New report on street lighting technologies available from NLPIP

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The National Lighting Product Information Program (NLPIP) released its latest Specifier Report, designed to provide objective performance information on existing street lighting technologies -- including light-emitting diode (LED), induction, and high pressure sodium (HPS) streetlights. This report comes at a critical time when many municipalities, some with funding from the American Recovery and Reinvestment Act of 2009, are in the process of replacing HPS streetlights with LED and induction models.

NLPIP, established by Rensselaer Polytechnic Institute's Lighting Research Center (LRC) in 1990, helps lighting professionals, contractors, designers, building managers, and other consumers find and effectively use efficient, quality products that meet their lighting needs.

NLPIP performed photometric evaluations of 14 streetlights that used either HPS, pulse-start metal halide (PSMH), or induction lamps, or LED modules. NLPIP analyzed the streetlights for light output and distribution, energy use, spectral effects on visual performance, discomfort glare, and economic factors. The streetlights were evaluated as part of installations that meet the lighting criteria as defined in the American National Standard Practice for Roadway Lighting, ANSI/ IESNA RP-8-00 (R2005), for a simulated one-mile stretch of collector roadway (a road servicing traffic between local and major roadways).

According to NLPIP, when replacing the pole-mounted HPS streetlights on a one-mile section of collector road with the LED or induction

streetlights used in the study, it would take twice as many of the pole-mounted LED or induction streetlights to meet the lighting criteria as defined in RP-8-00.

Complete performance results are published in Specifier Reports: Streetlights for Collector Roads, which is available online at www.lrc.rpi.edu/nlpip/publicat … ls.asp?id=927&type=1 .

"The LED and induction streetlights we tested required narrower pole spacing. As a result, the life cycle cost per mile was dominated by the installation cost of the poles, as opposed to the initial cost of the streetlights or any potential energy or maintenance cost savings, as one may assume," said Leora Radetsky, LRC lead research specialist, principal investigator and author of the report.

LED and induction technologies are often marketed as money saving alternatives to HPS, with some manufacturers claiming reductions in energy and main¬tenance costs. However, NLPIP found that the HPS and PSMH streetlights evaluated in this test provided a better cost value than the LED and induction streetlights evaluated, which would need to produce about the same street-side lumens as the HPS models to be economically competitive.

The average power demand of the LED streetlight layouts evaluated was slightly lower than the average power demand of the HPS streetlight layouts, but there was wide variation among LED models, according to NLPIP.

Mesopic Vision

The human visual system uses two types of photoreceptors, cones and rods, found in the retina. Cones are used to process visual information under daytime or "photopic" light levels, while rods work under

completely dark "scotopic" conditions. There is, however, a range of light levels called "mesopic," where both cones and rods together provide input to the visual system. Mesopic light levels are typically found outdoors at night. However, commercial photometry is based entirely upon the photopic luminous efficiency function, which considers how the eye "sees" during daylight hours. As a result, conventional photometry may misestimate the effectiveness of some light sources used in nighttime applications in terms of energy efficiency and visual performance.

NLPIP notes that, at the illuminance levels typical of collector roadways, "white light" sources such as LED streetlights could be slightly dimmed and provide equal levels of visual performance, based on mesopic photometry. However, in the collector roadway scenario used in this study, the reduced power requirement would have little impact on the life cycle cost per mile described above.

Provided by Rensselaer Polytechnic Institute