



TRAFFIC PLANNING AND DESIGN INC.

WWW.TRAFFICPD.COM

LED Street Lighting and Retrofitting Municipalities

Prepared by: Frank G. Falzone Jr., P.E.

Prepared on: June 5, 2015

Originally published in the July 2015 issue of the [BCATO Monthly eNewsletter](#)



Photo credit:

<http://pressroom.gelighting.com/news/pennsylvania-town-finds-40-000-savings-and-cash-flow-positive-financing-in-ge-led-street-lighting-solution#.VXG9HmfbK70>

Street lighting can encompass a substantial share of a Municipality's budget with electricity bills and maintenance costs. With costs increasing, many Municipalities are looking at replacing existing street lighting fixtures and equipment with newer, more energy efficient technologies. Retrofitting provides a great opportunity for Municipalities to reduce their energy bills and maintenance costs while enhancing the overall performance and efficiency of their lighting system. Newer technologies, such as light-emitting diodes (LEDs) and wireless control/monitoring systems, have presented Municipalities with a variety of opportunities for high quality, cost-effective lighting solutions. These technologies offer superior efficiency and control with more appealing light than high-intensity discharge (HID) technologies.

The primary appeal of LED street lighting is energy efficiency compared to HID fixtures. LED street lights use 40-80% less electricity than HID fixtures. Properly designed LED street lighting systems can provide the required roadway illuminance and improved uniformity using less energy, compared to HID sources.

LED street lights are also easily controllable with intelligent monitoring systems. Typical manufacturer monitoring systems allow for potential added energy savings, electrical usage monitoring, and streamlined maintenance programs for Municipalities.

Pros and Cons of LED vs. HID

Category	HID	LED
Durability	Fragile	Heavy-Duty

Lifetime	15,000-25,000 hrs	100,000 hrs
Light Output Reduction over fixture life	Moderately High	Low
Performance	Warm-Up Time Required	InstantaOn
Controllable (i.e. dimming)	No	Yes
Warranty	Usually 1-2 yrs	Up to 10 yrs
Cost	Lower upfront cost, requires high maintenance	High upfront cost, very low maintenance cost

When municipalities chose to convert existing HID street lighting inventory to LED, they have the potential to provide improved outdoor lighting quality and reduce energy consumption and maintenance costs.

Municipality Street Lighting Retrofit

There can be some significant obstacles to an LED street lighting conversion project, most notably the capital costs involved, and the minimal reduction in overall energy bills due to street light tariffs already in place. Each Municipality should be aware of those financial classifications where costs will remain the same (energy tariffs and purchasing) and those which will be reduced (maintenance and energy consumption). Upon installation of the LED fixtures for the Pilot or complete Project, the Municipality may be eligible for various rebates from Utility Companies and State or Federal Programs.

Once a Municipality has decided that LED retrofitting makes sense and are prepared to move forward, a preliminary project schedule is summarized below.

Project Scope Definition

It may be more economical to convert all of a Municipality's street lights in one phase, or within strategically defined sub-phases. However, a Municipality may be more comfortable implementing a Pilot Project to evaluate the LED street lights in smaller quantity

to then determine if a complete retrofit is desired.

Likewise, before the project scope can be finalized, the Municipality should determine if a simple luminaire replacement, or if a more elaborate, wireless streetlighting monitoring system implementation is preferred.

Project Financial Resources

Municipalities should consider funding sources early in the project schedule, especially since the initial cost of LED street lights is considerably higher than HID lights. The several options of funding to be considered are: Municipal Budget Funding, State and Federal Government Programs, Utility Rebate Programs, Energy Saving Contractors (ESCO's), and Manufacturer Financing Programs.

The Delaware Valley Regional Planning Commission (DVRPC) is currently preparing a Regional Street Lighting Procurement Program (RSLPP) to aid municipalities with retrofitting to LED street lights. Through the RSLPP, DVRPC is working with municipalities in Bucks, Chester, Delaware, and Montgomery counties to assemble the resources needed to design, procure, and finance the transition to LED street lighting tailored to each municipality's specific needs.

Municipalities participating in the RSLPP will have access to resources that enable a thoughtful design and retrofit entire streetlight systems. The program leverages the Pennsylvania Sustainable Energy Finance (PennSEF) program, which facilitates the cost-effective and technically-sound advancement of energy performance contracting and provides access to low-interest energy efficiency financing backed by the PA Treasury. The energy performance contracts developed through this program must provide an energy savings guarantee whereby the energy cost savings will exceed the financing costs for each participant.

All municipalities in Bucks, Chester, Delaware, and Montgomery Counties are invited to take

advantage of this opportunity. Those interested in participating should contact Liz Compitello, Senior Research Analyst in the Office of Energy and Climate Change Initiatives, at ecompitello@dvrpc.org or 215-238-2897.

Project Financial Analysis

Completion of a Municipality-wide street lighting audit to determine the inventory is followed by mathematical analysis to determine a simple financial payback timeframe for investment. This preliminary analysis can be accomplished fairly quickly and can provide adequate information needed by the Municipality to determine if the retrofitting is feasible.

Project Goods Purchasing

There are a few methods for purchasing LED fixtures for a retrofit project. The first method is that the Municipality will directly purchase the LED fixtures and have their Public Works Department or an outside contractor install. The second method is a "turnkey solution" that may be offered by ESCO's; this method involves a singular contractor to provide the financing and installation of the LED fixtures.

Project Request for Proposal, Evaluation, and Award

The Municipality should prepare a request for proposal (RFP) for the chosen LED fixture and, if preferred, control system specification. Once the RFP has been advertised and bidders have submitted proposals, the Municipality should evaluate each proposal based on the criteria laid out in the RFP, followed by awarding of the project.

Project Execution

Through pre-construction coordination, the retrofitting project installation is completed and the optional monitoring system is commenced.

Post-Project Municipality Maintenance Program

The Municipality's Public Works Department should develop an updated maintenance program for the new LED fixtures, since

reduction in maintenance is a major benefit of the retrofit.

Municipality Standards Update

The Municipality should update all street lighting ordinances and standards to specify the new LED fixtures and monitoring system.

For assistance with street lighting design or developing a scope of work, please contact Frank G. Falzone Jr., P.E. of Traffic Planning and Design, Inc. (TPD) at ffalzone@trafficpd.com or 610-326-3100.

About the Author

Frank G. Falzone Jr., P.E. has over 10 years of transportation engineering design experience and serves as a Project Manager and Engineer for TPD's Private Design Team. His responsibilities include the preparation of highway design projects that include horizontal and vertical alignments, grading plans, alternative layouts, traffic control plans, street lighting, stormwater management plans and studies, and quality control for submissions to PennDOT. Frank has worked on many PennDOT design projects and serves as a municipal street lighting engineer, reviewing streetlighting designs for Bensalem Township in Bucks County and Montgomery Township in Montgomery County.