LED STREETLIGHT RETROFITS

Texas City Efficiency Leadership Council Best Practice

El Paso: LED Streetlight Retrofits

Contact Person: Larry Nichols, nicholslf@elpasotexas.gov

Project Description

Airline passengers flying at night across the United States have probably started to notice that city lights are changing from a yellow hue to daylight blue. This change in color is occurring due to massive streetlight retrofits in urban areas across the nation.

More than a dozen large-to-mid-size cities have retrofitted, or are in the process of retrofitting, their standard, high-energy-consuming streetlights – typically high-pressure sodium lamps – with new, more efficient LEDs (light-emitting diode). Consequently, more than 600,000 streetlights will be replaced, reducing electricity consumption by more than 198 million kilowatt hours (kWh) and greenhouse gas emissions by approximately 126,000 tons of carbon dioxide equivalent. Some of the cities that have taken on large-scale retrofits include Los Angeles, Houston, Atlanta, Austin, Baltimore, Boise, Chicago, Dallas, Seattle and Washington, D.C.

Texas has been active in this arena as most of the state's large cities are engaged in streetlight retrofits. For example, the City of Houston was the latest to announce its initiative and will soon begin a five-year program to replace all 164,000 of its streetlights. Once complete, the project is expected to save about 54 million kWh per year at a savings of $2.7 million annually.

The City of El Paso undertook a large-scale energy efficiency effort in 2008. In the ensuing five years, the project has completed eight phases of retrofits of traffic lights, streetlights and municipal building lighting. To date, the city has replaced 8,200 streetlights in two phases; a third phase launched in August 2014 will replace an additional 10,600 streetlights. This phase will largely upgrade city-owned streetlights.

The city has replaced both its standard and decorative streetlights. The latter, located downtown, are green cast aluminum, antique-style fixtures. The city worked with the downtown improvement district and the tax increment reinvestment zone (TIRZ) to fund the upgrade. The TIRZ contributed $1.4 million to the project. The remaining financing came from the LoanSTAR revolving loan program through the Texas Comptroller's State Energy Conservation Office (SECO).

SETTING THE STANDARDS

With the growth of the light-emitting diode (LED) industry comes a large number of market entrants claiming high lamp quality and long life. There are a variety of ways to verify these claims. When purchasing LED streetlamps it is important to verify that they satisfy industry standard testing method IES LM-79-2008. The U.S. Energy Department's Municipal Solid-State Lighting Consortium is another great resource for determining lighting quality and learning more about strategies for and financing of LED streetlight installation.

In all of its streetlighting projects, the city is realizing additional savings by taking over the maintenance of the new streetlights from El Paso Electric Company. The city believes it can maintain the lights at a cost lower than the utility's, anticipating savings from modifying the utility's standard fixed monthly fee.

Impetus for Implementing LED Streetlight Retrofits

The primary motivation for the city-wide energy efficiency project was mostly the desire to reduce operating and maintenance costs. Further, upon assessing its utility charges and expenses the city discovered that more than 45 percent of its $700,000 monthly electricity bill was exclusively paying to power its streetlights. With the advances in LED technology and the rapid reduction in LED purchase prices, the city saw the streetlighting retrofit as a great opportunity to quickly lower its power costs.

The second motivating factor was Texas Senate Bill (SB) 898. Starting in 2011, it mandated 5 percent reductions in electricity usage over each of the next 10 years by all political subdivisions located in the 41 national ambient air quality standards (NAAQS) non-attainment or near non-attainment counties. Senate Bill 898 is a continuation of SB 12, passed in 2007, and SB 5, passed in 2001. That previous legislation set emission reduction standards and requirements for the state's political jurisdictions.

RETROFIT PROJECT COST-BENEFIT ANALYSIS

PROJECT	COST ($ MILLIONS)	ANNUAL SAVINGS		SIMPLE PAYBACK (YEARS)
		ENERGY (KWH)	COSTS ($)	
Traffic Lights 6,600 lights retrofitted from incandescent to LED	2.98	9,888,132	642,192	4.6
Streetlights, Phase 1 7,300 lights converted	7.8	5,553,177	830,225	9.4
Downtown Lights Retrofit 920 decorative antique-style lights replaced	1.5	410,710	107,118	14
Streetlights, Phase 2 10,600 streetlights converted	7.5	5,428,670	838,795	8.9

Benefits of Retrofitting

The City of El Paso anticipates significant savings in both energy consumption and expenditures when all planned phases of the project are complete. The city expects to save 21 million kWh and $2.4 million per year. The average lifespan of the lights is approximately 15 years which will significantly reduce the city's maintenance costs as well. The table above displays costs and savings for each project including the city's 6,600-traffic-light retrofit.

Challenges Faced and Addressed

The primary challenge confronting the city was an incomplete inventory of the number or type of streetlights in its portfolio. Without this data, the city did not know who owned what lamps, making it difficult to conduct a lighting assessment.[1] Further, absent a valid accounting, the utility was billing the city based on an estimated number of streetlights. To fill this information vacuum, the city hired a contractor to map and classify its streetlight inventory, including each light's height, wattage and owner. Through this process, staff learned that the city had 28,000 streetlights – 3,000 more than what the utility had estimated.

The second challenge was negotiating a new streetlight tariff to reflect the savings from the LEDs. Streetlights in El Paso, as in many cities, are not metered; the city is charged a flat rate based on the wattage of the lamp. A retrofit from a 200-watt, high-pressure sodium or metal halide lamp to a 100-watt LED is a significant reduction in watts per lamp.[2] It has taken considerable time to establish and publish a new rate reflecting this shift in lamp size. Due to the length of the process, the new rate was not in place when the lights were installed.[3] The city had to continue paying the prior rate until El Paso Electric determined a new rate and the Public Utility Commission approved a new rate schedule through a rate case filing.

Upon approval of the new rate, El Paso Electric began applying the LED rate to streetlights for which it had been charging the city at the prior rate. The utility is still in the process of applying the new rate structure to 2,300 of the original 7,300 streetlights. The changeover was delayed, however, in order to confirm ownership of the poles. That issue has now been resolved, and the lower rate continues to be applied to new lights.

A NEW TARIFF IN TOWN

Streetlights typically are not metered. Therefore, charges for electricity consumed by a streetlight largely are calculated based on the wattage of the lamp. This translates into a flat monthly fee assessed per streetlight.

When installing new LED streetlights or replacing high-pressure sodium or metal halide streetlights, it is important to negotiate a new streetlighting service rate reflecting the reduced electricity consumption of the more energy-efficient LEDs.

Learn more about EL Paso's new LED service rates.

Description of the Retrofit Process

Motivated by the desire to reduce operating costs, as well as to comply with state law, the City of El Paso began the process of implementing a comprehensive, energy- efficient lighting strategy. To manage the program more effectively, the city determined that the best approach would be to contract with an energy service company (ESCO). The ESCO is responsible for providing turn-key retrofitting of the streetlighting as well as energy efficiency upgrades for traffic lights and municipal buildings.

How El Paso's Retrofit Process Worked

Upon selection of the ESCO, and with the approval of the City Council, city staff and the ESCO proceeded to identify and evaluate prospective projects. Their approach was to assess those projects affording the greatest benefit early on, so that the savings would foster additional efforts going forward. This strategy was termed "*the firstest with the mostest.*" The outcome of this assessment was a phased approach that included both streetlight and building retrofits.

Upon finalizing the project plan for Phase 1, the city applied for and obtained funding from SECO's LoanSTAR program. El Paso is repaying a low-interest loan with the energy cost savings derived from the retrofitting projects.

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1 In El Paso, either the city or the utility own the streetlights; neither entity owns all of them.

2 Less electricity consumption by the new LEDs means less power to be generated and used per streetlight. This change should be reflected in a lower rate charged per light.

3 The prior rate was flat based on lamp size/wattage. New rates average 15-20 percent less than the prior rate.

STEPS TO RETROFIT PROCESS

Energy service company chosen with competitive bid

Project identification – firstest with the mostest – LED Streetlight Retrofit

Secured funding through SECO LoanSTAR

Negotiated new tariff rate with El Paso Electric

Implemented project with ESCO

Project closeout with inspection

Simultaneous with securing the project funding, the city negotiated a lower streetlighting tariff with El Paso Electric. The new rate resulted in a 15-30 percent reduction in the rate charged per light for LEDs versus the mercury vapor and high-pressure sodium lamps previously in use. The city was able to lower its costs further by assuming responsibility for the operation and maintenance of the streetlights. Doing so is saving the city approximately $30,000 a month.

The city also has been able to develop an additional revenue stream from the old light fixtures. With council approval, the General Services Department held a pre-construction conference and began the resale project. The fixtures are sold at auction through GovDeals – four fixtures per pallet at $100 to $180 per pallet.

Phase 1 of the energy efficiency project spanned about 270 days from start-up through close-out. Subsequent phases followed a similar procedure excluding the ESCO selection and tariff negotiation. The same ESCO will be used for all phases of the project. The newly negotiated rate with El Paso Electric applies to all the streetlight retrofits in each additional phase. The rate will be adjusted as old lamps are replaced with LEDs.

Ongoing Efforts

In early June 2014, the City Council authorized spending $7.5 million to replace another 10,600 streetlights. This project will begin in August of 2014 and is expected to last 12-14 months. Upon completion, a total of 18,000 of the city's 28,000 streetlights will have been retrofitted.