



Emerson is guided by a belief that all businesses have a responsibility for the environment, a belief that is reflected in its commitment to innovation in Light Emitting Diode (LED) technology and its support for the transition from traditional lighting to LED in industrial facilities around the world through its Appleton™ brand. Over the past decade, LED lighting has proven to be a simple, cost-saving method for businesses to reduce their longterm impact on the environment and minimize the burden of hefty electricity expenses.

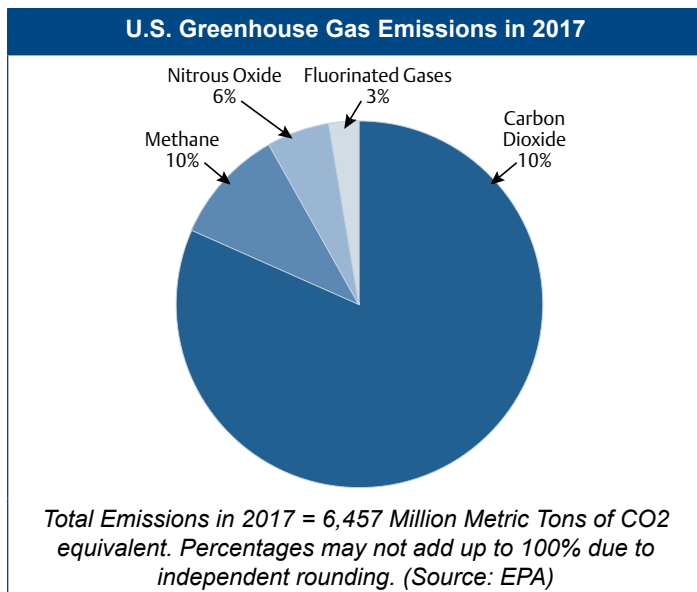
Industry estimates suggest that 80-90% of the roughly 150 million lighting units installed in industrial facilities in the United States continue to rely on energy-draining High Intensity Discharge (HID) sources, specifically metal halide, mercury vapor and high-pressure sodium lighting. Worse yet, fluorescent and incandescent lighting remains commonplace. LED luminaires create the same or better illumination as conventional lighting sources yet use less than half of the energy, making their higher upfront cost recoupable within months. Industrial facilities that install LED luminaires also realize lower maintenance and repair costs since LED lighting

typically operates at full capacity for more than 60,000 hours, or in some cases, up to 100,000 hours. That is 2- 4 times as long as most metal halide, or even sodium vapor

lights, and more than 40 times the lifespan of the average incandescent bulb.

Alongside financial benefits, the environmental case for LED luminaires is strong. Consider the following list of ways LEDs help businesses shrink their environmental footprint while improving their bottom-line.

Almost half of our carbon footprint is due to electricity, generated by coal, gas, or nuclear power plants. First and foremost, LED lighting consumes significantly less power per lumen than any other lighting source. LED lights are up to 80% more efficient than traditional lighting such as high-pressure sodium and metal halide, with 95% of the energy in LEDs converted into light and only 5% released as heat. LED's "Instant-On" capability is especially energy saving in industrial settings where HID lights are left on around-the-clock to avoid their long warm up-period. HID lighting requires a warm-up period because the lighting intensity is dependent on and changes as the material inside the bulb is evaporated into plasma. Additionally, as the HID heats up, it requires additional voltage to operate. Worse yet, HID lights become less efficient over time. They must use more and more voltage to produce the same lumen output as the light degrades. Roughly 17% of the typical US industrial building's electricity usage is devoted to lighting. This takes a bite out of a company's profits and out of the ozone layer.



Less energy use by LEDs translates into reduced demand from power plants and decreased greenhouse gas emissions. Greenhouse gases trap heat in the atmosphere, making the planet warmer by thickening the Earth's blanket. Greenhouse gases include Carbon Dioxide that enters the atmosphere through burning fossil fuels; Methane emitted during the production of coal, natural gas and oil; and Nitrous Oxide released in the combustion of fossil fuels and solid waste. Each of these gases can remain in the atmosphere for different amounts of time, ranging from a few years to thousands of years.

Due to their low energy consumption, LED luminaires contribute the least amount of carbon dioxide into the atmosphere of all lighting sources. For example, use of a simple incandescent bulb results in 4,500 lbs. of CO₂ annually, while LED bulbs contribute only 451 lbs. of CO₂ per year. Retrofitting HID fixtures with LED luminaires can have a huge environmental impact by reducing greenhouse gases. IHS Markit, a London-based company that analyzes information and provides solutions for corporations, released a study that shows 570 million tons of carbon dioxide emissions were eliminated in 2017 thanks to the use of LED bulbs. This is an amount similar to shutting down 162 coal-fired power plants around the world. Since LED lighting can last up to 20 years in some cases, this longer life also decreases the production of more luminaires and bulbs, and therefore reduce the greenhouse emissions created by the manufacturing process. Despite growing concern about global warming, US emissions rose over 3% in 2018 and global emissions

reached an all-time high. While commercial and household use of LED lamps is helping, far greater impact could be affected by full conversion of the industrial sector to LED.

Example using Emerson's Retrofit Calculator

Along with the economic benefits, the environmental contribution of retrofitting HID and other legacy lighting with high-efficiency industrial-grade LED lighting can be quantified using Emerson's Retrofit Calculator. A typical refinery, processing 100,000-150,000 barrels per day might have approximately 3500 70W high pressure sodium task lights and 100 400W high pressure sodium or metal halide flood lights. The table on the next page is reported from the calculator and shows the yearly environmental impact of retrofitting this example refinery to new LED luminaires. The energy savings in this one facility would be equivalent to the usage of 229 American households. Power Plants, Petroleum and Natural Gas Plants, and Petroleum Refineries are the three largest emitters of greenhouse gases, and improvements in these facilities can have the biggest impact on overall US emissions.

Fewer Luminaires Needed

LEDs exhibit far superior light distribution by focusing light in one targeted direction as opposed to other types of lighting that waste energy by emitting light in all directions. As a result, fewer LED luminaires are required to achieve the same level of brightness given off by HID, fluorescent or incandescent lights. Fewer lights reduce energy consumption and therefore benefit the environment in many ways.







LEDs Run Cooler

LEDs give off very little heat. And what heat is produced is dissipated by metal heat sinks that wick away the heat from the light source. Lowering the facility's temperature naturally reduces the power load on heat-sensitive systems, like air conditioning and refrigeration. Adding dimming, sensors or controls to LED fixtures can also reduce energy usage, while extending service life.

LEDs Don't Contain Mercury

LED luminaires are mercury-free. Therefore, from cradle to grave, they are not toxic to the environment and are 100% recyclable, helping to reduce the amount of waste materials delivered to landfills. Both fluorescent and mercury vapor lights contain mercury internal to the bulb and thus require special handling at the end of their service life. While mercury is effective at enabling white light, it is also highly poisonous and is especially harmful to the brains of both fetuses and children. None of these health considerations are linked to LED technology.

Emerson LED technology significantly reduces environmental impact of industrial facility lighting

Environmental Impact			
	Reduction of kWh	2,057,286	 Acres of Trees Planted 1,801
	Reduction of Carbon Dioxide Emissions	1,530.62 Metric Ton 3,374,435 Pound	 Reduction of Coal Emissions 759.6 Metric Ton 1,674,639 Pound
	Electricity Saved (Average Household Usage for One Year)	229	 Fewer Miles Driven (By Average Passenger Vehicle) 3,751,520

Zero UV Radiation

Most HID's emit a significant amount of UV radiation and require specific UV-blocking filters to meet safety standards in industrial spaces. When an industrial sized space is lit by many powerful HID's, it becomes a safety concern for employees. Health problems include skin damage, energy depletion, eye damage and worsening existing conditions such as lupus. Unlike HID's, LED's do not emit ultraviolet radiation. LED's represent a healthier, cleaner source of lighting that doesn't harm employees or the ozone, plus is any deal where there are materials stored that are highly sensitive to UV. This is why museums around the world, including the Van Gogh museum in Amsterdam, have retrofit their lighting with UV-free LED's and are preventing damage to priceless paintings.

Durable, Long-lasting Design

Appleton LED luminaires are the most rugged on the market and much more likely to survive harsh vibrations, corrosion or moisture on a plant floor during production. Even in the face of carelessness or accidents, the risk of damage is minimal. Not only does this keep employees safe, it also reduces a company's contribution to landfill crowding, manufacturing, and resource use.

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