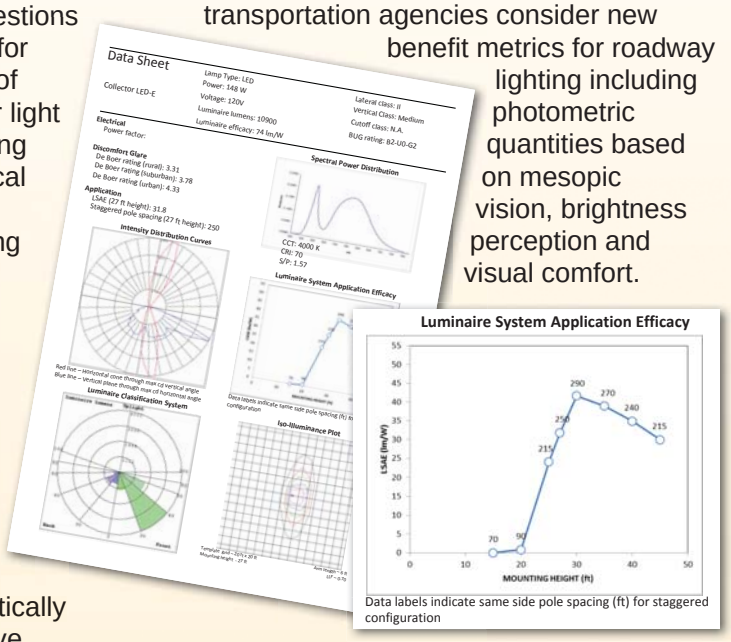
National Academies Report: New Roadway Lighting Technologies

The rapid development of lighting technologies, particularly solid-state systems using light emitting diodes (LEDs), has opened new possibilities and new questions about roadway lighting in the U.S., which for decades has been dominated by the use of high pressure sodium (HPS) lamps. Other light source technologies have also been angling for roadway market share. There is a critical need for objective technical information about new types of roadway lighting among transportation agencies. In response, the Transportation Research Board (TRB), part of the National Academies, initiated a project to evaluate new lighting technologies and identify new metrics for comparison.

A major challenge in assessing new roadway lighting technologies is that information for different systems is given in different forms, making comparisons difficult. Researchers at the LRC systematically analyzed the performance of representative luminaires of each type, and developed a consistent "data sheet" format, allowing direct comparisons. They found that many commercially available LED, ceramic metal halide, and plasma discharge roadway lighting systems can meet existing standards for lighting collector roads and freeways, achieving comparable or greater pole spacing than HPS systems and in many cases, resulting in lower energy use.

Importantly, not all systems of each type performed equally well. This underscores the importance of developing consistent data reporting formats such as those in the report.

A metric developed by the LRC, called luminaire system application efficacy (LSAE), can be used to optimize pole height and spacing to achieve optimal economic performance of different roadway lighting designs. LRC recommends that transportation agencies consider new benefit metrics for roadway lighting including photometric quantities based on mesopic vision, brightness perception and visual comfort.



The data sheets developed by the LRC show how pole spacing (data labels) and luminaire system application efficacy, or LSAE (vertical axis), are impacted by mounting height (vertical axis).

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http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-07(305)_FR.pdf

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