

# Technical Brief on Outdoor Lighting

Certain studies suggest there be restrictions on the color of LEDs for outdoor applications because of blue light hazard, glare, and circadian disruption.

1

## Blue Light Hazard

### What is it?

Temporary (or permanent) loss of visual photoreceptor functions following exposure to short-wavelength radiation of the retina. "Blue light" is high radiance; short wavelength light focused on the retina by the optics of the eye for an extended duration has the potential to cause permanent damage to the retina. It is dependent on spectral distribution, optics, amount of exposure, and use case.

Correlated Color Temperature should never be used to characterize light as a stimulus for blue light hazard. Blue light is not restricted to LEDs – they do not contain significantly more blue than any other source at the same color temperature.

2

## Glare

### What is it?

Glare is a visual sensation caused by excessive and uncontrolled brightness that can be disabling and uncomfortable.

**Disability Glare:** reduction in visibility due to scattered light in the eye, depends on how much light and the angle between the line of sight and the glare source.

**Discomfort Glare:** painful sensation when exposed to a bright light in field of view. It is subjective and is not directly linked to physiological cause.

3

## Circadian Disruption – Melatonin Suppression

Disruption occurs only when there is a short wavelength blue light exposure exceeding a specific intensity aimed at the retina for an extended period during normal sleep hours. Light exposure, both intensity, and duration, from typical street or outdoor lighting is insufficient to cause disruption associated with melatonin suppression.

Much of the research studying melatonin suppression associated with outdoor lighting used technology comparisons represent drastic differences in colors (such as a 6000K LED to a 2000K High Pressure Sodium). The current LED designs focus on 3000K CCT for "warmer" color appearance or 4000K CCT for "cooler" color appearance.

Until more is known about the effects of long-wavelength light exposure (amount, spectrum, duration) on circadian disruption, it is inappropriate to single out short-wavelength radiation from LEDs as the causing factor for this.

*NEMA represents nearly 350 electrical equipment and medical imaging manufacturers that make safe, reliable, and efficient products and systems. Our combined industries account for 360,000 American jobs in more than 7,000 facilities covering every state.*

