

November 5, 2021

To:

Dan Chu, Acting Executive Director
Sierra Club

Re: Spatially Anisotropic Visual Radiation

Dear Dan Chu,

As a member of the Sierra Club, I was involved in the process of writing Sierra Club's Light Pollution Policy, which was adopted by the Board on March 24, 2021. At the time, I was operating SoftLights.org, which has since become the Soft Lights Foundation.

Since the approval of the Sierra Club Light Pollution Policy, the Soft Lights Foundation has developed a comprehensive understanding of how Light Emitting Diodes were purposely removed from regulation as laser radiation, which allowed LEDs to rapidly devour market share in the lighting industry. As you would expect when technology is unregulated, terrible things can happen.

LEDs emit electromagnetic radiation in the human visible portion of the spectrum that is anisotropic. This means that the radiation is not uniform and can be exceedingly dense in the center of the beam and not as dense elsewhere. This type of radiation is regulated for laser beams, but through the efforts of the lighting industry, LED radiation is essentially unregulated.

Previously developed regulations, such as the Illuminating Engineering Society IES RP-8-18 for Roadway and Parking Lot Lighting, were created before the widespread use of LEDs. As high-powered LEDs were developed for the purpose of illumination, the IES and the lighting industry shoehorned the use of LEDs into the existing IES RP-8-18. However, this action is not possible because IES RP-8-18 is valid only for spatially isotropic radiation in the human visible portion of the electromagnetic spectrum.

Figure 1 is a diagram showing the categorization of radiation. As we can see in the chart, LEDs are a different type of radiation than candles, incandescent light bulbs and High-Pressure Sodium lamps, all of which are spatially isotropic.

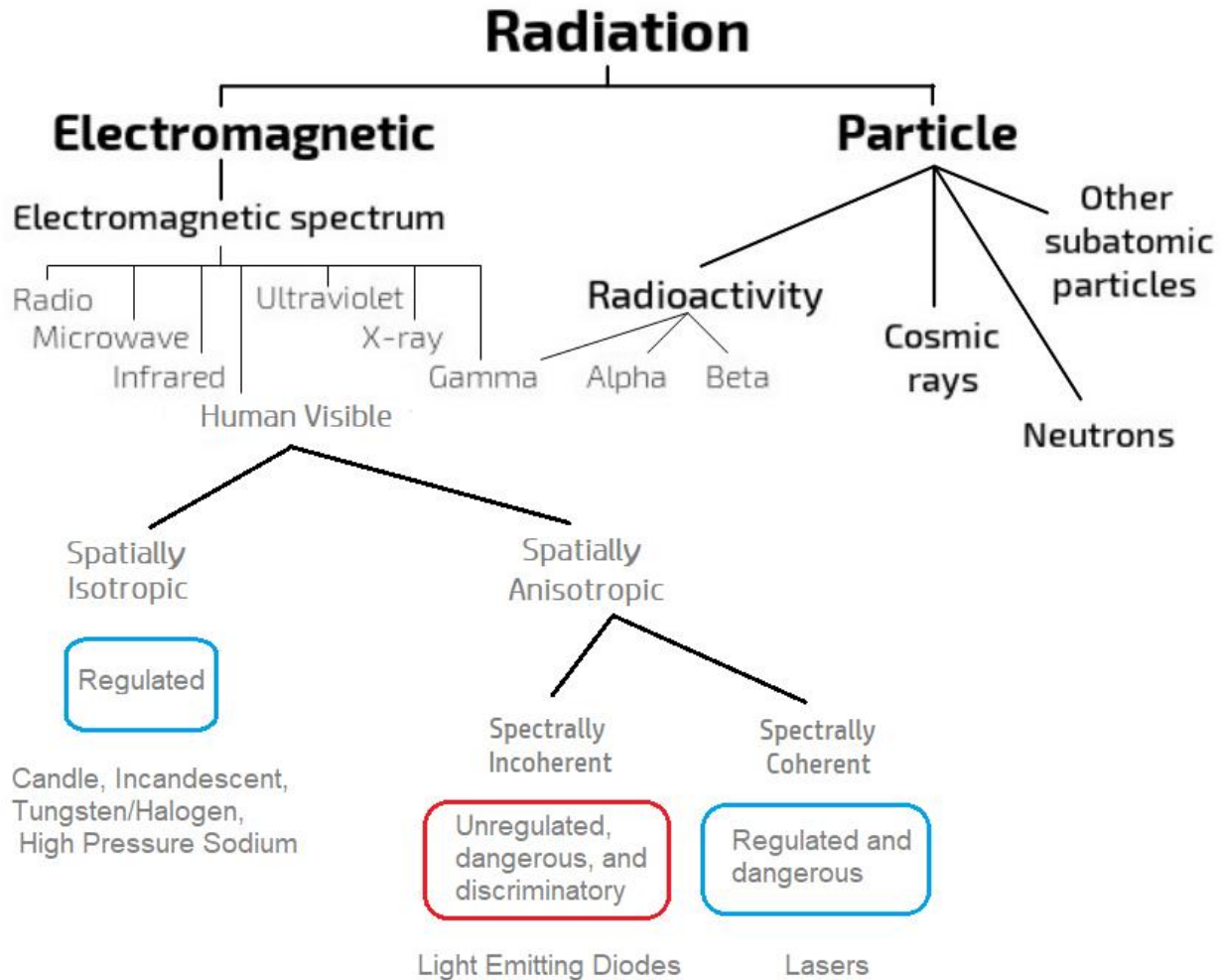


Figure 1 – Radiation

The promotion of LEDs by the industry as “energy saving” is a myth. From the diagram in Figure 1, we can see that LEDs are spatially anisotropic, which means that the radiation is highly directed and non-uniform. This type of radiation is incompatible with the human central nervous system, is dangerous for human eyes, and is extremely harmful to nearly every biological system on earth. Therefore, it cannot be stated that LEDs “save energy”; only that LEDs are spatially anisotropic radiation that is hazardous.

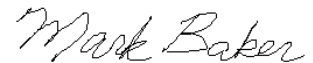
LED radiation is so hazardous that they have been shown to cause epileptic seizures, debilitating migraines, psychological trauma, eye damage, vehicle crashes, loss of liberty and possibly loss of life. LED radiation is thus discriminatory. While reducing the amount of blue wavelength light near 450 nanometers reduces the harm, and while lowering the radiance also reduces the harm, and while diffusion coverings also reduce the harm, there is currently no known safe level of spatially anisotropic

radiation for certain individuals who we may call LED-reactive. Some of the personal stories of harm from LED radiation can be found on our website.¹

To our knowledge, there are currently no ocular exposure standards for spatially anisotropic radiation from LEDs. We have reached out to numerous US government agencies such as the Environmental Protection Agency and Department of Energy and none of them are regulating radiation from LEDs. The National Highway Transportation Safety Administration is also not regulating LED radiation, so vehicles with LED headlights, LED Daytime Running Lights, and LED flashing lights are causing eye damage, visual distraction, and psychological trauma because there are currently no limits on the spatial, temporal, or spectral properties of LED radiation.

We have gained this knowledge since our work with the Sierra Club and now understand with full confidence that LEDs are causing dramatic environmental harm, severe harm to humans, have increased overall light pollution, and are not saving energy or reducing our carbon footprint. We therefore urge the Sierra Club to abandon its support of LEDs, to remove references to LEDs from the Light Pollution Policy and to remove promotion of LED radiation from all Sierra Club materials.

Sincerely,



Mark Baker
President

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¹ www.softlights.org/stories