ENERGY STAR® Lighting in Two Historic Madison Buildings

Standard, incandescent light bulbs are common in many areas of the Memorial Union and the State Capitol. In 2003, the Wisconsin Division of Energy received a grant to install ENERGY STAR compact fluorescent bulbs in socket-based fixtures in selected areas of these buildings.

Saving energy

Incandescent lighting, on average, accounts for one-third of the total lighting energy used in commercial buildings. These bulbs are extremely inefficient—most of the electricity they use produces heat, not light. Not only are they inefficient, but they provide only 750 to 1,000 hours of light (at most). When used in fixtures burning for 12 to 20 hours a day, they must be replaced every two to three months. And, all of the heat they produce adds to the air conditioning load of the building.

ENERGY STAR Compact Fluorescent Light bulbs (CFLs) deliver the same amount of light as incandescent bulbs, but use one-third the energy. They also last for 8,000 to 10,000 hours. Their longer life reduces the replacement schedule for long-burning fixtures to once a year. ENERGY STAR CFLs emit a quarter of the heat of incandescent bulbs. They provide the twin benefits of lowering energy demand for lighting and air conditioning during hours when energy typically costs the most (midday).

Challenges

The Memorial Union on the campus of the University of Wisconsin in Madison was built in 1928. It is a focal point for social, cultural and recreational activities for the UW community. Memorial Union users are passionate about the building and its ambience.

Similarly, the State Capitol, completed in 1917 and designated a National Historic Landmark in 2001, is the hub of state government, hosts a variety of cultural activities and is a tourist destination. Making changes, even lighting changes, to these buildings is a challenge. It requires sensitivity to the buildings’ users, facility maintenance staff and the buildings’ architecture and history.

Because of these challenges, Division of Energy staff recommended a cautious, trial-and-error approach to converting incandescent lighting to ENERGY STAR CFLs. Maintenance personnel at each building were essential to the project’s success and helped identify areas with good potential for lighting conversions.

Action plan

Lighting in many institutional buildings has been upgraded over the years. Most of the upgrades focused on fluorescent tube lighting, which is the most common lighting in commercial buildings. Socket-based incandescent lights often were not upgraded to CFLs.

Division of Energy staff presumed that many socket-based lighting conversions were overlooked because facility managers or building owners couldn’t find acceptable CFL substitutes for the particular lighting application. To overcome this barrier, Division...
staff provided assistance to Memorial Union and Capitol maintenance staff in identifying less available, specialty CFLs that would be acceptable for each of the areas slated for conversion.

Funding for this project allowed Division staff to purchase the CFLs. Maintenance staff at the facilities installed the bulbs. If the converted lighting wasn’t acceptable, either because of the appearance of the bulbs or the light quality, another ENERGY STAR option was selected. In some instances the lighting was returned to incandescent.

Maintenance staff at both the Memorial Union and the Capitol dated and tracked the installed CFLs to verify lifetimes and identify early-failure problems.

**CFLs that worked**
In many areas, the common “twist style” CFL worked well. Several areas in the Memorial Union have lighting located behind wooden scrims on the upper perimeter of the room. The twist-style CFLs worked well in these locations—producing similar light output as the incandescents. Maintenance staff benefited because they no longer had to bring out ladders every month to change out hundreds of bulbs more than 20 feet off the ground.

Finding the right CFLs for the Capitol is very challenging.

Light levels must be right and ballasts can’t be visible. Eleven-watt twist style CFLs worked well in several glass-beaded ceiling chandeliers in the Assembly parlor—lower wattage than was originally specified. Each chandelier has 11 bulbs and higher wattage CFLs produced far too much light for the building aesthetics.

Other types of CFLs used in the Memorial Union and Capitol included:
- Dimmable twist styles
- Reflector floodlight styles (both dimmable and not)
- Globe and circular styles
- Warm white and daylight styles

**Costs**
CFLs cost more than incandescent bulbs. However, maintenance staff at both buildings had been using long-life incandescent bulbs. They purchased these higher cost bulbs to reduce the hours they spent replacing burnt out bulbs.

CFLs selected for this project cost from $2.50 up to $20 for a dimmable reflector flood-type. Most of the CFLs were in the $6 and under range. Despite the higher initial costs, the savings are substantial: the Memorial Union saves $12,154 annually or $24,484 over the life of the bulbs—an average annual savings of $13.78 per CFL installed.

The Capitol saves $6,731 annually or $11,107 over the life of the bulbs. This amounts to $20.58 per CFL installed.

These cost savings do not include the savings attributable to reduced air conditioning load. Nor do they include savings from reduced maintenance costs associated with replacing bulbs.
Conclusions

This project demonstrated a successful approach to replacing socket-based incandescent bulbs with CFLs in commercial buildings. Both the Memorial Union and the State Capitol have lighting challenges, but Division staff have found acceptable solutions. There are still several areas in both buildings with good opportunities to replace incandescent bulbs with CFLs. Division of Energy staff are confident they can find suitable CFLs for these fixtures.

This same approach can be applied successfully to other commercial facilities. The savings are there for the picking.

For more information on this project, contact Barbara Smith at the Wisconsin Division of Energy, barbara.smith@wisconsin.gov.

Sources for CFLs

CFLs can be purchased from local hardware stores, large retail outlets, and lighting distributors. To find a retailer in Wisconsin, go to Focus on Energy’s Product/Service Providers link at www.focusonenergy.com/providers.

Many of the bulbs used in the Memorial Union and State Capitol were purchased from the Energy Federation Incorporated (EFI). www.energyfederation.org.

Credits

Photos of the Memorial Union courtesy of Jeff Miller, University of Wisconsin – Madison.
Photo of the Capitol Assembly Parlor courtesy of Nels Akerlund.