

January 17, 2022

BY EMAIL

Michael Kafka, Deputy General Counsel
Duke Energy
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Re: The LED Fraud

Dear Michael Kafka,

The natural night is a fundamental resource that is critical to the proper functioning of humans and nearly all biological systems. Artificial light is a pollutant that damages the natural night resource and greatly increases sickness, risk of cancer, mood disorders and premature births.¹

In 2016, the American Medical Association published ground-breaking recommendations regarding LED radiation with a document titled Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting.² This document stunned the world as it alerted the public to the toxicity of LED radiation, and the AMA recommended setting limits on this radiation. The LED cartel fought the AMA's recommendations and continues to do so. Since 2016, neither the government nor the LED cartel have taken appropriate steps to address the dangers of LED electromagnetic radiation.

MarieAnn Cherry is an adult who has epilepsy, a formally recognized disability, and who has been sickened by LED light beams many times. Her exposures to LED light beams, even for a fraction of a second, has led to hundreds of seizures resulting in broken bones, lost teeth, and psychological trauma. MarieAnn has researched the issue and has written up a synopsis of how the safety of LEDs has been ignored by the authorities.³ MarieAnn's document also contains links to 40 studies on the toxic effects of LEDs.

While it is unethical to directly study whether a technology triggers a life-threatening seizure in humans by exposing the person to the possible trigger and it is also unethical to involuntarily subject humans to medical experiments,⁴ a study does not necessarily have to be carried out in a laboratory. A

¹ <https://www.softlights.org/resources>

² <https://www.ama-assn.org/sites/ama-assn.org/files/corp/media-browser/public/about-ama/councils/Council%20Reports/council-on-science-public-health/a16-csaph2.pdf>

³ http://www.softlights.org/wp-content/uploads/2022/01/One-Third-of-us-at-Risk_-The-Medical-science-of-LEDs.pdf

⁴ https://media.tghn.org/medialibrary/2011/04/BMJ_No_7070_Volume_313_The_Nuremberg_Code.pdf

study of verifiable reports of incidents related to LED light beam exposure is a valid study. MarieAnn has compiled a list of verifiable quotes from persons who have been injured by LED exposure.⁵

MarieAnn's efforts highlight the toxic effects of LED light beams on people with epilepsy, but the toxicity of spatially non-uniform electromagnetic visible radiation impacts all members of the public and all other creatures such as owls because of the way it interferes with the proper functioning of nerves, and the damage to the eye caused by chemical and thermal damage.

The Soft Lights Foundation has concluded that the entire switch to LED is based on fraud. The idea that has been sold to the public is that LEDs are energy efficient or save energy compared to incandescent or High-Pressure Sodium and that LED radiation is safe and non-discriminatory. These are fraudulent claims.

To assist Duke Energy with the technical details of why LED light beams are so toxic, we provide additional technical information. LEDs emit electromagnetic radiation from a flat surface which creates a mix of energies that are not uniform, and the result is a low quality, toxic, hazardous, and discriminatory type of visible electromagnetic radiation.

According to the US Department of Energy's website, energy efficiency means "using less energy to get the same job done."⁶ The job is to provide uniform illumination with minimal harm. LEDs do not produce uniform illumination⁷, but rather they emit radiation from a flat surface which creates a mix of energies that are not uniform. Since LEDs do not do the same job as an incandescent or High-Pressure Sodium, **the claim that LEDs are energy efficient cannot be made.** LEDs are simply a low quality, toxic, hazardous, and discriminatory type of visible radiation.

The left side of Figure 1 shows a spherical emitter that sends light in all directions in space. Because of the curvature of the emitter, the light rays do not overlap, and the radiation is spatially, spectrally, and temporally uniform. Every single point on the sphere is the same as any other point. On the other hand, the right side of Figure 1 shows a flat surface emitter such as an LED, which has a middle and edges. This flat surface creates a situation where the middle of the chip has different energy than the edges of the chip. LEDs send light only in the forward direction and the light rays are confined to an 'escape angle' which is determined by the physical characteristics of the chip. Thus, there are overlapping rays, with the most overlap being in the center of the chip, and the least overlap being on the edges. The result is that every point in space has different spatial, spectral, and temporal properties. **An energy efficiency comparison between an incandescent or High-Pressure Sodium and an LED cannot be made.**

⁵ <http://www.softlights.org/wp-content/uploads/2022/01/Quotes-from-individuals-harmed-by-LED-exposure.pdf>

⁶ https://www.energystar.gov/about/about_energy_efficiency

⁷ <https://ieeexplore.ieee.org/document/8879542>

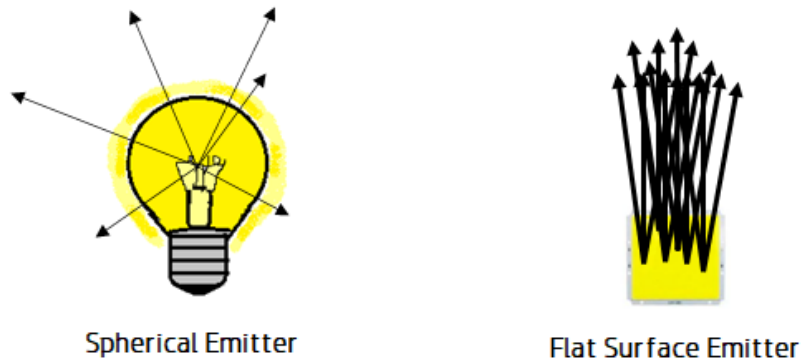


Figure 1 - Spherical vs. Flat Surface Emitter

Figure 2 shows the uniform spatial energy from candles, incandescent and High-Pressure Sodium versus the non-uniform spatial energy from an LED. The intense peak of energy will cause eye damage and will overload the nerve signals to the brain because the information is not uniform. These negative outcomes are the effects of the toxicity of LEDs.

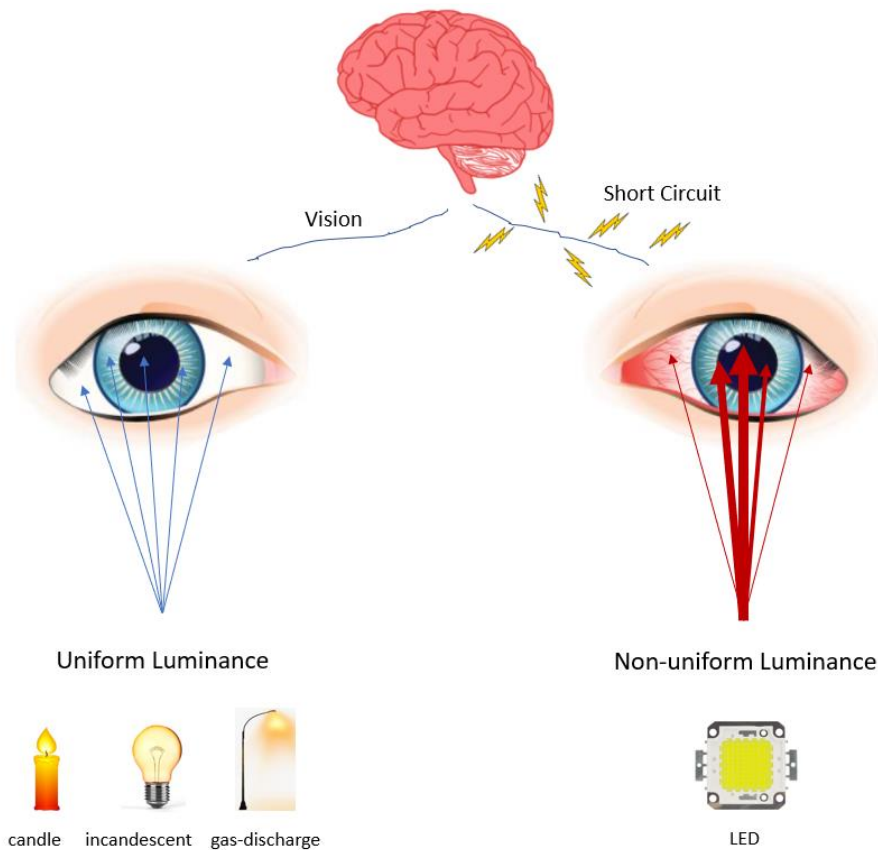


Figure 2 - Spatially Uniform v. Non-Uniform Radiation

Figure 3 is a diagram showing the categorization of radiation and shows that *light* and *illumination* are spatially isotropic radiation in the human visible portion of the electromagnetic spectrum. Radiation emitted by LEDs do meet the regulatory meaning of or comply with standards for the use of light as illumination.

Regulatory Meaning of Light and Illumination

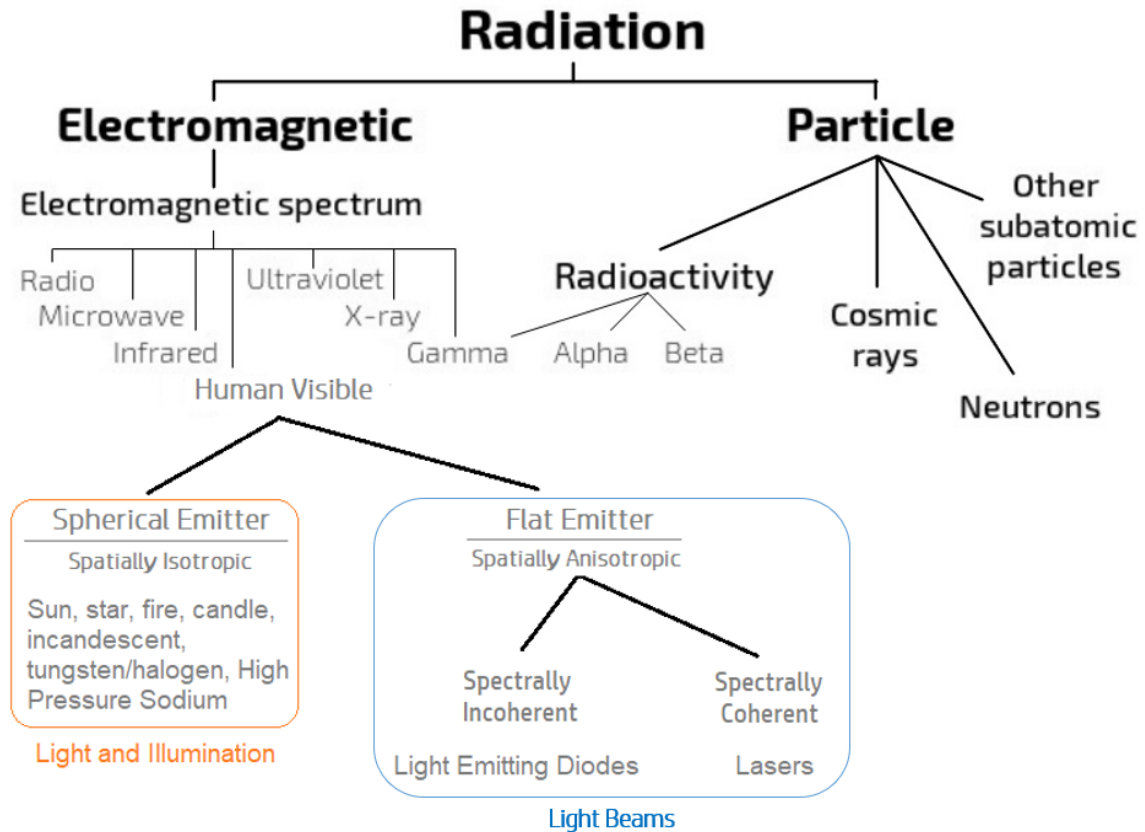


Figure 3 - Radiation Types

As an example of how dangerous LED radiation is, the operator’s manual for the Ryobi P705 Flashlight includes the following: *“WARNING: Do not direct the light beam at persons or animals and do not stare into the beam yourself (not even from a distance) Staring into the light beam may result in serious injury or vision loss.”* The warning also refers to children, who along with infants are an identified high-risk population vulnerable to LED-exposure harm. Babies often lack an adult’s automatic, self-protective aversion response to bright or intense light, and will stare directly at the source. The parenthetical *“(not even from a distance)”* indicates a high level of danger.

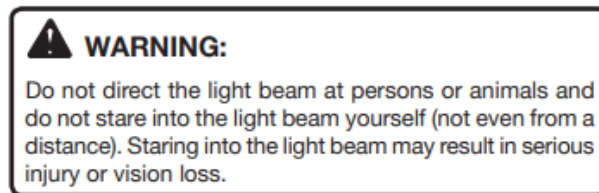


Figure 4 - LED Warning Label

LED light beams can trigger epileptic seizures, whether the light beam is static or flashing. Businesses that wish to protect themselves from liability may place a sign at the entry way to their business to alert people with epilepsy of the danger. Duke Energy has not placed such signs around their LED streetlights, even though it has been documented that LED streetlights trigger epileptic seizures.



Figure 5 - Epilepsy Warning Sign

Figure 6 is a quote from the Duke Energy’s website.⁸ The statement that an LED uses less energy is a fraudulent claim, as energy use by an HPS and an LED cannot be compared because they don’t provide the same service. HPS provides uniform illumination, while LEDs are a light beam incapable of providing uniform illumination.

⊖ What is an LED?

LED stands for light-emitting diode. An LED bulb produces light when electrons move around within its semiconductor structure. They are the most efficient lights on the market. In fact, LEDs are up to 80% more efficient than incandescent bulbs and last about 22 years! Some LEDs cost as little as 96 cents per year to operate. They are available for a wide range of uses including spotlighting or directional lighting, such as in recessed cans, flood or track lighting, as well as for more general purposes where the light emits in all angles (called omnidirectional).

Figure 6 – Duke Energy Fraudulent Statement

Figure 7 highlights the fraudulent claims. A uniform illumination device that is compatible with the human nervous system is shown on the left side of the diagram.

⁸ <https://duke-energylocator.clearesult.com/#/faq>

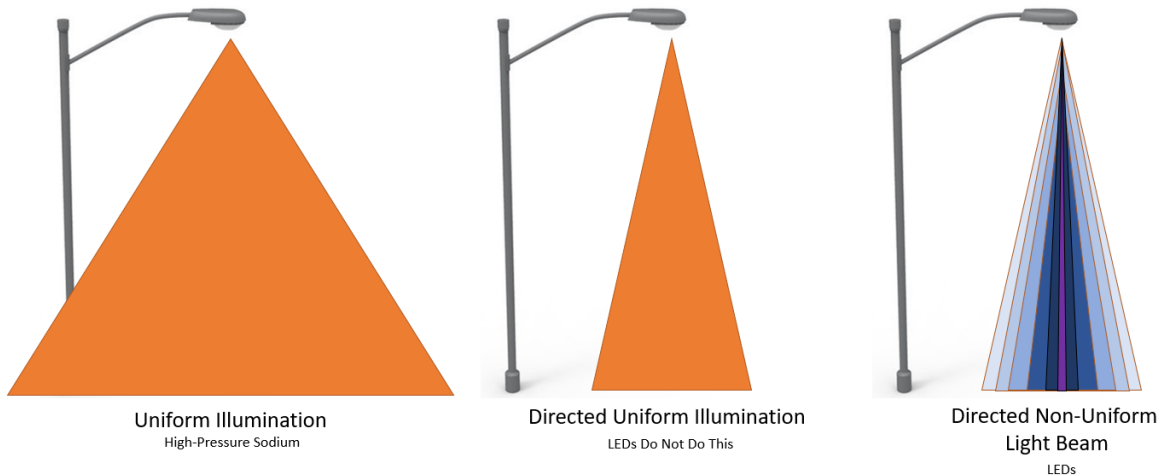


Figure 7 - Streetlight Comparison

In the middle portion of Figure 7 is what Duke Energy fraudulently claims is the shape of the LED light beam. Duke Energy claims that the beam is directed, but uniform, therefore saving energy. The reason this claim is fraudulent is because Duke Energy knows that this middle diagram is not a truthful representation of the actual shape of the LED light beam. The real pattern of an LED light beam is shown on the right side of the figure which demonstrates the non-uniformity of the light and shows that the middle of the light beam is exceedingly intense, far beyond human tolerance levels and that there is extreme variability between the peak luminance in the middle, and the luminance at the edges.

As further proof that the replacement technology must provide the same service as the previous technology, but using less energy, consider this purple streetlight in Greenville, South Carolina.⁹ Duke Energy claims that this purple light does not provide the same service as High-Pressure Sodium. In other words, the criterion for a streetlight is more than just lumens per watt. To validly claim that LEDs are energy efficient, LEDs must provide uniform illumination with a safe and acceptable color.

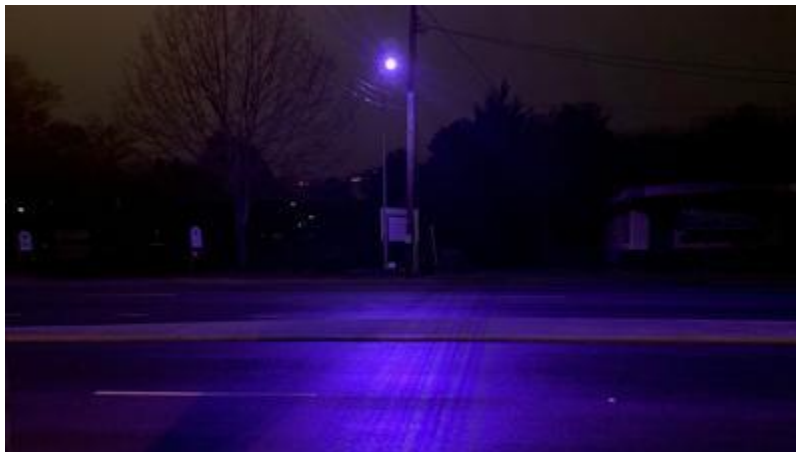


Figure 8 - Duke Energy Purple Street Light

⁹ https://www.foxcarolina.com/news/seeing-purple-street-lights-duke-energy-wants-you-to-let-them-know/article_2c682a9c-865e-11eb-ba24-97d7e414282f.html

LED Streetlights do not comply with standards or regulations that were written for spatially uniform emitters. For example, the Illuminating Engineering Society publishes the de-facto standard for streetlights titled IES RP-8-18. This document is only applicable to uniform emitters and cannot be used for LED light beams or laser beams.

LED flashing lights turn on and off nearly instantly and have a dangerous peak radiance. These LED flashing lights are being used on radio towers, utility vehicles, and bridges. The non-uniform radiation and extreme variability between peak radiance and edge radiance triggers seizures, causes migraines, interferes with human nerve functioning, reduces vision, increases agitation, and endangers the lives of the public and first responders.

Figure 9 is a diagram showing why the spatial distribution of LED radiation is so toxic and dangerous. The peak luminance of an LED can be hundreds of thousands or even hundreds of millions of nits, far exceeding human thresholds, and the non-uniform shape interferes with the human nervous system.

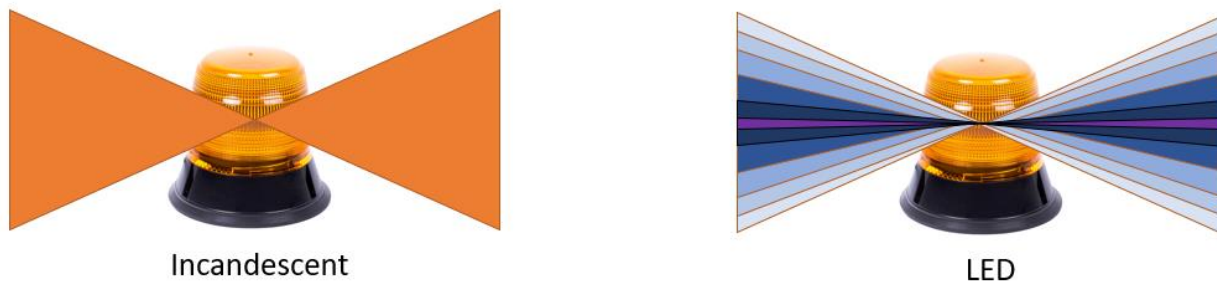


Figure 9 - Incandescent vs. LED Flashing Lights

The result of exposure to LED electromagnetic radiation is immediate sickness in the form of headaches, nausea, eye pain, loss of balance, migraines, panic response, altered vision, epileptic seizures, disorientation, and other neurological disturbances. Each of these symptoms is being verifiably reported by an increasing number of individuals and constitute medical evidence of LED-induced harm.

LED streetlights are a misrepresented, unsafe product which Duke Energy is knowingly installing and operating in public settings. LED visible radiation exposure is causing catastrophic physical harm, subjecting at-risk individuals to illness and injury, and plunging formerly healthy, independent people into crisis levels of stress, hopelessness, psychological trauma, and persistent thoughts of suicide.

Duke Energy is liable for the injuries, harm, emotional trauma, and suffering caused by the installation and operation of LED electromagnetic radiation devices.

Sincerely,

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