

## A lighting Engineer Speaks

Before the end of this coming decade, every town in Maine will be converted to LED street lighting. LED fixtures have the advantage of significantly reducing energy usage (carbon footprint) and maintenance costs that no town is going to pass up.

What we need to fight for is full cutoff, <3000K CCT (correlated color temperature) and low glare. The fixtures being installed will last a generation, before replacement is needed, so we need to get it right the first time. Davis, CA spent \$350,000 dollars replacing their new 4000K fixtures with lower color temperature units because of an angry citizenry. <https://www.darksky.org/citys-led-retrofit-shows-need-for-careful-lighting-choices/>

Full cutoff is nearly universally accepted now because that is an easy way to design LED optics. The correlated color temperature and now glare are the key elements that few really understand and where the emphasis should be.

Virtually every major city in the US has adopted the International Dark Sky Association and American Medical Association recommended <3000K CCT sources. Given a choice in pilot studies, virtually all communities select the warmer (lower color temperature) color lights. Interestingly, the 3000K LED sources have better color rendering than 4000K and 5000K LEDs and the 3000K units no longer have the lower efficiencies that early versions suffered. (We don't want the higher color temperature unit because it reflects more light in the atmosphere and the primary blue source affect human and animal/bird/insect circadian rhythms with serious heart side effects.

Having convinced much of the rest of the country of the merits of full cutoff and 3000K fixtures, one of the current concerns of the IDA is the glare that is produced with directly viewed LEDs. The LED dies have an extremely high brightness in a very small package. Some LED floodlights have LED dies with 1/5 the brightness of the sun! The city of Portland and the town of Mount Desert installed Cree fixtures with WaveMax indirect waveguide optics to reduce glare. General Electric also manufactures fixtures with curved reflected optics to spread the image of the LED die over a larger area, reducing brightness and glare. There are other options as well.

These are some of the criteria that communities should be aware of before they agree to a particular installation. Arguing to prevent the installation of LEDs is going to be a losing battle. If you believe in climate change, you should be supporting this conversion to solid state lighting.

---Dwight

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