City of Portland Green Purchasing Case Study

Residential LED Street Lights

Purchasing Green

In 2009, the City of Portland's Bureau of Transportation's (PBOT) Traffic Signals and Street Lighting Division, in partnership with the U.S. Department of Energy's Municipal Solid-State Lighting Consortium, began pilot testing light emitting diode (LED) street lights as a replacement for high pressure sodium (HPS) residential street lights. Based on their positive experience with LEDs, in April 2013 the City moved ahead with plans to completely convert 45,000 cobra-head fixtures to Leotek's ECobra-head LED Roadway Luminaires. As of autumn 2018, about 98 percent of the City's street lights now feature LEDs, with the remaining lights expected to be installed in 2019.

LED street lighting is becoming more commonplace, especially as prices for the new technology decrease. In addition to Portland, early adopters include Los Angeles, Seattle, and Boston.

Benefits

LEDs provide better lighting than traditional HPS street lights. The old street lights dumped too much yellow light near the pole and spilled excessive light behind the pole into neighboring yards and windows. LEDs have better distribution of light, eliminating dark spots between light poles and substantially reducing 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 luminaire and reflected light from the roadway, which contributes to urban sky glow, or light pollution.

Energy savings from switching to LEDs is also considerable. The new lights draw 29W, representing a 75 percent reduction in power use over the City's previous 118W lights. Lights on collector and aerial roadways represent a 64 percent power reduction.

One of the biggest benefits of the new lighting is 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, as was the practice with HPS lights. When the LED fixtures do require service, crews report that it is quick and easy. A crew member can access the light head without the use of any tools and replace a light in only 15 minutes.

Cost

The cost of LED fixtures has dropped considerably over the last 15 years. In 2000, each of the ECobra fixtures cost about $500. Today, they are $124. As these lights become the technology of choice for street lighting, costs are expected to continue to decrease.

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

At a glance –

Who –

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

Product –

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

Cost –

- **$124/fixture**

Benefits –

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

"Energy efficient, low maintenance, great street lighting technology."

Tod Rosinbum, Senior Engineer (retired), City of Portland Bureau of Transportation

By comparison, HPS lights cost about $110. However, because LEDs last longer and are easier to service, the City projects a 75 percent reduction in maintenance costs over the life of the LEDs.

PBOT estimates that replacing the City's residential lighting technology with LEDs will have an eight year return on investment. Furthermore, after the initial investment is repaid PBOT can apply any savings (estimated at $2 million) from its annual budget of $7 million for operating the street light system toward other projects, such as system maintenance and future pole and circuit replacement.

Performance

Initially, the City did receive some complaints from residents that the lights were too bright. The ECobra LED lights have three output levels – 3,000 lumens, 4,100 lumens, and 5,000 lumens drawing 29W, 42W, and 54W respectively. PBOT now sets all residential units at the lowest output level.

Overall, the LEDs are performing extremely well and have a low failure rate of less than 0.5 percent.

Lessons Learned

PBOT notes two important lessons learned from the demonstration project. First, it is important to have good specifications for your solicitation document to ensure you get the best product. PBOT highly 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 local requirements.

Second, PBOT encourages working with other regional partners, such as neighboring cities and counties. The City's LED street lights contract allows for cooperative purchasing, so communities surrounding Portland are able to purchase LED street lights at the same discounted rate. The City of Portland's ITB required the replacement of over 45,000 lights – so if you are a smaller community, developing a regional partnership can increase the number of units purchased, driving down the price.

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About Portland Bureau of Transportation (PBOT)

The Bureau of Transportation maintains the $13 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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