

Tackling Light Pollution

"Hell is filled with good intentions..."
—St. Bernard of Clairvaux

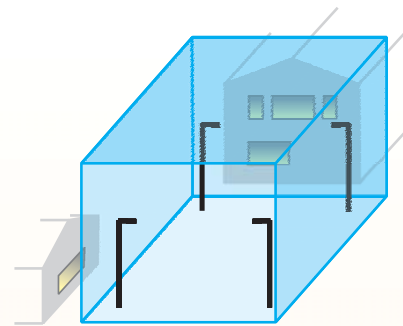
"When you cannot measure it... your knowledge is of a meagre and unsatisfactory kind..."
—Lord Kelvin

To many, light pollution spoils the beauty of the night. However, it also wastes energy, hinders vision, disturbs sleep, and perhaps endangers wildlife. Many communities have looked for ways to reduce light pollution including restrictions on the type of luminaires allowed for outdoor lighting. Although restricting luminaires to full-cutoff over semi-cutoff types intuitively makes sense, quantitative analyses of these measures show that they have little or no effect on minimizing light pollution. What is needed is a system for characterizing light pollution that allows communities to develop enforceable limits based on physical quantities, and which can be used in available lighting software to design lighting systems meeting these limits.



The LRC rooftop was the site of an outdoor glare experiment, studying the effect of background illuminance on discomfort.

The LRC has developed a quantitative framework for quantifying light pollution from an installation, currently known as Outdoor Site (Lighting) Performance (OSP).



The OSP calculation box

OSP uses a calculation "box" consisting of the boundaries of a property and a top plane recognizing the public's ownership of the night sky. Property boundaries are a logical and legally recognized foundation for legal considerations. Three OSP metrics are used:

- **Glow**—the average illuminance on the entire calculation "box," indicative of the amount of sky glow generated by an installation
- **Trespass**—the maximum illuminance on any of the vertical calculation planes, indicative of the potential to disturb neighbors
- **Glare**—the degree to which illumination from luminaires will cause discomfort to observers

OSP test runs using actual lighting installations provide a realistic and accurate basis for developing limits on glow and trespass. Indoor and outdoor experiments are being used to develop sensible criteria for limiting discomfort glare. Communication of the OSP system to lighting practitioners in the U.S. and in Europe demonstrated the promise of OSP as a practical tool in the mitigation of light pollution and its negative consequences.

Sponsors

Acuity Brands, Lumec, Philips Lighting, R-Tech/Schröder



View LRC Project Sheets at
www.lrc.rpi.edu/resources/newsroom/projectsheets.asp

Lighting
Research Center