

Light Emitting Diodes (LED) are now the dominant source of artificial light at night. A broad range of lighting options using LED technology is available.

Kelvin (K) is the measured unit for defining **Correlated Color Temperature (CCT)** of a light source. Light bulbs are found listing CCT 2700K or just 2700K.

Lumens define brightness of a light source. More lumen = brighter (replaces watts). A home light bulb rated at 60 watts emits 800 lumen of light.

Glare is a visual sensation caused by excessive and uncontrolled light brightness in your field of view. Shielding light fixtures helps reduce glare and improves safety.

High Pressure Sodium (HPS) fixtures were used for Phoenix streetlights from the 1970's to about 2020. HPS were rated at 2200 Kelvin often labeled as *warm-yellow* and had NO significant blue in the visual spectrum.

> Incandescent bulbs were rated at about 2600 Kelvin. Various bulbs were brighter via more watts. But all incandescent bulbs were about 2600K .

LED can vary in CCT from 1700K to over 7000 Kelvin.

Phoenix history of LED lighting.

In about 2012, the City began considering new, energy efficient, LED streetlights. In 2016, five Phoenician's (with help from many more) educated the City Council who voted 9-0 in favor of installing 'soft-white' 2700K streetlights! This avoided the harsh blue-white LED lights at 4000K that had been picked from a catalog by the Street Department. With energy efficient 2700K LED streetlights the City of Phoenix led the world with smart outdoor lighting! Since then other countries, cities, towns, and even HOA's have followed with smart LED below 3000 kelvin.

When LED's go above 3000 kelvin blue-light increases significantly. As the CCT rises to 4000K, 5000K, and above – blue light contributes significantly to the visual spectrum. An exposure to blue-rich white spectrum is considered unhealthy for us and increases problematic glare. Even brief exposures to this kind of light can signal our brain that thinks it is daylight even when it is night time.

In 2016, American Medical Association (AMA) outlined negative impact of LED lighting on our “circadian sleep rhythms” due to the trigger of blue-rich LED*. Report noted increased glare also. Currently, blue rich LED outdoor lighting (4000K – 7000K) for humans result in adverse suppression of melatonin which can have as much as “five times greater impact” on our circadian rhythm. Also, wildlife such as owls and bats can be harmed by blue rich LED at night.

A LED light source below 3000K has less blue in the color spectrum and a 2700K bulb has even less blue which are often advertised as 'soft white' or 'warm' light.

- 1.) **City** of Phoenix selecting LED streetlights rated at 2700K avoided a \$33 million dollar mistake with proposed 4000K LED streetlights.
- 2.) Capping the CCT of outdoor LED lighting at 3000 Kelvin is needed for the health and safety of Phoenicians. Web links and sales departments are marketing 4000K, 5000K, and even 6000 Kelvin light fixtures for outdoor lighting. Under the current City outdoor lighting ordinance, these high rated Kelvin LED lighting is allowed everywhere all night long.
- 3.) **Many** types of LED fixtures are now available. All the types of lighting fixtures listed in the current city lighting code (§23-100) are being replaced with LED and newer OLED fixtures.
- 4.) Outdoor LED decorative lighting has increased, not just for holidays, but year around. My estimate is an increase of about 20% of LED outdoor lighting over the past couple of years – in our Phoenix neighborhood of 86 homes & a church.
- 5.) **In** 2016 the American Medical Association (AMA) reported on a decade of research which showed that blue light within LED bulbs Note: Devices like cell phones (Apple blue screen) can result in negative health impacts at night, also.
- 6.) **Phoenix** lags behind in addressing LED lighting. Major cities like Pittsburgh, PA or local cities like Flagstaff and Fountain Hills have adopted updated outdoor lighting ordinances (even HOAs have updated rules) *reflecting* the dominant lighting source – today which are LED.
- 7.) **Currently** some LED outdoor lighting are beginning to negatively affect the nighttime environment which is tied to our quality of life.

- 8.) Good public outreach programs use this basic set of outdoor lighting tips:
- a.) Use light only if it is needed.
 - b.) Direct light so it falls only where it is needed.
 - c.) Light should be NO brighter than needed.
 - d.) Use light only WHEN needed.
 - e.) Use only warmer-colored lights outside.

This tool is easy for people to understand and has been successful in people adopting SMART LIGHTING tips.

>> SLIDE SHOW <<

>> Suggested enhancement to the Phoenix Outdoor Lighting Code addresses the need to build the most sustainable desert city possible and they meet the Tools of Action framework. This step can help prevent negative environmental impacts from getting worse.

We have provided a significantly enhanced lighting code to aid the City of Phoenix maintain the health and well-being of our communities.

The donation of the suggested code update has been provided to help the City meet this need and parallels the Framework for our Future and is part of the Core Values. This effort helps to insure the Vision for the health and well-being for the environment and for Phoenicians. Updating the Lighting Code is preventive medicine.

Thank you for your time.

