Fact Sheet: "An Act to improve outdoor lighting, conserve energy, and increase dark-sky visibility"

A bill titled "An Act to improve outdoor lighting, conserve energy, and increase dark-sky visibility" has been introduced by Sen. Cynthia Creem (**S.2147**) and by Rep. Sean Garballey (**H.3306**). It is a refile of S.1927/H.2858 from last session, and proponents seek to exceed those bills' 24 bipartisan co-sponsors.

This legislation would promote energy-efficient lighting practices throughout the Commonwealth by:

- requiring municipal- and state-funded projects to use fully-shielded exterior lighting in new or replacement installations, and to install that lighting only where it is needed;
- requiring these installations to use lighting with a correlated color temperature (CCT) of no higher than 3000K, which researchers advocate for human circadian health and nocturnal habitats.
- establishing maximum illumination thresholds for municipal- and state-funded lighting projects
- requiring Mass. Dept. of Transportation to review and update its criteria for roadway lighting to conform to commonly accepted best practices; and
- requiring the Mass. Department of Public Utilities to establish reduced-rate tariffs for low-wattage LED streetlights and for streetlights that are dimmed or turned off during the night. This would benefit towns that want to install LED streetlights, particularly if they're opting for electronic dimming controls.

Poorly designed or excessive night lighting harms the environment in many ways, including:

- **Energy waste**: by one recent estimate, light streaming up into the night sky from cities and towns in Massachusetts equates to 1½ billion kilowatt-hours and $180,000,000 in wasted electricity annually.
- **Visual impairment:** poorly designed lighting causes harsh glare that blinds and distracts drivers, especially in bad weather and for elderly drivers with poor visibility.
- **Environmental consequences:** overlit buildings disorient many birds, especially during their seasonal migrations, causing death due to impact or predation.
- **Loss of the starry sky:** skyglow from light pollution reduces enjoyment of the night sky. More than two-thirds of Americans can't see the Milky Way from their homes.

By contrast, well-designed lighting illuminates the ground without wasting energy and without being a burden or nuisance to the environment or other people and property. Lighting professionals recognize that the most straightforward means to create a glare-free nighttime environment is to utilize fully-shielded lighting fixtures, which emit all of their light down (below horizontal) and none of it directly up into the sky.

Note that the bill's requirements would apply only to new or replacement lighting installations — existing lighting would not be affected, and provisions are included to permit waivers when deemed necessary by special circumstances. Nor would it add to project costs, because well-designed, fully-shielded lighting is now almost universally available from manufacturers.

The primary sponsor is the International Dark-Sky Association (darksky.org) and its Massachusetts chapter. If you have questions regarding this bill, please contact Kelly Beatty (kbeatty@darksky.org), Tim Brothers astrobrothers@gmail.com, or Mario Motta (mmotta@massmed.org).

References:

"Human and Environmental Effects of Light Emitting Diode Community Lighting" (American Medical Association, CSAPH Report 2-A-16, 2016; http://bit.ly/1XZzsz3)

"Visibility, Environmental, and Astronomical Issues Associated with Blue-Rich White Outdoor Lighting" (International Dark-Sky Association, 2010; https://is.gd/IDA_bluelight_report)

"IDA and IES announce strategic collaboration to advance quality lighting to reduce light pollution" (Illuminating Engineering Society, April 16, 2020; https://is.gd/5principles)

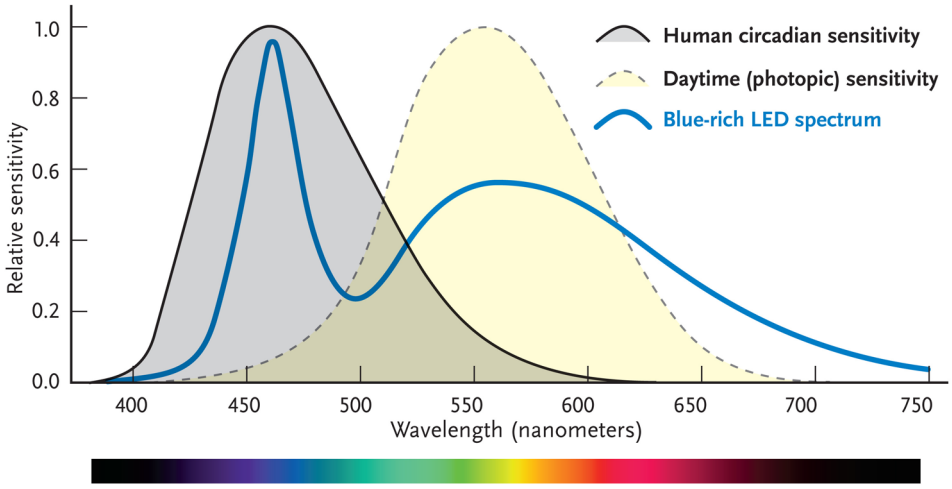
LED Streetighting: Promise and Pitfalls

by J. Kelly Beatty *(reprinted with permission from Sky & Telescope, May 2015)*

We are on the cusp of a once-in-a-lifetime revolution in the way we illuminate our nighttime environment. Light-emitting diodes, or LEDs, are rapidly replacing any and all light sources used at night — from flashlights to headlights to streetlights.

There's much to like about LEDs. They are mechanically uncomplicated, produce a great deal of light from very little electricity, have extremely long lifetimes (up to 100,000 hours), and can be dimmed or cycled on and off instantly. Illumination technology has not taken such a dramatic step forward since the introduction of high-pressure sodium (HPS) bulbs in the 1960s.

However, white LEDs are strong sources of blue-rich light, which has several negative side effects. For example, blue-rich light is more disruptive to the circadian activity of nocturnal wildlife, including humans.



As the graph shows, our eyes are much more sensitive to blue light at night than they are in daylight. Blue-rich light can create strong, often disabling glare within the eyes of elderly people. Most critically for astronomers, blue-rich light scatters readily in the atmosphere (which is why our daytime skies are blue). This means blue light creates far more skyglow at night than a similarly bright "warm" source such as HPS.

One easy way to determine an LED's apparent color is to note its *correlated color temperature,* or CCT. Very high values, 5000 kelvins or above, have the harshest, bluest light; those with CCTs of 3000 K or lower have a "warmer," more environmentally benign output. A 2010 analysis by the International Dark-Sky Association addresses these problems in detail; see **https://is.gd/IDA_bluelight_report**.

The odds are high that your town or city is planning to convert its streetlight to LEDs, if it hasn't already. The same prospect applies to businesses near you. If so, the IDA makes the following recommendations:

- Always choose fully shielded fixtures that emit no light upward.
- Use "warm-white" or filtered LEDs with a CCT no higher than 3,000 K.
- Choose models with adaptive controls like dimmers, timers, and motion sensors.
- Consider dimming or turning off the lights during overnight hours.
- Do not overlight just because LEDs have high luminous efficiency.