



**WOODWARD**  
ENERGY SOLUTIONS

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# Whitepaper

## **Illuminating Ways to Save Costs and Modernize Your Facilities**

Document Version 1.0  
May 2019

When you consider the benefits of light-emitting diode (LED) lighting over incandescent, halogen or fluorescent lighting, it's not surprising to discover that each day, more and more businesses and organizations make the decision to switch to LEDs. After all, LEDs are:

- Longer-lasting;
- Energy-efficient;
- Better for the environment;
- Instantly bright;
- Flexible for use in design;
- Durable; and
- Able to withstand extreme temperatures.<sup>1</sup>

And because LEDs offer such a substantial reduction in electricity costs, it can even be possible to leverage the savings you realize from switching to pay for most (or even all) of your project.

This whitepaper offers an overview of the ways LED lighting can help your business save on lighting costs, modernize your facilities and increase employee comfort and productivity.

## BETTER LIGHTING = A BETTER BOTTOM LINE

The U.S. Department of Energy estimates that LEDs typically use about 25-80% less energy than traditional incandescents and can last anywhere from 3-25 times longer.<sup>2</sup>

As you can see in the Energy.gov table on the right, which compares a 60-watt (W) traditional incandescent with energy-efficient bulbs that provide similar light levels, the LEDs provide not only the longest life and energy savings but the greatest cost savings as well.

## COMPARISONS BETWEEN TRADITIONAL INCANDESCENTS, HALOGEN INCANDESCENTS, CFLS, AND LEDS\*



### 60W Traditional Incandescent:

Energy \$ Saved (%)	.....0%
Annual Energy Cost*	.....\$4.80
Bulb Life	.....1000 hours



### 43W Energy-Saving Incandescent:

Energy \$ Saved (%)	.....~25%
Annual Energy Cost*	.....\$3.50
Bulb Life	.....1000 to 3000 hours



### 15W CFL 60W Traditional:

Energy \$ Saved (%)	.....~75%
Annual Energy Cost*	.....\$1.20
Bulb Life	.....10,000 hours



### 15W CFL 43W Halogen:

Energy \$ Saved (%)	.....~65%
Annual Energy Cost*	.....\$1.20
Bulb Life	.....10,000 hours



### 12W LED 60W Traditional:

Energy \$ Saved (%)	.....~75%-80%
Annual Energy Cost*	.....\$1.00
Bulb Life	.....25,000 hours



### 12W LED 43W Halogen:

Energy \$ Saved (%)	.....~72%
Annual Energy Cost*	.....\$1.00
Bulb Life	.....25,000 hours

\*Based on 2 hours/day of usage, an electricity rate of 11 cents per kilowatt-hour, shown in U.S. dollars.

Don't forget the tax savings available for becoming energy-efficient.<sup>3</sup> Plus, many power companies also offer rebates for switching to more energy-efficient lighting.<sup>4</sup> The combination of energy savings, tax breaks and rebates—especially when translated to larger facilities that rely on hundreds and even thousands of lights during a typical operating day—can add a considerable boost to your business' bottom line.



### LITTLE-KNOWN LED FACTS

The U.S. Department of Energy estimates that by 2027, widespread use of LEDs could save the equivalent annual electrical output of 44 large electric power plants (1,000 megawatts each)—a total savings of more than \$30 billion at today's electricity prices.<sup>5</sup>

An additional bonus: LEDs can do more than just lighting. Depending on the need, LEDs can be installed with sensors and locators that allow for audio, video, motion, temperature, chemical detection and other data to be streamed and analyzed by your business.



### LITTLE-KNOWN LED FACTS

The U.S. Department of Energy estimates that a Virginia Tech study found that LED lights installed in milk display cases not only reduces energy—it helps milk taste better.<sup>6</sup>

## SOLUTIONS FOR EVERY INDUSTRY

The energy cost savings is just the beginning. Thanks to the wide range of LED lighting products available, their durability and the quality of light they produce, businesses now have the opportunity to more effectively showcase products, improve work environments, increase productivity and help ensure workplace and in-school safety.

**RETAIL**—For retail businesses, LEDs not only reduce energy, but showcase products more effectively. That's because LEDs have relatively high Color Rendering Index (CRI) values. CRI is a measurement of how well light sources render colors (including skin tones) compared to natural sunlight, which is considered the baseline light source. The higher the value, the more natural the color appears. As a result, under LED lights fresh carrots look orange and appetizing, while clothing colors are sharp and true.

**OFFICE ENVIRONMENTS**—Updating your lighting can do more than cut overhead and enhance the look of your facilities. It can also improve your employees' health and well-being.

A study by the American Association of Interior Designers indicated that 68 percent of employees complain about the lighting situation in their offices.<sup>7</sup> Among the negative health effects that have been associated with poor lighting are:

- Headache
- Eye, neck, back and shoulder strain
- Trips, slips and falls
- Difficulty using or dropped materials or tools
- Depression (as a result of insufficient or gloomy lighting)

A switch to LED lighting, which has been shown to compare better with the natural sunlight most humans crave, can increase employee comfort, safety and morale—and improve productivity as a result.



## LITTLE-KNOWN LED FACTS

Research commissioned by Serco, a United Kingdom prison operator, found anecdotal evidence that upgrading to LED lighting at a particular prison resulted in a reduction of aggressive behavior by inmates. Although a direct link couldn't be established, the results were encouraging enough that further study is being undertaken.<sup>8</sup>

**OUTDOOR APPLICATIONS**—LEDs are durable and weather-resistant, making them perfect for public outdoor spaces. And in an era of budget constraints and requirements to reduce carbon footprints, LEDs are both cost-effective and green.

LED lighting can also improve public safety. A recent article in Campus Safety magazine discussed the relationship between LEDs and security solutions citing, among other factors, the newest security camera solutions that illuminate a much larger area and produce more well-lit, quality color footage of surveyed areas.<sup>9</sup>



## LITTLE-KNOWN LED FACTS

The number of LED street lights in operation all around the world is more than 300 million and growing. It's predicted that the combination of efficient LED street lights and smart lighting will lead to a 97% reduction in electricity requirements by the year 2020.

**INDUSTRIAL**—In today's competitive manufacturing market, maintaining tight control of costs and productivity can mean the difference between profit and loss. And when lighting can represent one of the largest chunks of a typical warehouse or light manufacturing facility's electrical expenses—as much as 37 percent<sup>10</sup>—it's important to have a cost-effective lighting solution.

A custom LED retrofit can save energy costs, reduce maintenance and improve safety and productivity. Plus, the combined energy and maintenance savings realized by an LED retrofit—especially when combined with any utility rebates and tax savings available for the switch to more energy-efficient lighting—frequently ends up paying for itself within a much shorter time frame than other improvement projects.<sup>11</sup>

**SCHOOLS**—From preschools to universities, today's schools face constantly shrinking budgets and pressure to reduce operational costs. The cost savings inherent to LED lighting can go a long way toward helping ease those pressures.

The combination of utility-company rebates, tax incentives and even the financing programs offered by a growing number of utility companies make it easier than ever for schools and churches to use the savings realized to pay for a lighting retrofit—plus reap the savings for years to come.

But even more important than the savings aspect of a change to more efficient LED lighting is the positive effect the change in lighting has on students and teachers.



## LED IN SCHOOLS: A TRIAL EVALUATION

In 2017, the U.S. Department of Energy commissioned an evaluation of trial LED lighting systems in several Texas classrooms. The lighting was color-tunable and could be dimmed or brightened within individual zones in the classrooms to better support classroom functions (AV presentations, student speeches) and students' circadian rhythms.

While this trial didn't specifically measure changes in student performance, there were some definite benefits seen in the trial classrooms.

The flickering, humming and delayed brightness of outdated fluorescent lighting has long been a source of complaints in classrooms (and workplaces, too). Negative effects mentioned range from decreased concentration to severe headaches.

Teachers interviewed after the trial period was complete mentioned that they appreciated the ability to tailor the classroom lighting to their needs. They also felt the lighting and controls allowed the students to be more engaged in choosing the settings for different classroom activities.

For one teacher, the results were even more tangible. Over the past 10 years with fluorescent lighting, he estimated that he had migraine headaches four to six times per school year that he attributed to noticeable flickering of the lights, which would cause him to miss one or more days of work. After the trial, he reported that this had been the first school year in 10 years that he didn't miss a single day of work due to a migraine.<sup>12</sup>

## LIGHTING THE WAY

Switching to LED lighting can be a great decision for so many reasons, from shrinking your energy use and bill to reducing your ecological footprint on the planet. LEDs are not only 100 percent recyclable—with zero UV emissions and no toxic chemicals such as mercury—their long life means fewer materials are consumed in production of new LEDs.

Forward-thinking companies are making the switch to LED every day. Since 2015, IKEA has eliminated halogen and fluorescent lighting from their stock (they eliminated incandescent bulbs in 2011), and now sells only LED lighting. GE recently announced plans to drop its compact fluorescent lighting (CFL) business.

Is it just a matter of time before LEDs are the only lighting options available? Although no one can say for sure, the signs do seem to be pointing in that direction. With exciting new advances in energy technology emerging every day, a bright future is in view. There's never been a better day than today to investigate all the ways a switch to LED lighting can save costs and modernize your facilities. Don't be left in the dark!

Would you like to learn more about how you can reap the benefits of switching to LEDs?

Woodward Energy Solutions is ready to help you with a turnkey LED solution—from consultation and design, to financing and installation. We can streamline the process of retrofitting your facilities with LEDs, saving you both time and money. Call us today at (866) 967-4533 for a free audit; we think you'll be pleasantly surprised by the results.

To learn more and view some of our projects, visit [www.woodwardenergy.com](http://www.woodwardenergy.com).

## SOURCES:

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