Soft Lights Foundation

9450 SW Gemini Drive
PMB 44671
Beaverton, OR 97008
www.softlights.org

February 27, 2022

BY EMAIL

Quinton Lucas, Mayor
Kansas City, Missouri
quinton.lucas@kcmo.gov

Re: The LED Fraud

Dear Quinton Lucas,

We were asked to notify the Kansas City council about the dangers of LED streetlights and LED lights in general. We read the story by Brianna Lanham and Sherae Honeycutt about Kansas City's consideration of converting to LED streetlights. (https://fox4kc.com/news/kansas-citys-plan-to-install-new-led-streetlights-already-raising-flags/) We applaud Ms. Lanham and Ms. Honeycutt for reporting on some of the major negatives of LED lighting and we applaud Mary Nemecek of the Audubon Society for her advocacy. It is a very big deal that the toxicity of LED streetlights is finally being discussed in front of the public.

We can explain to you and the council why LED lights cause so much glare and light trespass, why LED streetlights are dangerous, and why the claim that LED streetlights save energy is fraudulent.

There are now two types of light in the world: point sources and flat surface sources.

Point sources are the types of light that we have evolved with, such as the sun, incandescent, and even High-Pressure Sodium. We measure the brightness of such light with the metric luminous intensity.

Flat surface sources are a new invention that has never before been seen in this world. Flat surface sources include LEDs and lasers. The non-curved flat surface emits non-uniform energy that cannot be a point source. The brightness of flat surface light is measured using the metric luminance. Flat surface light is toxic, hazardous, discriminatory, and unregulated.

Figure 1 is a slide highlighting the differences between the two types of light.

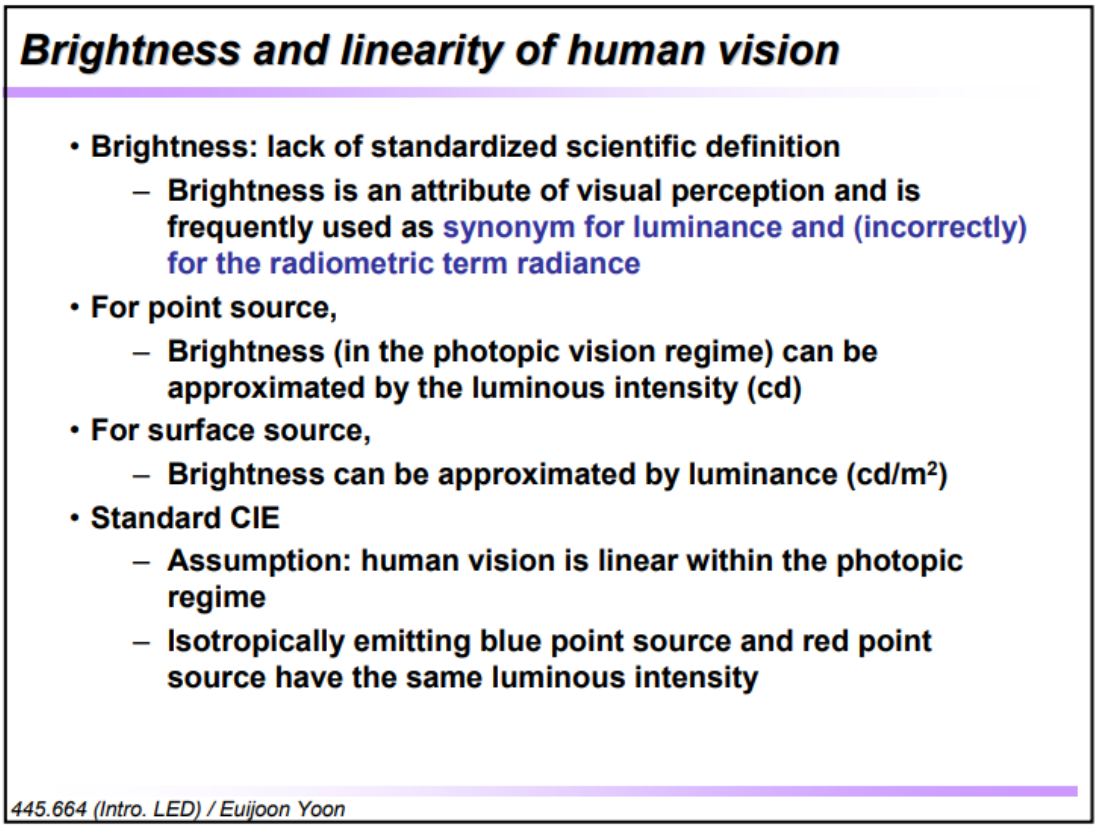


Figure 1 – Brightness of Two Source Types[1]

The differences between a point light source and flat surface light source must be understood by all involved, including council, city staff, and the public. Once the differences are understood, then the council, staff, and public can begin to discuss solutions to the glare, light trespass, health hazards, and discrimination of LED light beams.

The left side of Figure 2 shows light from a point source. The light is uniformly spread and follows the well-known Inverse Square Law.[2]

[1] Seoul National University - https://ocw.snu.ac.kr/sites/default/files/NOTE/791.pdf
[2] https://en.wikipedia.org/wiki/Inverse-square_law

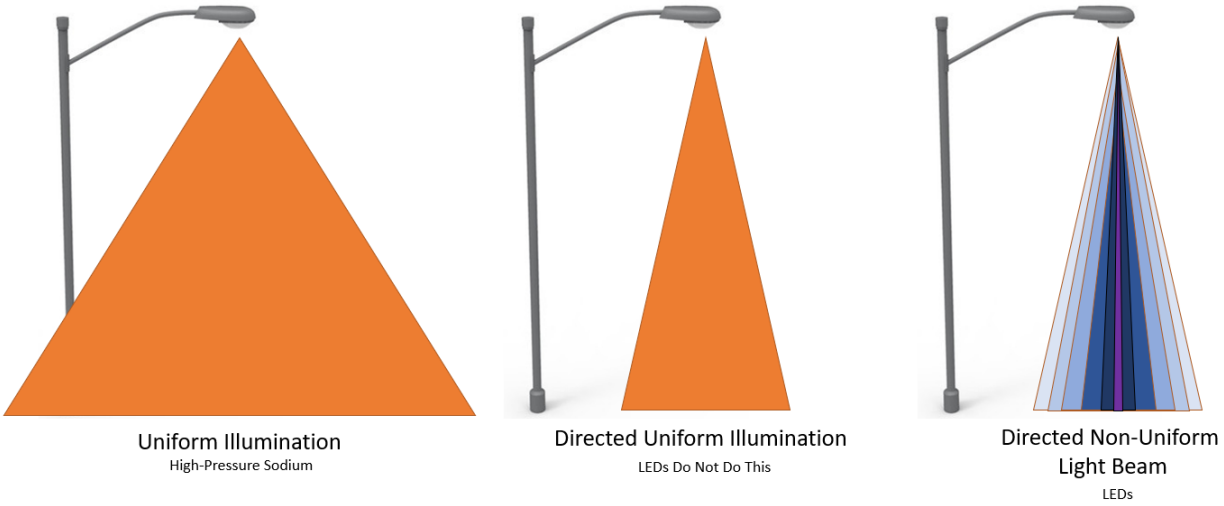


Figure 2 - Streetlight Comparison

What Evergy did not explain to Kansas City is that a flat surface source does not emit uniform light. Evergy likely told Kansas City that LED light beams are "directed", which is shown in the middle of Figure 2. While flat surface sources do indeed emit directed light beams, those light beams are not uniform. The middle image in Figure 2 is not the shape of LED light.

The true shape of light from a flat surface is shown on the right in Figure 2. The energy is non-uniform, with the light beam being extremely dense in the center of the chip, and much less dense on the edges.[3] This non-uniform light from the tiny source interferes with human nerve signaling because human nerves were only designed to receive signals that arrive with uniform energy.

None of the streetlight standards such as the Illuminating Engineering Society IES RP-8-18 Roadway and Parking Lot lighting are applicable to LED light beams. IES RP-8-18 is only applicable to point sources. What Evergy didn't tell Kansas City is that LED streetlights do not comply with any standards, and this is a major safety and liability issue for Kansas City.

Evergy also likely informed Kansas City that LED streetlights are "energy efficient". This is a fraudulent claim because, by definition, to be energy efficient, a new technology must provide the same service as the previous technology but using less energy.[4] Since flat surface sources don't provide the uniform illumination that HPS provides, flat surface sources cannot be compared to point sources in terms of energy use. Point Sources and flat surface sources are two entirely different categories of light, just like lemons and lemon-scented soap are two different products.

LED streetlights emit dangerous glare because of the large spike of 450 nanometer blue wavelength light. Figure 4 shows the spectral power distribution of High-Pressure Sodium and Figure 4 shows the spectral power distribution of 3000K LED. Notice the dramatic difference in the amount of blue wavelength light.

[3] https://ieeexplore.ieee.org/document/8879542
[4] https://www.energystar.gov/about/about_energy_efficiency

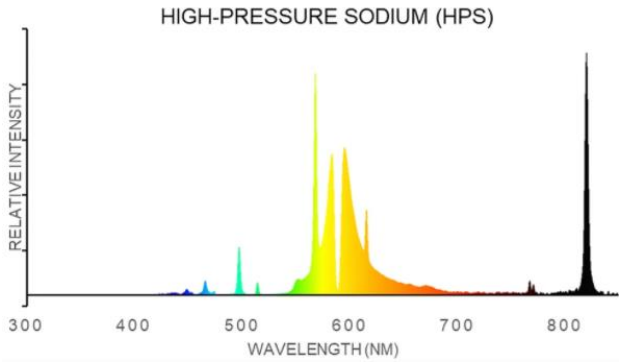


Figure 3 - HPS Spectral Power Distribution

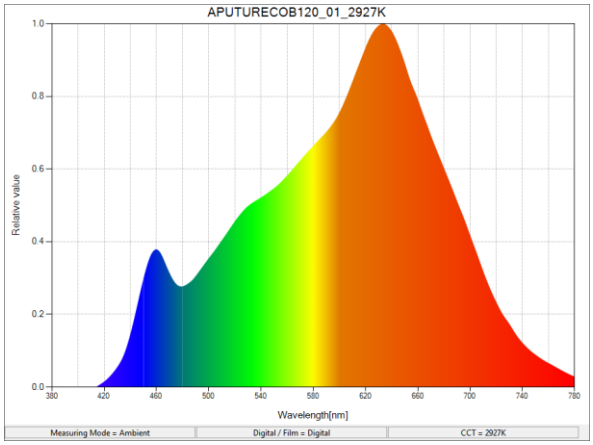


Figure 4 - 3000K Spectral Power Distribution

When the American Medical Society set a safety standard of 3000K as the maximum color temperature in 2016, they didn't state that 3000K is the safest color temperature. 3000K is an absolute upper limit, to be reached only in exceptional circumstances. What was not reported in the Fox4KC article is that in 2021, the United Nations, the International Dark Sky Association, and Dr. Mario Motta, the author of the 2016 AMA report, set a new limit of 2200K as the maximum safe upper limit. This new limit is discussed on the IDA's website: https://www.darksky.org/our-work/lighting/values-centered-outdoor-lighting/ At this stage, with the hundreds of studies on the dangers of blue wavelength light[5], no city should even consider outdoor lighting with a color temperature higher than 2200K.

When we combine the non-uniform spatial properties and non-uniform spectral properties of LED light beams, we have a very dangerous type of light that puts community members at high risk because they can neither see nor be seen properly. This lack of uniform illumination and excessive blue wavelength light from LEDs will cause Kanas City residents much suffering. The only way to provide safe illumination is to use point sources such as incandescent, High-Pressure Sodium, or Low-Pressure Sodium, and those sources must be fully shielded, diffused, and dimmed. For example, Kansas City could replace existing 100-watt HPS with 50-watt HPS for a 50% energy savings without incurring the toxicity of LEDs.

One of the most tragic outcomes of using LED light beams is its effects on those who are LED-reactive. This includes people with epilepsy, autism, migraines, PTSD, and other neurological conditions where the non-uniform energies of the LED light beams cause the nerves to overload and short circuit, resulting in epileptic seizures, migraines, panic attacks, anxiety, and agitation. Some of these heart-wrenching stories are posted on our website.[6] LED lights are discriminatory because they interfere with a person's major life functions such as seeing, thinking, and concentrating, and are causing some people to be unable to access public services or their place of employment.

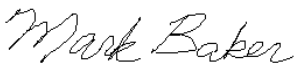
[5] http://www.softlights.org/human-health/
[6] http://www.softlights.org/stories

The natural night is a fundamental resource that is critical to the health of humans and nearly all biological systems. Adding artificial light pollutes the natural night resource, resulting in significant increases in rates of cancer, premature births, and mood disorders.[7] We urge the Council to reconsider the use of artificial light and develop a long-term plan of protecting the natural night resource. The Soft Lights Foundation makes the following recommendations.

1) Evergy must fully disclose the dangers of LED lights, including its impacts on those with epilepsy, migraines, autism, and PTSD.
2) Evergy must fully disclose that LED streetlights do not emit uniform light, and that LEDs do not save energy because they do not provide the same uniform illumination service as HPS.
3) Evergy must provide to the city an analysis of replacing 100-watt HPS with 50-watt HPS.
4) Develop a long-term plan to protect the natural night resource.
5) Use only tiny amounts of artificial light for wayfinding.
6) To prevent injury and discrimination, do not use flat surface light sources.

Our website (www.softlights.org) has a wealth of educational information that will help the council, city staff and the public understand the difference between a point source and a flat surface source. In addition, we are available to answer any questions you might have.

Sincerely,



Mark Baker
President
Soft Lights Foundation
mbaker@softlights.org

[7] http://www.softlights.org/human-health/