



Fluorescent light is created from chemical reactions that occur when electricity is applied to mercury vapor enclosed in a glass vacuum chamber. While highly effective in generating white light, mercury vapor is highly toxic. In addition, fluorescent lighting has become relatively less energy efficient as new lighting technologies have emerged. For these reasons, the European Commission has revised its Ecodesign and Energy Labelling Directive to ban virtually all fluorescent lamps by 2023 and require they be replaced with mercury-free and more energy efficient lighting sources. In this white paper, Emerson looks at Commission Regulation (EU) 2019/2020 and provides guidance on how to prepare your lighting assets for the changes, especially as they apply to ATEX/IECEx rated hazardous zones and harsh industrial locations.

The origin of fluorescent lamps dates back to the 1850's when the French physicist Alexandre E. Becquerel investigated the phenomena of fluorescence and phosphorescence. Decades after, F. Meyer, H. J. Spanner and Edmund Germer patented an experimental fluorescent lamp in 1927, and fluorescent lamps became a widely available lighting source around the world. Today, fluorescent lamps come in various shapes and sizes, from CFL bulbs to T-12, T-8 and T-5 linear fluorescent lamps, and are used in millions of residential, commercial and industrial buildings.

For a long time, fluorescent lighting has reigned supreme as an affordable and energy efficient alternative to incandescent lamps. However, the benefits of fluorescent lighting become less impressive when you consider its health and environmental dangers. No matter what the design, mercury vapor is used in all fluorescent lamps to transport electrical currents. Mercury is a heavy metal and a potent neurotoxin that can cause serious health issues.

Mercury exposure can occur whenever a fluorescent lamp breaks. If not immediately contained, the mercury evaporates into an invisible, odorless vapor that is easily inhaled. When fluorescent lamps are disposed of in waste landfills or illegal dumps, mercury will leach into the groundwater, converting into methylmercury and exposing people to mercury poisoning. Additionally, mercury from lamps is known to seep into lakes, rivers and oceans where fish absorb it through the food they eat and the water that passes over their gills.

Due to a lack of toxic chemical disposal sites, it is estimated that less than 10 percent of the mercury within fluorescent bulbs is safely recovered. The other 90 percent is released into the environment, putting public health at serious risk. This situation is much worse in less developed countries.

Is Fluorescent Lighting Energy Efficient?

Another reason cited by the European Commission for banning fluorescent lamps in its latest Ecodesign and Energy Labelling Directive is energy efficiency. Compared to traditional incandescent bulbs, fluorescent lighting is vastly superior, using approximately 70 percent less energy and lasting years longer. Yet when it comes to energy efficiency and the circular economy, incandescents set a very low bar. Fluorescent's performance pales in comparison to Light Emitting Diode (LED) technology from technical performance, energy usage and recyclability perspectives.

LED lighting lasts three times longer and consumes 50 to 60 percent less electricity than even the most efficient fluorescent lamp. What does that mean to the global economy and the environment? According to the Oko-Institut, a leading research and consultancy institution in Germany, transitioning from fluorescent to LED lighting would spare Europe 309 TWh (terawatt-hour) of electricity — the equivalence of seven 500 MWh (megawatt-hour) coal-fired power plants — over 15 years. Oko-Institut concluded that this energy efficiency would save Europeans nearly €30 billion in utility costs over the same time period. Given these savings it is no surprise that the payback period for switching from fluorescent to LEDs is short, in general, six months or less.

Another important benefit to LED energy efficiency is the reduction in CO₂ emissions. The Clean Lighting Coalition estimates that 3.5 billion tons of CO₂ emissions can be avoided in Europe between 2025 to 2050 by transitioning to LED lighting. The Clean Lighting Coalition also projected it could potentially remove 232 billion tons of mercury pollution from the environment by 2050, both from the lamps themselves and from eliminating the burning of coal in Europe's power plants.

Understanding the Directive

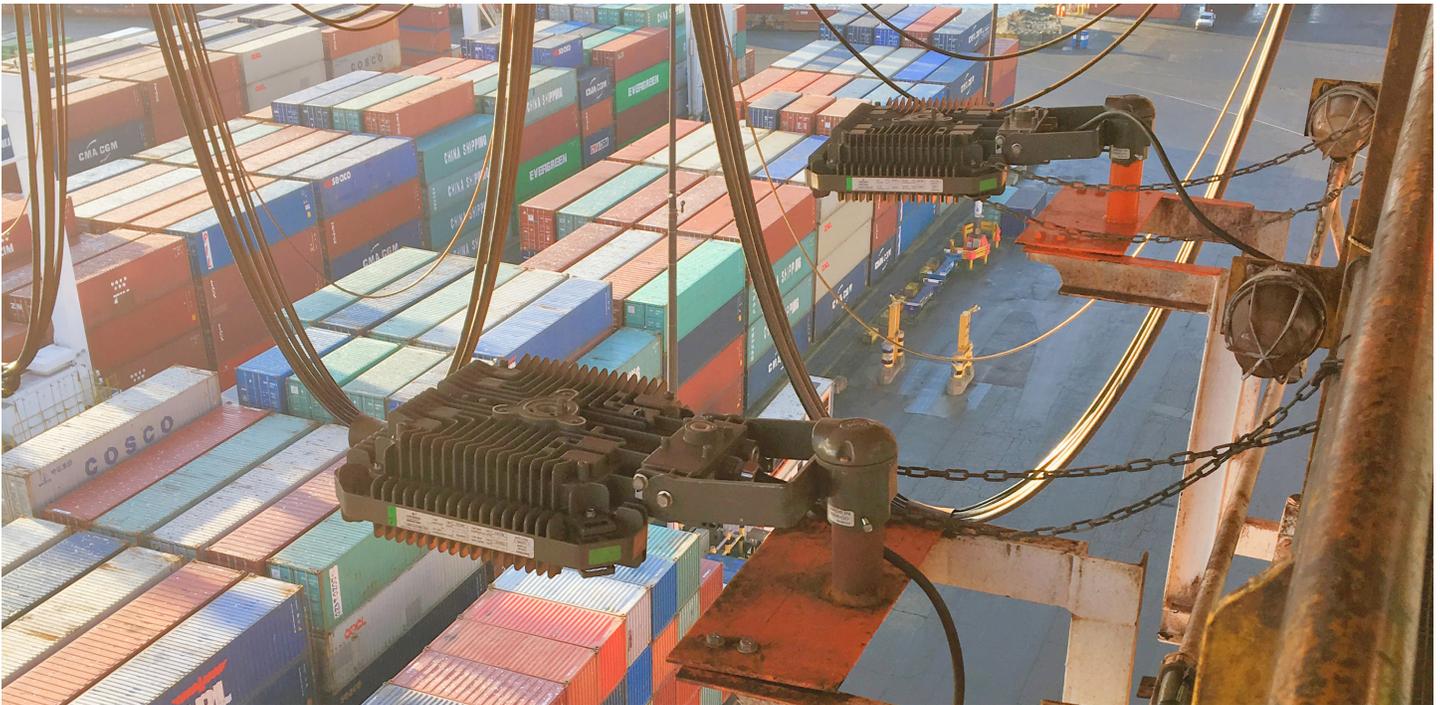
The European Commission is the European Union's (EU) politically independent executive arm, and is the sole EU institution tabling laws for adoption by the EU Parliament and Council. Together with the Court of Justice, the European Commission ensures that EU law is properly applied in all member countries. Its regulations and directives are legislative acts to which EU countries must legally adhere.



In 2009, the European Commission created its Ecodesign and Energy Labelling Framework Directives. It was established to set ecodesign requirements for energy using products, including lighting, stipulating such things as energy efficiency, functional obligations, information and labelling.

For the purpose of this white paper we will only be addressing the latest directive, Regulation (EU) 2019/2020, which came into effect September 2021 in the UK and EU. Regulation (EU) 2019/2020 is extensive and comprehensive. Please note that by summarizing the contents of the legislation, this white paper does omit parts, including those that may be relevant in your situation.

Just as Regulation (EU) 244/2009 phased out incandescent lamps, Regulation (EU) 2019/2020 aims to phase out fluorescent lamps in favor of LEDs. Also known as the "Single Lighting Regulation" — since it merges requirements that were in three separate pieces of legislation — Regulation (EU) 2019/2020 sets minimum energy efficiency requirements that effectively ban the sale of compact fluorescent lamps after September 2021 and T8 linear fluorescent lamps in 2023. These "light sources," as they are now known, will need to be replaced with more energy efficient LED light sources to meet the requirements.



Hazardous and Harsh Industrial Lighting

Per the Official Journal of the European Union Annex III (1) (a) Commission Regulation (EU) 2019/2020 issued on October 1, 2019, the hazardous location luminaires, defined in Directive 2014/34/EU, are exempt. However, fluorescent lamps such as T8 lamps will no longer be available for sale starting on September 1, 2023. In other words, the users of fluorescent luminaires will not be able to purchase fluorescent lamps starting from this date.

Unlike in a home, warehouse or store, fluorescent lamps in hazardous locations cannot simply be replaced with an LED substitute to satisfy Regulation (EU) 2019/2020. It would be unsafe, as well as illegal, to attempt to replace a fluorescent T8 lamp in a fluorescent linear luminaire with an LED T8 lamp. Replacing fluorescent lamps with LED lamps in a hazardous location rated luminaire will void the luminaire's safety certifications. Emerson cannot stress enough that there are no LED replacement lamps rated for hazardous locations that are certified by any governing body.

Along with fluorescent linear luminaires, floodlight fixtures for hazardous and harsh industrial locations that use high pressure sodium (HPS) light sources are also impacted by

Regulation (EU) 2019/2020. If the HPS lamp cannot fulfill the energy efficiency requirements set forth for lighting sources, the fixture will need to be retrofit with a new LED floodlight fixture. Like fluorescent linear luminaires, floodlight fixtures installed in hazardous locations cannot be upgraded by replacing the HPS lamp with a similar LED lamp.

LED: The Safe, Responsible Choice

Retrofitting fluorescent fixtures in hazardous and harsh industrial locations with high-efficiency, industrial-grade LED luminaires is a proven substantiality practice that delivers both bottom-line benefits and environmentally friendly operation with relatively short payback.

In terms of photobiological safety, LED technology has similar characteristics when compared to legacy lighting technologies. LED's assembled in luminaires in accordance with the applicable standards are completely safe.

Emerson's Solution

Emerson designs and manufactures Appleton™ brand linear luminaires to meet ATEX and IECEx compliance requirements for Zone 1 and 2 hazardous locations, such as those found in petrochemical plants, chemical processing facilities, fuel storage areas, and waste water treatment centers. Hazardous locations have explosive or potentially explosive atmospheres where even a small electrical arc can set off a catastrophic event.

Without availability of T8 fluorescent lamps to replace spent units, there is no alternative for facility managers but to eventually retrofit existing fluorescent linear luminaires with their LED counterparts. For example, Appleton ATX FE and FN Series Nonmetallic Fluorescent Luminaires can easily and cost-effectively be replaced with Appleton ATX FELED luminaires in Zone 1 and 21 locations or ATX FNLED luminaires in Zone 2 and 22 hazardous locations.



Final Thoughts

While the latest changes to the Ecodesign and Energy Labelling Directive may appear complex and cumbersome, they can be used to leverage better facility management decisions for your lighting assets. Transitioning from fluorescent lighting sources to LED now will not only help you stay compliant with Regulation (EU) 2019/2020, it offers a compelling case for improving your environmental commitment and strengthening your bottom line.

To better prepare for the phase-out of fluorescent lamps, start the planning process by considering the existing lighting fixtures in your facility that need an upgrade to LED technology and write a specification document that details your application requirements. Evaluate the LED luminaires and choose the ones that satisfy your requirements by scrutinizing the product's features, lighting layouts, and calculated energy savings. For more details, refer to Emerson's Technical Article "Retrofit Considerations When Switching to LEDs."

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