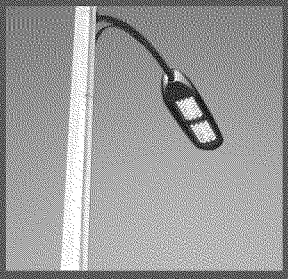
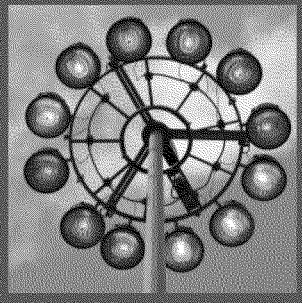
SEAD STREET LIGHTING FACT SHEET

CLEAN ENERGY MINISTERIAL
Accelerating the Transition to Clean Energy Technologies

Most Common Fixtures



Cobrahead
The most common type, mounted on an arm extending over the roadway.



High Mast
Provide uniform area lighting and have high mounting heights; typically used on highways.

Decorative
Typically used in historic and commercial areas and have less control over where the light they produce is directed.

UPGRADING STREET LIGHTS

Street lights are important for visibility and safety. But they also add to the look and feel of a community, and help municipalities and utilities save energy and money. To improve street light quality while lowering energy use and costs, consider **fixture types**, **energy consumption**, **lighting technologies** and **lighting standards**.

Fixture Types

Cobrahead fixtures are the most common type of street lights. A cobrahead fixture is mounted on an arm extending over a roadway and is designed to direct light in a specific pattern.

Decorative fixtures are typically used in historic and commercial areas for their aesthetic appeal. These typically offer less control over light direction.

High mast fixtures have high mounting heights and provide uniform area lighting. These are typically used on highways.

Light Technology

Conventional fixtures use a high pressure sodium (HPS) or metal halide (MH) bulb and a reflector to provide and distribute light.

Light emitting diodes (LEDs) have begun to gain popularity due to their potential to provide energy savings, savings in maintenance costs, and longer life cycle.

Energy Consumption

To reduce street light energy consumption, purchasers should consider proper lighting design and fixture selection. Lighting design should disperse light uniformly and ensure that target light levels are achieved but not exceeded, since over-specifying light output leads to wasted energy.

Lighting Technologies

The three main lighting technologies — HPS, MH, and LED — produce similar light output per watt of power consumption. LED fixtures offer the best control over light direction and uniformity, and as such can provide significant energy savings. Energy consumption can be reduced by selecting an appropriate fixture for the particular roadway — regardless of which lighting technology is used.

Lighting Standards

Several lighting standards provide guidance on appropriate lighting levels for various road types. The two most prominent standards cited are the American National Standard Practice for Roadway Lighting (IESNA RP-8) and the International Commission on Illumination Technical Report — Lighting of Roads for Motor and Pedestrian Traffic (CIE 115). Among other criteria, both RP-8 and CIE 115 provide recommended minimum average light levels and uniformity ratios.

SEAD STREET LIGHTING TOOL

The SEAD Street Lighting Tool is useful for municipalities seeking to upgrade or retrofit street lights. This tool provides an easy access point for the photometric analysis that is critical for achieving energy savings in street lighting designs. Unlike other professional lighting design software packages, the SEAD street lighting tool provides **three unique advantages**:

1. By combining basic **photometric analysis *with* life cycle cost and energy analysis**, the tool allows easier evaluation of fixture performance and better understanding of tradeoffs.
2. The **simple step-by-step approach** makes it quick and easy to create preliminary street lighting designs of the most common road layouts, even for novice users.
3. The ability to **analyze a large number of fixtures simultaneously** allows beginner and advanced designers alike to identify the fixtures most likely to meet desired targets.

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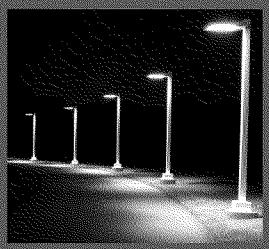
Use the SEAD Tool to:

✓ **Evaluate lighting quality**

✓ **Determine life-cycle costs**



✓ **Analyze large batches of fixtures simultaneously**

Resources

US DOE Technical Information Network for SSL

US DOE Municipal SSL Consortium

US DOE LED fact sheet

IESNA RP-8 Standard

SEAD Street Lighting Tool White Paper

LED FIXTURES

LED fixtures are quickly becoming a viable option for street lighting upgrades because of their reduced maintenance requirements, longer lifetimes, and greater energy savings potential. Since quality can vary significantly among different LED fixtures and manufacturers, it is especially important to assess manufacturer claims about fixture quality and expected life.

Expected LED Life

LEDs rarely fail outright — but their light output decays over time. Useful life for LEDs is typically defined as when light output drops to 70% of original output. LED life in excess of 50,000 hours is common. LED life is sensitive to the operating temperature of the LED junction, which is influenced by fixture design. Ask manufacturers for operating temperature data, LM-80 test results (the standard method for testing LED depreciation at different junction temperatures), and estimates of how fixture life will vary based on outdoor temperature.

Durability

Fixtures are susceptible to failure through electrical components and seals. Ask manufacturers about surge protection, water sealing and the Ingress Protection rating, and any certification or testing on the electronic components. Warranties of 3–5 years are common — be sure you are comfortable with the warranty period for your expected fixture life.

Efficiency

LEDs are incrementally more efficient than most conventional sources. The biggest energy-saving benefit comes from their ability to deliver improved uniformity, allowing designers to reduce over-lighting and lower total power use per kilometer.

Color

Current lighting standards for street lighting do not address light color temperature, but there is growing evidence that the bluer light produced by LED fixtures can produce better visibility with the same light output as standard lights. This increased visibility means that lower light levels may be acceptable to achieve the required light quality.

Simultaneous Analysis of Multiple Fixtures

In the example depicted below, over 1,000 fixtures were simulated with the SEAD Street Lighting Tool. The 126 fixtures shown in the graph met both the luminance and uniformity targets for the simulated road, but did not exceed the luminance target by more than 50%. In this instance, there is a wide range of annual energy consumption among the fixture choices – the best performing LED fixture had annual energy consumption less than 60% of the best performing HPS fixture.

In this example energy consumption ranged from 6,000 kWh/kilometer/year to 43,800 kWh/kilometer/year. Through a quick analysis, the tool provides a valuable indicator of which fixtures will provide the best lighting and energy performance.