SDRL Lab, Executive Summary Street Lights
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Vision scientists have given names to the cone and rod sensitivity functions, which are referred to as photopic and scotopic responses. The new research findings explain how to put these together to yield a valid measure of brightness for the full scene viewing of lighting practice. One might think that it would take two light meters to achieve the evaluation, but in many lighting applications the traditional light meter can be used if an additional property of the lighting is known.

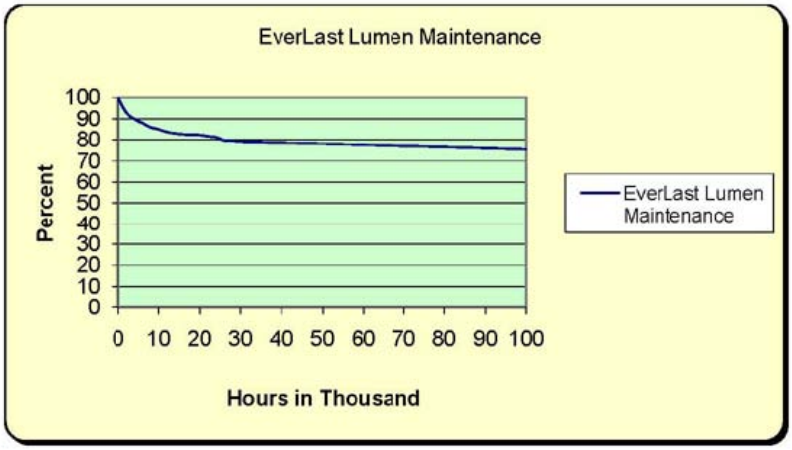
For any light source or any lighting that has a stable and approximately constant color temperature, the ratio of scotopic to photopic output is a fixed constant independent of intensity, which can be measured with instruments and can be supplied by the lamp manufacturer. Once this ratio is known, a scotopic value can be determined simply by multiplying the known ratio by the measured or given photopic value. The specific ratio is noted as the quantity S/P where S is the scotopic measure and P is the analogous photopic measure. The new research explains that brightness perception is simply correlated to the value $(S/P)^{0.78}$ rather than just P alone. See attached energy user news as a reference.

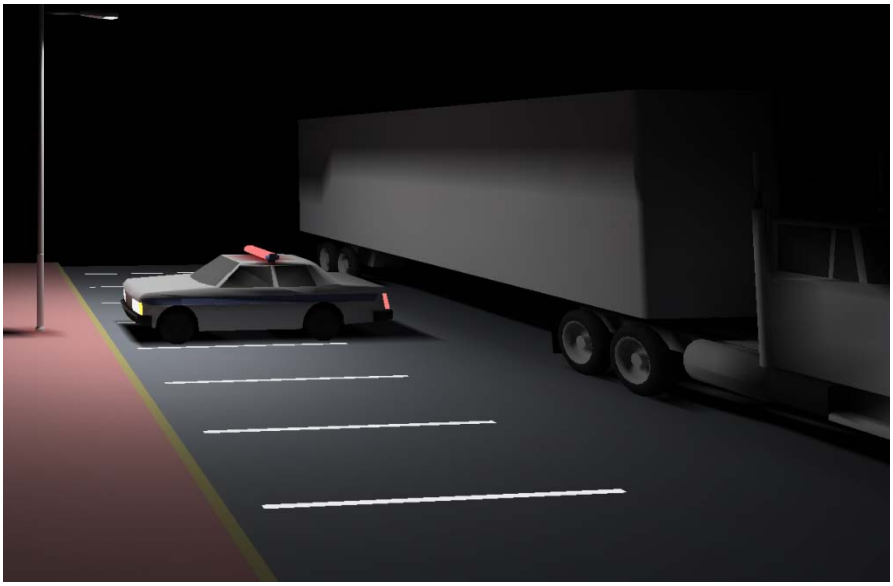
An example will illustrate the simplicity and usefulness of the new research findings. Consider a comparison between two lamps: A low color temperature (HPS) 2100k, and in comparison to the cooler Induction lamp which has a color temperature of 5000k in this case. The S/P ratio for the 2100k lamp is given by a lamp catalogue value of 0.57 while the value measured for the Induction lamp is 2.10. Thus, the two lamps when lighting the same scene will yield an equal sensation of brightness with the regular HPS street light photopic illuminance of the 2100k lamp needing to be about 38% higher than the photopic illuminance of the Induction lamp.

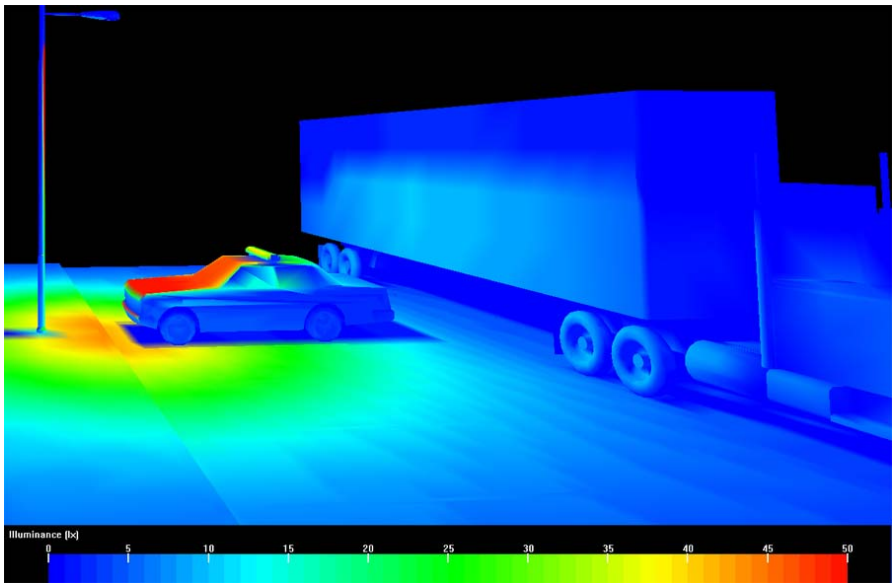
That value is obtained by computing the ratio [20,212 Scotopic lumen of Induction lamp by 14,592 lumen of HPS lamp] or in this case the Induction is 38% more visually effective per watt than HPS and or after 10,000 hours lumen depreciation this would reach larger differences which employs the rule given above as specified by the research findings. See simulation results utilizing various fixture and induction lights

	Fixture Performance	Photopic Lumens (Mean Lumens)	Scotopic/Photopic	Scotopic Lumens @ 10,000 Hours	Lumen Depreciation @ 10,000 Hours	Net Pupil Lumens @ 10,000 Hours	Net Usable Illuminance @ 10,000 Hours
HPS 250watt w/ Prismatic lens	73%	25,600	0.57	25,600 x0.57= 14,592	32%	9,721	9,721x78= 7582
EverLast 100watt Cobra w/ clear lens	94%	9,625	2.10	9,625x2.1= 20,212	14%	17,382	17,382x94= 16,339

Induction Lamp







Simulation Results using the Induction Lamps