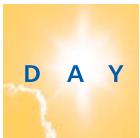


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THE BIMONTHLY NEWSLETTER OF THE DAYLIGHTING COLLABORATIVE

www.daylighting.org

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DAYLIGHTING
collaborative®

Thank you to the members who support the Daylighting Collaborative's mission of **lighting every building using the sky**:

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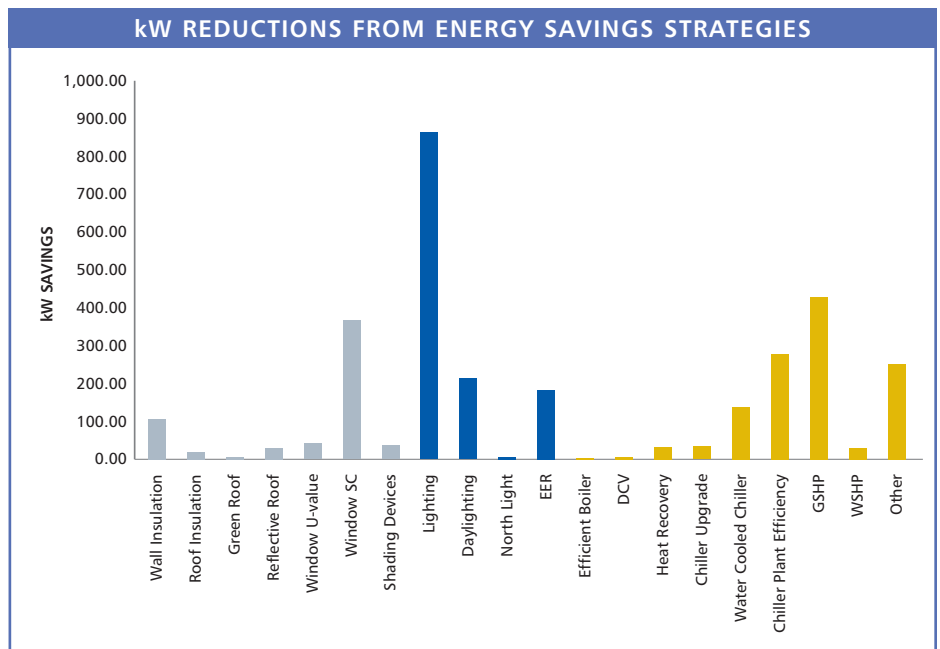
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WINDOWS AND ENERGY USE

Aesthetics often drive the glazing selection process: color, transparency, reflectivity, and translucency all have a tremendous impact on the appearance of a building. The challenge is to meet the aesthetic design criteria while also achieving the best energy performance.

There are two approaches to selecting glazing materials to meet energy goals. The first is to follow prescriptive recommendations and the second is to simulate the building's energy use through a computer modeling process. Prescriptive metrics are useful for quickly narrowing the field to a few glazing products that meet your design criteria. However, simulating the building's energy use is the only reliable method to understand the complex interaction between the window system and the other systems (HVAC, lighting, and other envelope measures).



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TRAINING UPDATE

LIGHTING AND DAYLIGHTING TRAINING IN NORTHERN ILLINOIS

Energy Center of Wisconsin and ComEd kick-off partnership with lighting and daylighting training.

More than 100 architects, engineers and lighting professionals attended Lighting and Daylighting Design with Efficiency, presented by Jim Benya, June 17 in Oak Brook, IL. The training kicked off a partnership between the Energy Center of Wisconsin and ComEd of Chicago to offer new construction design services and continuing education programs in Northern Illinois. The service aims to improve standard building practices to make commercial buildings more energy efficient.

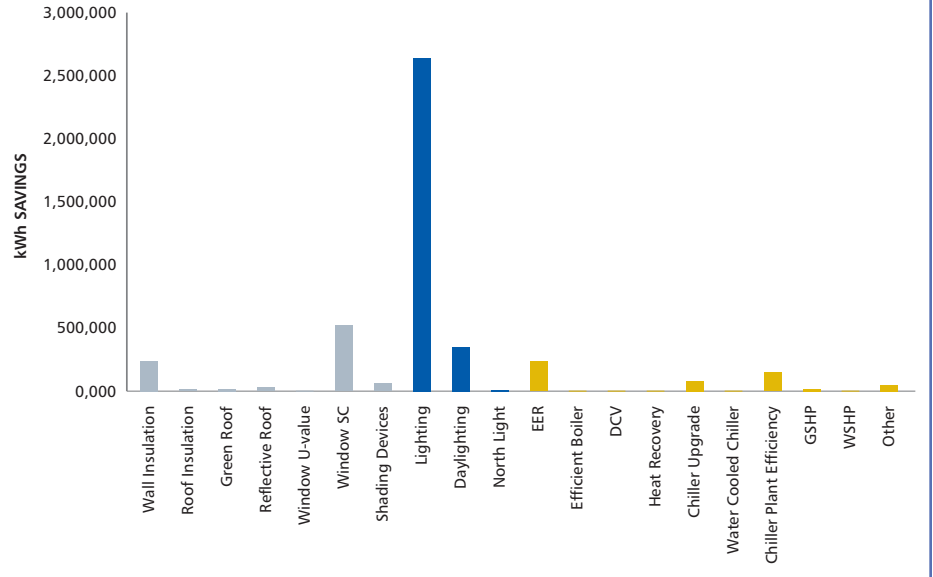
For more information on the program and upcoming trainings, please visit www.ecw.org/comedtraining.

MEMBERSHIP UPDATE

The Daylighting Collaborative welcomes a new member!

Wasco Daylighting Products is a manufacturer of commercial and residential skylights. We're grateful to all our members for their generous support and collaboration in developing and delivering the resources the building design community needs to light every building using the sky.

kWh REDUCTIONS FROM ENERGY SAVINGS STRATEGIES



continued from page 1—**WINDOWS AND ENERGY USE**

The Energy Center manages four programs in the Midwest that provide building design teams with assistance in meeting high performance goals for their projects. We've consulted on over 12 million square feet of new commercial projects in the last five years. For one of these programs, we compared the electricity (kW and annual kWh) across 20 projects totaling 2,956,000 square feet between the years 2005–2007. All of these projects followed a comprehensive approach to determine their savings. This approach allows the design team the greatest flexibility to meet energy performance goals. It identifies integrated design solutions that are analyzed through whole-building energy simulations. The baseline for determining the energy savings was ASHRAE 90.1 2001.

Every commercial new construction project is unique and our sample is not statistically significant, but it is possible to draw some conclusions from these graphs.

First of all, the commercial building code in Wisconsin is much more stringent now than it was (ASHRAE 90.1 2001 vs. 2004), particularly with regards to Lighting Power Density (LPD). Most of the electricity savings from LPD reductions no longer exist because of this more stringent baseline. However, the potential for new technology to transform the market still exists. Cost effective LEDs for ambient lighting applications could cut LPD targets in half, but they are still in development.

Next, a few large projects employed Ground Source Heat Pumps (GSHP), which delivered excellent peak demand (kW) reduction. However, GSHPs are still not standard

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DAYLIGHTING COLLABORATIVE
SHINES AT LIGHTFAIRJIM BENYA HONORED WITH
GE EDISON AWARD

The Daylighting Collaborative was thrilled to be a part of the record-setting 23,000 industry professionals that attended **LIGHTFAIR 2009** in New York. The Daylighting Collaborative booth was located in the heart of the Daylighting Pavilion and LIGHTFAIR keynote speaker Ed Begley, Jr. paid us a visit. It was great to see many familiar faces and promote daylighting practices to interested professionals from around the world.

Congratulations to Daylighting Collaborative Advisory Committee member **Jim Benya**, along with **Michael Neils**, **Juan José Villatoro** and **James E. Christensen**, who received the prestigious GE Edison Award for lighting the Sacramento Memorial Auditorium in Sacramento, CA. The project also earned an Award for Excellence in Environmental Design.

LIGHTFAIR 2010

MARK YOUR CALENDAR for next year's LIGHTFAIR, May 10–14, 2010 in Las Vegas. For more information, please visit www.lightfair.com.

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issue on commercial new construction projects. Furthermore, they are great for reducing peak loads, but not effective at saving kWh over a more standard system type.

But most interestingly, window SC (Shading Coefficient) was the 3rd best performing energy efficiency measure on the list for peak electric (kW) savings, and the 2nd best in terms of electric (kWh) savings. There are two primary reasons for these rankings. First, every building has windows (less savings per building, but more savings from all the buildings in the program), and second the baseline for window values has changed little between code iterations. However, our analysis applies solely to Window SC values. Additional electricity savings will result if we were to account for a reduction in window-to-wall ratios, building orientation, or shading features (louvers, blinds, light shelves, and the like). Also, therm savings (natural gas) would result from analyzing U-factor improvements of the glazing assemblies. Overall, Window SC improvements account for 10% of the kW and 12% of the kWh savings for the energy efficiency measures we considered.

There are certain instances where glazing upgrades will contribute a greater percentage of energy savings to a building's total energy use. In smaller buildings, the ratio of exterior skin to floor area is much higher, which yields higher savings per square foot on glazing improvements. Smaller buildings have narrow floor plates as well, which is an advantage for good glazing and daylight access.

Re-glazing is a key component in renovating old buildings to be more energy efficient. Older glazing units, especially operable ones, are typically responsible for large thermal losses or gains due to infiltration and exfiltration. With all of the advancements in glazing technology over the last two decades, replacing glazing consistently ranks among the most cost effective measures on retro-commissioning reports.

The commercial building envelope is one of the few building level energy efficiency measures that have not advanced as fast as other building systems, such as lighting or HVAC. This is in part because envelope energy savings estimates are highly dependent on other systems, and therefore hard to accurately assess. By themselves, passive envelope features (glazing, reflective or green roofs, and insulation) typically take a backseat to active measures like HVAC or lighting improvements. However, when they're involved in complex, synergistic design strategies (daylighting, passive cooling/heating, and natural ventilation) they have a tremendous impact on the overall performance of a building, and are pivotal to achieving aggressive energy reduction goals. ■

For information on high performance windows, go to:

- Lawrence Berkeley Lab Windows and Daylighting: <http://windows.lbl.gov/>
- National Fenestration Rating Council: www.nfrc.org/
- Tips for Daylighting with Windows:
<http://windows.lbl.gov/daylighting/designguide/download.html>
- Windows for High Performance Commercial Buildings
www.commercialwindows.umn.edu

UPCOMING EVENTS

The Daylighting Collaborative will have a booth at the **Greenbuild International Conference and Expo** in Phoenix, Arizona on November 11–13, 2009.

DID YOU KNOW...

Buildings are generally classified in two categories according to how they use energy: **Externally (Envelope) Load Dominated** or **Internally Load Dominated**.

In externally load dominated buildings, such as houses, most of the energy use goes for heating and/or cooling to keep the indoor climate comfortable based on the weather and season. Over a year's time the largest use of energy is for climate related loads exchanged through the building envelope. All other end uses (lighting, appliances, hot water, etc) are less. Improving the building shell and insulating are more beneficial to reducing energy use in externally load dominated buildings than integration of daylighting, which provides a secondary benefit.

In internally load dominated buildings such as offices, school and stores, most of the energy use powers internal needs such as lights, computers, other equipment, ventilation air, etc. Building envelope loads and geographic location have much less to do with the energy use of these buildings. An office in Houston tends to have similar energy use patterns as one in Detroit. These buildings can use daylighting as a central design approach to reduce overall building energy use year round.

Why? Our sealed commercial buildings trap the heat of lights, equipment and people inside requiring the use of space cooling most of the year. These internal loads act like small furnaces scattered throughout the building and are on during all occupied hours throughout all seasons.

As a result, internally load dominated buildings reap the most energy savings reward from appropriate daylighting design. Reduced use of electric lighting through daylighting design results in:

- Reduced internal heat gain through reduced use of electric lighting during daytime hours.
- Reduced cooling energy used as result of reduced heat gain.
- Reduced peak demand costs through reduction of both lighting and cooling energy during peak demand hours.
- Reduced solar heat gain through improved window to wall ratios, glazing performance and exterior shading to reduce direct sunlight penetration associated with daylighting design.

To appropriately choose energy use reduction strategies, it is critical to know how your building type and design will use energy. Integrated design and communication between the architectural and engineering teams from the beginning will ensure you appropriately identify and address all opportunities to reduce energy use and energy costs. ■

