the raised floor/underfloor ventilation system and daylighting afforded by the narrow floor plate. Underfloor ventilation provides operating and energy efficiency as well as environmental advantages. Conditioned air is delivered through the raised floor system at a lower velocity than traditional HVAC systems with wireless access through-out the facility. The building also includes a variety of features and services intended to support healthy living and work needs. These amenities include:

- **The Courtyard Café** with healthy menu options and a high glass wall to let in sunlight and allow unobstructed views of the gardens.
- **A convenience market** that includes laundry, dry cleaning and tailoring services.
- **A medical center** and indoor fitness facility for wellness and physical conditioning.
- **Indoor and outdoor fitness facilities** and walking trails.
- **A credit union and ATM**.
- **The discovery center for career development**.

**Driving Forces**

Organizational objectives, company experience and industry expertise have shaped long-term performance, beginning in the design and construction phases and continuing today. A desire to break down perceived “silos” influenced the headquarters’ design. At the previous facility, the 10 business units tended to work as autonomous units. The objective involved flattening the organizational structure and bringing people together for more cross talk and sharing of best practices. Owens Corning is a growing, changing organization, requiring employee and business adjacencies to continually shift. The planning team adopted an interior scheme that was flexible, allowing moves and organizational shifts to take place quickly, with minimal cost, and without generating building materials waste.

Industry expertise was gathered by benchmarking recommended best-in-class buildings. The team found little to emulate until it connected with the Advanced Building Systems Integration Consortium (ABSC), a coalition at Carnegie-Mellon University. The ideas and concepts gathered from ABSC are reflected in some of the best features of the building.
A further enhancement to operational and energy efficiency as well as occupant comfort is the daylight and views to the outdoors created by a relatively narrow floor plate in combination with ample glass. Offices and work areas are near but not next to windows, so interior walls do not block incoming light. The design reduces the need for artificial light while creating a pleasant environment for employees.

Flexible Space

The raised floor system also accommodates modular underfloor power and data distribution systems that simplify the reconfiguration of work space. In the previous headquarters building, it cost an average of $1,000 per person to move or realign individuals and business teams. That cost included contractors to rework walls, ceilings, lighting, power, mechanical and supporting services, as well as administrative coordination and move time.

Underfloor air distribution gives employees the flexibility to control airflow and temperature at their workstations. Air can be delivered at lower velocities than traditional HVAC systems, resulting in the use of smaller, more efficient fans.

### Building Energy Use

<table>
<thead>
<tr>
<th>Month</th>
<th>Electricity (kWh)</th>
<th>Natural Gas (cubic feet)</th>
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<tr>
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<tr>
<td>Feb</td>
<td>1,034,471</td>
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<td>May</td>
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<td>Aug</td>
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<tr>
<td>Dec</td>
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<tr>
<td>Annual</td>
<td>7,574,133</td>
<td>1,429,900</td>
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</table>

Excludes data center use.

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<th>Natural Gas (cubic feet)</th>
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<tr>
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<td>Annual</td>
<td>7,059,966</td>
<td>1,279,800</td>
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Data Center

Another significant contributor to efficient operation is the HVAC management system. One challenge to effectively managing resource use in this building is the data center servers. The data center used 28% of the total energy in 2008 (up from 22% two years earlier), while occupying less than 1% of the building area. Data centers are large consumers of electricity to operate and cool the servers.

When compared to buildings without data centers, our energy use is high. The building nevertheless has an ENERGY STAR rating of 93, placing it in the top 10% of this type and size, because the program allows the energy use of the data center area to be backed out, providing the energy use is metered. Managing energy use in the data center is an important factor in the overall trend to cut energy consumption in the building by more than 25%. More energy-efficient servers have been deployed along with a cooling strategy to focus on the equipment instead of the whole room. This is certainly helping, but gains have been more than offset by growth in data processing and storage capacity.

Other contributors to driving down operating costs include leveraging daylighting with additional controls and developing an automated step-by-step process for conditioning the building before occupants arrive in the morning. Motion detectors and photocells monitor and turn off lights when they are not needed. The company also launched a program in 2002 to solicit ideas from employees. A team was assembled and creating a pleasant environment for employees.

Top: The relatively narrow floor plate of the building provides views of the interior courtyard and Maumee River. Ample glass provides daylighting, reducing the need for artificial light while creating a pleasant environment for employees.

Above: Small white circles applied to the glass in a frit pattern help reduce heat gain on the courtyard side of the building.

Above: Reflective glass on the river side of the building reduces heat gain. Low-maintenance native grass is mowed once a year and does not require irrigation.

Left: At the company’s previous headquarters building, reconfiguring office space required moving walls, ceilings, and lighting and cost an average of $1,000 to move each employee. The new headquarters’ modular workspaces can be reconfigured with only a hammer, wrench and screwdriver, costing less than $100 per person.
to evaluate and prioritize the best suggestions; some demonstrated big savings, were easy to deploy and required no investment, so they were implemented right away. So many ideas were submitted that the facilities team is still working to implement some of them.

LEED Certification
When seeking LEED certification, the initial examination revealed 23 LEED credits earned or achievable with simple documentation and no cost. With further study, 21 more credits were found to be readily available, again with no cost. The combined savings from all of the credits resulted in operational savings of more than $100,000 per year. Much was learned while preparing to seek LEED certification, including ideas for new control strategies that resulted in reduced energy costs and improved indoor air quality.

One significant issue was lighting. For aesthetic reasons, an uncommon lamp was selected in the initial construction for the primary lighting fixture throughout the office areas: a fluorescent T8 U-tube with a smaller-than-usual turn radius. The lamps are energy efficient, but every lamp has mercury in larger amounts than the best-in-class standard. Since there were no alternative U-tube lamps available, the existing lamps are being replaced with alternative straight tube lamps, which have the added benefit of reducing consumption while maintaining sufficient levels of lighting.

Value of Efficiency
Although the company didn’t invent anything new for the building, the teams brought together an unusual combination of materials, technologies and processes that assist in managing the overall system. The building serves as a symbol of the company’s willingness to try new approaches to achieve business needs called for a horizontal building in a campus-like setting, which typically means a location in the suburbs. However, we found a way to achieve our business needs in the urban environment.

For a different result, work differently
We forced a coalition among the interior design firm, furniture supplier and the furniture installer to encourage fresh thinking, parallel development and breakthrough results.

Buy-in from the top on objectives is critical
The CEO was actively engaged and secured alignment within the leadership team around the objectives at a critical time when early decisions were being questioned.

You can have it both ways
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Redefining how work space is allocated and used
We converted to a culture of “casual collisions” that enable interaction and exchange of ideas.

Business value in social environment
Work space can be arranged to create “casual collisions” that enable interaction and exchange of ideas.

Recruiting value in culture of connectivity
The physical and cultural environment that job candidates experience when they visit has helped the company hire extraordinary talent.

Economic and environmental value in flexible work space
Operating sustainably means more than conserving energy; flexible work spaces facilitate reconfigurations without construction costs or waste, keeping $500,000 worth of scrap building materials out of the landfill annually.

Willingness to try new approach can pay dividends
The decision to use underfloor air distribution was scary at the time, but we have been rewarded with occupant comfort, energy savings and flexibility.

Occupant engagement adds value
We insisted that the building design team work in our offices to ensure a high level of interaction. A core team of employees was involved in the project as well. We rallied around a shared set of objectives.

Address “whole life” aspects of work
We are more productive when we have easy access to basic needs such as fitness, banking, health care, food, laundry and dry cleaning, etc.

Leverage outdoor attributes
We created a pleasing and productive environment with daylighting, open sight lines, and exterior and interior landscaping that appears to bring the outside world indoors.

Highlight stairwells and common spaces to enhance networking
Our stairwells are wide enough for side-by-side conversations to continue during movement between floors.

Executive visibility is positive
Corporate leaders are in the middle of things with offices in the center of the building. The board room also is centrally located. The facility does not include any designated parking or dining areas for executives or the board.

L E S S O N S  L E A R N E D

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