The United States Army Reserve (USAR) 88th Readiness Division (88th RD) was recognized in two 2017 Interior Lighting Campaign (ILC) exemplary recognition categories. The troffer lighting upgrade projects at the two recognized sites are expected to save more than 246,000 kilowatt-hours (kWh) annually, or roughly enough electricity to run 23 homes for a year.

Background

One project was recognized in the Highest Percentage of Annual Energy Savings for Troffer Lighting Retrofits in the Large Project category. This project involved the retrofit of 1,225 troffers and reduced energy use by 72% at the COL P. Schulstad U.S. Army Reserve Center (USARC) in Arlington Heights, Illinois. The other project was recognized in the Highest Percentage of Annual Energy Savings for Troffer Lighting Retrofits in the Medium Project category. This project involved the retrofit of 94 troffers at the 1LT Robert L. Poxon USARC in Southfield, Michigan, that reduced energy use by 63%.

The 88th RD supports the Army Reserve soldiers and civilians located in the Midwest, Great Plains, and Northwest states, and the 88th RD jurisdiction includes 9.5 million R² of building space in facilities located across a 19-state region.

Project Drivers and Successes

With goals to reduce energy use, the 88th RD Energy Team was driven to find projects that met funding criteria. “These projects met the requirements for the project savings-to-investment ratio and payback periods to qualify for supplemental funding from the Army Reserve Installation Management Directorate (ARIMD),” said Chris Jackson, Energy Manager for the 88th RD.

The majority of the troffers upgraded at these two recognized sites were two-lamp (58-Watt), three-lamp (88-Watt) and four-lamp (112-Watt) 2’ x 4’ T8 fluorescent luminaires. The upgrades included installation of 24 to 50-Watt light-emitting diode (LED) luminaires as well as the installation of occupancy sensors throughout both facilities. The sensors are believed to contribute up to 25% of the energy use reduction.

The two recognized projects were among a group of upgrade projects completed by the 88th RD at four sites located in Ohio, Michigan, and Illinois totaling 516,000 square feet (ft²) of lighted space.

The 88th RD Energy Team expects a measurable reduced number of

Learn More

U.S. Army Reserve 88th Division (Readiness)
www.usar.army.mil/88th-RD/
labor hours and repair costs with the LED retrofit lighting compared to the existing conventional light fixtures as a result of the longer life of the LED fixtures.

Not only do the lamp replacements take maintenance staff time, they also cause disruptions to the work space. Both the Michigan and Illinois facilities are used for training, administration and storage.

Minimizing disruptions in the facilities was another significant reason that the 88th RD chose to retrofit the existing fixtures rather than replacing the entire fixtures. The reduced time and effort to install a retrofit as well as lower component costs when compared to a traditional fixture replacement were other considerations. An additional benefit of retrofitting was that it minimized disturbance to ceiling tiles and support structures.

The choice to retrofit rather than replace came with challenges. Project staff found that the LED lamps require a specific type of dimmer that can reduce the voltage to very low levels while keeping the fixture illuminated. The original dimmer switches, used previously with the T8 lamps, were not compatible with the LED lamps and had to be changed out. Also, soon after the retrofit, several of the fixtures had early failure of LED segments, resulting in dark spots in the fixture covers. These burned out strips were replaced by the lighting contractor soon after they were installed.

Despite the challenges, the 88th RD Energy Team agreed that the obstacles encountered on the projects were kept to a minimum through close coordination and hard work of the Department of Justice Contract Office Representative, operations personnel, and facility managers. As a result the project was pretty straightforward.

The new LED fixtures provide a more even illuminance when compared with the old T8s. Project staff recorded pre- and post-installation illuminance levels at the height equivalent to a 30-inch desktop showing an increase in illuminance levels.

### Next Steps

The 88th RD currently has a lighting retrofit project at the PFC Grella Army Reserve Center in North Canton, Ohio, and has several other projects staged for upgrades in Idaho, Wisconsin, and Iowa. The 88th RD anticipates using the same lighting technologies and controls in those projects as were used in the Michigan and Illinois projects.

### Lessons Learned

- Close coordination between the Contract Office Representative, operations personnel, and facility managers kept obstacles to a minimum.
- Retrofit was preferable to full replacement to minimize disturbance of ceiling tiles and disruption of active workplaces.
- LED luminaires are not compatible with all dimmers, and compatibility should be verified prior to installation.

### Projects at a Glance

<table>
<thead>
<tr>
<th></th>
<th>Medium Project</th>
<th>Large Project</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Location</strong></td>
<td>Southfield, MI</td>
<td>Arlington Heights, IL</td>
</tr>
<tr>
<td><strong>Total Area of Project</strong></td>
<td>8,000 ft²</td>
<td>94,000 ft²</td>
</tr>
<tr>
<td><strong># of Troffers Upgraded</strong></td>
<td>94</td>
<td>1,225</td>
</tr>
<tr>
<td><strong>Annual Energy Savings</strong></td>
<td>15,000 kWh</td>
<td>231,000 kWh</td>
</tr>
<tr>
<td><strong>Energy Use Reduction</strong></td>
<td>63%</td>
<td>72%</td>
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<tr>
<td><strong>Annual Energy Cost Savings</strong></td>
<td>$1,800</td>
<td>$16,200</td>
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</tbody>
</table>

### Before and After Retrofit — Southfield, MI - medium site

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology</strong></td>
<td>2-4 lamp T8 fluorescent</td>
<td>LED</td>
</tr>
<tr>
<td><strong>Number of Troffers</strong></td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td><strong>Wattage per Troffer</strong></td>
<td>62-112-W</td>
<td>30-50-W</td>
</tr>
<tr>
<td><strong>Annual Energy Use</strong></td>
<td>23,800 kWh</td>
<td>8,800 kWh</td>
</tr>
</tbody>
</table>

### Before and After Retrofit — Arlington Heights, IL - large site

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology</strong></td>
<td>2-4 lamp T8 fluorescent</td>
<td>LED</td>
</tr>
<tr>
<td><strong>Number of Troffers</strong></td>
<td>1,225</td>
<td>1,225</td>
</tr>
<tr>
<td><strong>Wattage per Troffer</strong></td>
<td>58-112-W</td>
<td>24-40-W</td>
</tr>
<tr>
<td><strong>Annual Energy Use</strong></td>
<td>322,000 kWh</td>
<td>91,000 kWh</td>
</tr>
</tbody>
</table>
Federal Energy Efficiency Requirements for Interior Lighting

Although every site, whether federal, private, commercial, or industrial, can benefit from the energy savings, maintenance savings, and lighting quality improvements, offered by energy-efficient lighting, federal sites have another motivator. They must ensure compliance with the multiple laws, executive orders, and Federal Acquisition Regulations, which mandate that federal agencies meet efficiency requirements in all procurement and acquisition actions that are not specifically exempted by law.

ENERGY STAR® Lighting

Federal laws and requirements mandate that agencies purchase ENERGY STAR® qualified products. To find ENERGY STAR qualified lighting products, see www.energystar.gov/productfinder/.

Federal Efficiency Requirements

In cases where there is no ENERGY STAR product category, the agency must comply with FEMP-designated efficiency requirements.

The table below lists the minimum federal efficiency requirements that various categories of interior LED lighting must meet to be eligible for purchase by federal agencies.

FEMP LED Purchasing Guidance

For more information on high-efficiency lighting technologies and information for federal agencies, including lighting requirements language for contracts, visit energy.gov/eere/femp/purchasing-energy-efficient-commercial-and-industrial-led-luminaires.

<table>
<thead>
<tr>
<th>Luminaire Type</th>
<th>Light Output</th>
<th>Luminaire Efficiency (LE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial: Linear Ambient‡</td>
<td>≥375 lm/ft</td>
<td>≥119 lm/W</td>
</tr>
<tr>
<td>Commercial: 1-Foot by 4-Foot Troffers</td>
<td>≥1,500 lm</td>
<td>≥119 lm/W</td>
</tr>
<tr>
<td>Commercial: 2-Foot by 2-Foot Troffers</td>
<td>≥2,000 lm</td>
<td>≥111 lm/W</td>
</tr>
<tr>
<td>Commercial: 2-Foot by 4-Foot Troffers</td>
<td>≥3,000 lm</td>
<td>≥115 lm/W</td>
</tr>
<tr>
<td>Industrial: Low Bay</td>
<td>≥5,000 to &lt;10,000 lm</td>
<td>≥109 lm/W</td>
</tr>
<tr>
<td>Industrial: High Bay</td>
<td>≥10,000 lm</td>
<td>≥128 lm/W</td>
</tr>
</tbody>
</table>

‡ Includes luminaires with both direct and indirect lighting components

Helpful Guides

LED Retrofit Kits, Tubular LEDs, and Lighting Controls: An Application Guide — This document provides guidance for retrofitting existing fluorescent troffers including the LED and associated control options available, the pro/cons and costs/benefits of each option, and agency specific requirements (where applicable). www.energy.gov/eere/femp/downloads/led-retrofit-kits-tleds-and-lighting-controls-application-guide

Forrestal Tubular LED Demonstration Project: Lessons Learned — This document provides lessons learned from the relighting project at the James V. Forrestal Building. Project consisted of replacing the existing fluorescent lamps with tubular LEDs. www.interiorlightingcampaign.org/sites/default/files/FEMP-LessonsLearnedForrestal-TLED.pdf

Proven Specifications

Use these specifications, developed by DOE’s Better Buildings Alliance and the DesignLights Consortium, to specify performance expectations, warranty, and testing requirements for your lighting projects.


Designlights Consortium Networked Lighting Control Systems Specification www.designlights.org/content/CALC/SpecificationAndQPL

Interior Lighting Campaign

On June 25, 2017, the 88th RD was 1 of 13 organizations recognized by the Interior Lighting Campaign (ILC) for...
exemplary energy performance in their application of high efficiency troffer lighting systems at the 2017 Building Owners and Managers Association International Conference and Expo, in Nashville, Tennessee.

The ILC encourages facilities to install energy-efficient lighting as well as lighting occupancy or daylight controls to cut energy use and deliver occupant satisfaction. By adopting more efficient lighting, such as systems that meet the Better Buildings Alliance specification for troffers, building owners can save up to 50% on a one-for-one basis, and up to 80% with the use of controls.

The ILC’s overall goal is to achieve the replacement of 2 million planned or installed high-efficiency interior lighting solutions (troffer, high-bay, low-bay, and suspended linear lighting systems and controls) by April 2018.

ILC Recognition Received
• Highest Percentage of Annual Energy Savings for Troffer Lighting Retrofits - Medium Project
• Highest Percentage of Annual Energy Savings for Troffer Lighting Retrofits - Large Project

Join the ILC
Federal sites are encouraged to join the ILC. The ILC will provide you with:
• technical assistance
• information on financing and incentives
• lighting savings calculators.

Federal sites commit to:
• building or retrofitting at least one building space with high-efficiency lighting. (Sites built or retrofitted with complying fixtures any time after January 1, 2013 are eligible to compete.)
• Share your results.

Report your actual energy savings by April 2018 for a chance to be recognized at the ILC recognition event at the Illuminating Engineering Society 2018 Annual Conference, August 2018, Boston, Massachusetts.

ILC Recognition Categories
ILC recognition spans four application categories including troffers, high-bay, low-bay, and suspended linear. There are also special recognition categories including best use of lighting controls, largest number of facility projects, largest portfolio-wide energy savings, and sector recognition, including a category for federal agencies.

2018 ILC Exemplary Performance Recognition categories include:
• Highest Annual Energy Savings for Lighting Retrofits
• Highest Percentage of Annual Energy Savings for Lighting Retrofits
• Highest Annual Energy Savings for Lighting New Construction
• Highest Percentage of Annual Energy Savings for Lighting New Construction
• Special Recognition Categories:
  - Best Use of Lighting Controls in a Single Building
  - Largest Number of Facility Projects
  - Largest Portfolio-wide Annual Energy Savings

• Recognition may also be presented to participants in the federal sector.

“The adoption of advanced interior lighting technologies continues to bring U.S. businesses and other organizations significant energy savings,” said the Energy Department’s Deputy Assistant Secretary for Energy Efficiency Kathleen Hogan. “By investing in more efficient lighting, ILC partners demonstrate how cost-effective measures can make a big difference in a building’s energy consumption.”

Through the Better Buildings Alliance, members in different market sectors work with the U.S. Department of Energy’s exceptional network of research and technical experts to develop and deploy innovative, cost-effective and energy-saving solutions that lead to better technologies, more profitable businesses, and better buildings in which we work, shop, eat, stay, and learn. Join today to start saving energy in your commercial buildings through programs like the Interior Lighting Campaign, www.interiorlightingcampaign.org. Photo courtesy of Pacific Northwest National Laboratory.