Soft Lights Foundation

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November 25, 2021

BY EMAIL

William Cox, Senior Attorney
Florida Power and Light
700 Universe Blvd.
Juno Beach, FL 33408-0420
will.cox@fpl.com

Re: Spatially Anisotropic Visible-Radiation Devices

Dear William Cox,

We wish to alert Florida Power and Light to liability issues related to the sale, installation, and operation of LED radiation devices. Light Emitting Diodes are inappropriately named because they do not emit light. LEDs emit spatially anisotropic visible radiation, but they do not emit the subset of the electromagnetic spectrum known as visible light. Figure 1 is a diagram that shows that *light is spatially isotropic radiation in the human visible portion of the electromagnetic spectrum*.

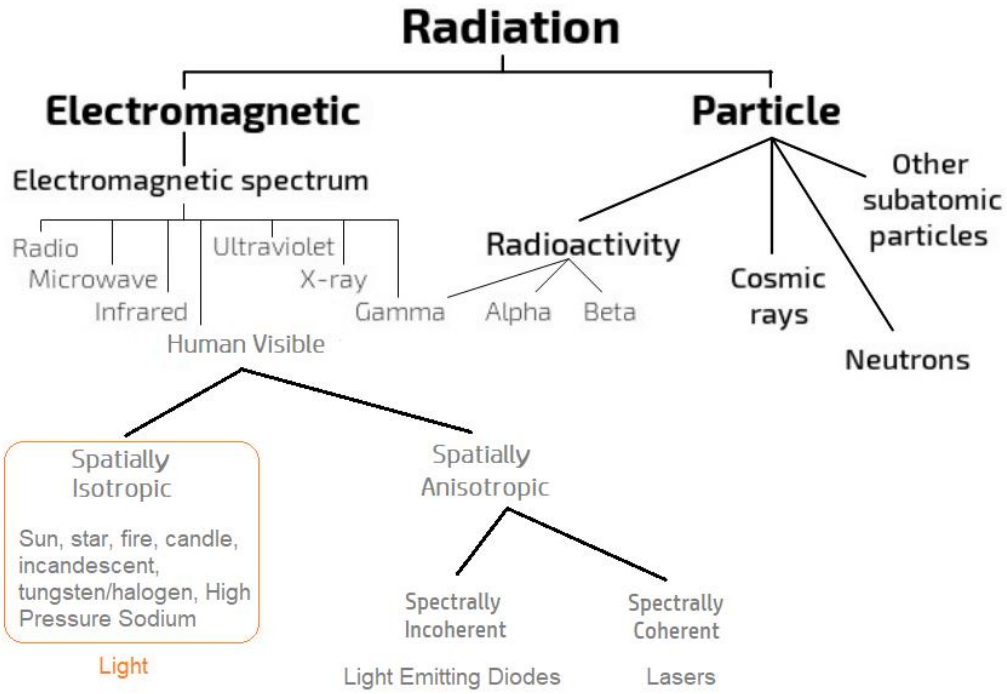

Figure 1 - Radiation

Figure 2 shows LED radiation devices that were installed at the Stuart Centre shopping mall by Florida Power and Light that subject persons in the area to unregulated, toxic, hazardous, and discriminatory visible radiation. As is clear from the photo, citizen's civil rights are being violated because the radiation is being directed into their eyes and damaging the natural night resource that is fundamental to the proper functioning of all biological systems. LEDs emit spatially anisotropic radiation that is visible, but this radiation is not light.

Figure 2 – Florida Power and Light Website[1]

Biological systems have a long history of evolution with *light*. *Light* is emitted by the sun, stars, fire, candles, and fireflies. *Light* is a fundamental component of biological life. Humans use their visual receptors to see objects using reflected light, the different wavelengths of light provide color information, and light controls circadian rhythms. LED visible radiation, on the other hand, is directed energy visible radiation that is not light, and which interferes with proper functioning of human eyes and nerves. This directed energy radiation can cause eye damage and overwhelm the nervous system.

The Illuminating Engineering Society Recommended Practice for Design and Maintenance for Roadway Parking Facility Lighting (IES RP-8-18) is the de-facto standard for outdoor lighting for streets and parking lots. Section 2.1 of this document states, "Radiant energy that is capable of exciting the retina and producing a visual sensation is consider *light*." This definition is inaccurate, as it is missing the words "spatially isotropic", even though the contents of IES RP-8-18 assume the radiation to be spatially isotropic. The references to *light* in IES RP-8-18, therefore, are for *spatially isotropic radiation in the*

[1] https://www.bizjournals.com/southflorida/news/2020/03/27/how-a-florida-shopping-center-saved-money-and.html

visible portion of the electromagnetic spectrum. The word *light* in IES RP-8-18 does not refer to microwaves, x-rays, or spatially anisotropic radiation such as LEDs and lasers.

The reason this is important is because FPL has installed or is planning to install LED radiation devices that do not comply with existing standards, emit toxic and hazardous radiation, discriminate against persons with disabilities and have unregulated spatial, temporal, and spectral characteristics. LED radiation devices have been shown to cause pain, sickness, eye damage, seizures, migraines, emotional trauma, and thoughts of suicide.

The Illuminating Engineering Society does not guarantee their own standards and disclaims any liability for the use of their standards. Thus, if Florida Power and Light claims that they followed standards for LED radiation devices and are therefore not liable for the harms caused by LED radiation devices, FPL's claim will fail, both because IES RP-8-18 is not applicable to LED radiation devices, and because IES has warned that their standards are not trustworthy enough to be guaranteed or relied on.

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To our knowledge, there are no ocular exposure standards for LEDs. In his 2009 presentation, Senior Engineer Michael Shulman of Underwriters Laboratories wrote, "Currently, neither the U.S. nor Canada have mandatory standards or regulations for ocular exposure to LEDs emitting incoherent visible light."[2] In the research article, titled Light Emitting Diode Induced Retinal Damage[3] the authors state, "*Excessive LED light exposure presents a potential hazard to retinal function.*" In other research, those in

[2] http://www.softlights.org/wp-content/uploads/2021/10/MichaelShulman_LEDFireElectricalSafety.pdf
[3] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5313540/

Risk Group 3 (those with epilepsy, autism, migraines, photophobia, etc.) are often purposely ignored during the research, invalidating results that might have shown that LEDs are safe.

LEDs are not "energy efficient" as claimed by FPL[4]. To be energy efficient, a technology must provide the same quality of service and perform the same task as the previous technology[5]. The task in this situation is to provide *light* and uniform illumination while using less energy and not causing harm. Since LEDs do not emit spatially isotropic radiation, LEDs do not emit light, and the radiation that LEDs do emit is not uniform. Instead, LEDs emit spatially anisotropic visible radiation that is sending people to the hospital, causing eye damage, and violating civil rights. The claim of "energy efficiency" by FPL is fraudulent and FPL is liable for harms caused by LED visible radiation.

As an example of how dangerous LED radiation is, consider this warning shown in Figure 3 from the company Gear Light. We found no such warnings on FPL's website, even though FPL's LED radiation devices are likely to be more powerful and dangerous than an LED flashlight.

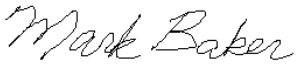
Figure 3 - LED Flashlight

The fact that LEDs emit unregulated visible radiation and lack standards, cause sickness and eye damage, interfere with the human nervous system, and discriminate against people with disabilities makes FPL liable for the harm and discrimination they cause because FPL sells, installs and/or operates LED radiation devices.

To protect human health and reduce liability, FPL must protect the natural night resource and limit visible radiation. Any lighting must be fully shielded (not just full cutoff) and use the subset of spatially isotropic electromagnetic radiation known as *light* with a Correlated Color Temperature of 2700 Kelvin or less, with 2000K preferred to protect the natural night resource.

[4] http://www.campbellpropertymanagement.com/blog/2017/11/15/fpl-can-help-with-your-led-street-lights/
[5] https://www.energystar.gov/about/about_energy_efficiency

Sincerely,



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