Residential LED Street Lights

Purchasing Green

In 2009, the City of Portland's Bureau of Transportation's Traffic Signals and Street Lighting Division began replacing the City's existing street lighting technology – high pressure sodium (HPS) residential street lights – with light emitting diode (LED) street lights. After issuing an invitation to bid (ITB), the City procured Leotek's ECobra-head LED Roadway Luminaires.

PBOT purchased the Leotek ECobra LED roadway luminaire to replace high pressure sodium residential street lights throughout the City.

To date, more than 500 light fixtures have been replaced, and the City will begin replacing all residential street lights over the course of the next three-to-five years. Currently, the HPS bulbs need to be replaced every five years and are replaced as part of a five year group replacement plan. Moving forward, as bulbs are scheduled to be replaced, the entire fixture will be replaced with the ECobra-heads LED fixtures instead. The City has over 54,000 street lights and the replacement will focus first on residential roadway lights, with the ornamental street lights being replaced last.

Benefits

The City of Portland's Energy Policy requires investing in energy efficient technologies that have a ten year or less return-on-investment (ROI) period. The Traffic Signal and Street Lighting Division estimates that replacing the City's existing residential lighting technology with LEDs will have a three-to-ten year ROI depending on the number of fixtures in a neighborhood and the cost of the fixtures at the time of replacement.

The City identified several other benefits beyond a quick ROI. The LEDs have better, broad spectrum lighting than traditional HPS cobra head-style street lights, which dump too much yellow light near the pole and spill excessive light behind the poles into neighboring yards and windows. LEDs have better distribution of light, which eliminates dark spots between the light poles and substantially reduces wasteful dumps of light directly below the street lights. And because the lighting generated from LEDs is more uniform white light, it enhances roadway visibility, while simultaneously minimizing direct uplighting from the luminary and reflected light from the roadway (which contributes to urban sky glow, or light pollution).

Moreover, less light is wasted, so there is less wasted energy. The City estimates the LED lights will result in savings of about 18 million kilowatt hours annually, which translates to a 40-60 percent energy savings, once all lights are replaced.

One of the biggest benefits the Traffic Signals and Street Lighting Division will see will be reduced maintenance costs. Because the LED lights last up to 100,000 hours (24 years), the City will no longer have to replace bulbs on a five-year rotating schedule. And when the LED fixtures do require service, the design

At a glance –

Who –

- **PBOT's Traffic Signals & Street Lighting Division**

Product –

- **Leotek ECobra-head LED Roadway Luminaires**

Cost –

- **$155/fixture**

Benefits –

- **Long product life**
- **Reduces maintenance costs**
- **Reduces energy costs**
- **Improves lighting quality**

"Energy efficient, low maintenance, great street lighting technology. We're looking forward to implementing these fixtures city-wide."

Tod Rosinbum,
Senior Engineer,
City of Portland Bureau of Transportation

of the light head allows for entry to the luminaire for maintenance without the use of any tools.

Cost

The cost of LED fixtures has dropped considerably over the last decade. In 2000, a typical residential LED fixture cost about $450. Today, they run closer to $155. As these lights become the technology of choice for street lighting, costs are expected to continue to decrease.

By comparison, HPS replacement costs are in the vicinity of $110. Though the LEDs are still more costly to install compared to the existing technology, the City expects to see a 75 percent reduction in maintenance costs over the life of the LEDs.

Performance

The City has had a failure rate of less than 0.5 percent with the ECobra LED residential street lights, and are quite pleased with their performance and energy savings. The ornamental street light technology is not quite as far along as the ECobra lighting technology, which is part of the reason the City is addressing the replacement of the ornamental street lights last.

Lessons Learned

The City noted two very important lessons learned from the demonstration project. One is the importance of having good specifications for your solicitation document to ensure you get the best product. The Traffic Signals and Street Lighting Division recommends the Department of Energy's Municipal Solid-State Street Light Consortium as a resource, particularly their model specifications. The City relied on these specifications for its invitation to bid (ITB), with some modifications for the local requirements, and would recommend anyone interested in purchasing LED street lights to review the MSSLC's website for more information.

The City also recommends working with other regional partners, such as neighboring cities and counties in the area. The City's purchasing contract allows for cooperative purchasing, so the communities surrounding Portland are able to purchase the LED lights at the same discounted rate. The City of Portland's ITB required the replacement of over 44,000 lights – so if you are a smaller community, developing a regional partnership for the procurement of the lights could help increase the number of lights purchased and drive the price down as well.

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About Portland Bureau of Transportation (PBOT)

The Bureau of Transportation maintains the $8.4 billion investments in infrastructure facilities from streets and structures to traffic signals and street lights. PBOT is a community partner in shaping a livable city. We plan, build, manage and maintain an effective and safe transportation system that provides people and businesses access and mobility. We keep Portland moving.

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