Project 15-7:
LED Street Lighting Analysis and Tool

Final Report: May 2015; available online @ www.dstar.org

Project Summary:

The relatively new LED lighting technology used for street lighting offers a number of advantages over conventional lighting technologies, such as (1) longer lifetime, (2) higher energy efficiency, and (3) more flexibility in designing lamps that offer beneficial light characteristics (color temperature that is pleasing to pedestrians, light that increases color contrast of objects thereby improving safety to pedestrians and vehicle users, etc.). In addition to the performance advantages, the relatively high purchase costs of LED products is decreasing thereby further paving the road for widespread deployment of LED lighting.

DSTAR has identified a need to address the challenges faced by utilities in assessing available test data and characteristics of LED street lighting systems relative to deployment specific conditions. The initial phase, Phase I, documented in the P15-7 report focuses on the development of a calculation tool to assess lifecycle costs associated with LED street lighting installations. The LED lighting vendor-provided parameters that are used as input to the calculator, such as lamp life and light performance metrics are taken at "face value", even though there is uncertainty in the quality of available vendor data and the consistency in the methods used to obtain and report the data. Another objective accomplished in Phase I was to engage DSTAR members to identify their specific challenges they have to face when evaluating and designing street lighting with LEDs. The report (1) documents the results of Phase I, (2) provides some results of our initial literature search on the subject, which will be deepened in the future proposed research, and (3) describes the proposed two future research in detail.

The calculation tool to assess lifecycle costs associated with LED street lighting installations was developed in MS Excel and is document in the appendix of the P15-7 report. The purpose of this tool is to facilitate a direct comparison of two lamp products (e.g., existing lamp and replacement lamp), for two job types (i.e. 'New Installation' or 'Retrofit'). A typical scenario for a 'New Installation' application is a comparison of two lamp products that are considered for a new street light project. A typical scenario for a 'Retrofit' application would be to compare street lighting that is currently installed with lighting that is selected as a candidate to replace the existing lamp. In this scenario, the initial purchase cost of the replacement lamps are accounted for while no initial purchase is needed for the existing lamps (they are only replaced at their end-of-life).

<u>**Who Should Use:**</u>

Distribution Planning Engineers, Lighting Engineers, Designers

<u>LED Street Lighting Lifecycle Cost Comparison Tool:</u>

The tool was developed in Microsoft Excel 2013 as a spreadsheet calculator and requires Microsoft Excel 2007 or later to run. The spreadsheet calculator comprises the following five sheets: (1) 'Main', (2) 'Presets', (3) 'Lamps', (4) 'Results', and (5) 'Assumptions'. Most of the user-specifiable parameters as well as graphs illustrating the results of the analysis reside in the 'Main' sheet, as shown in the figure below.
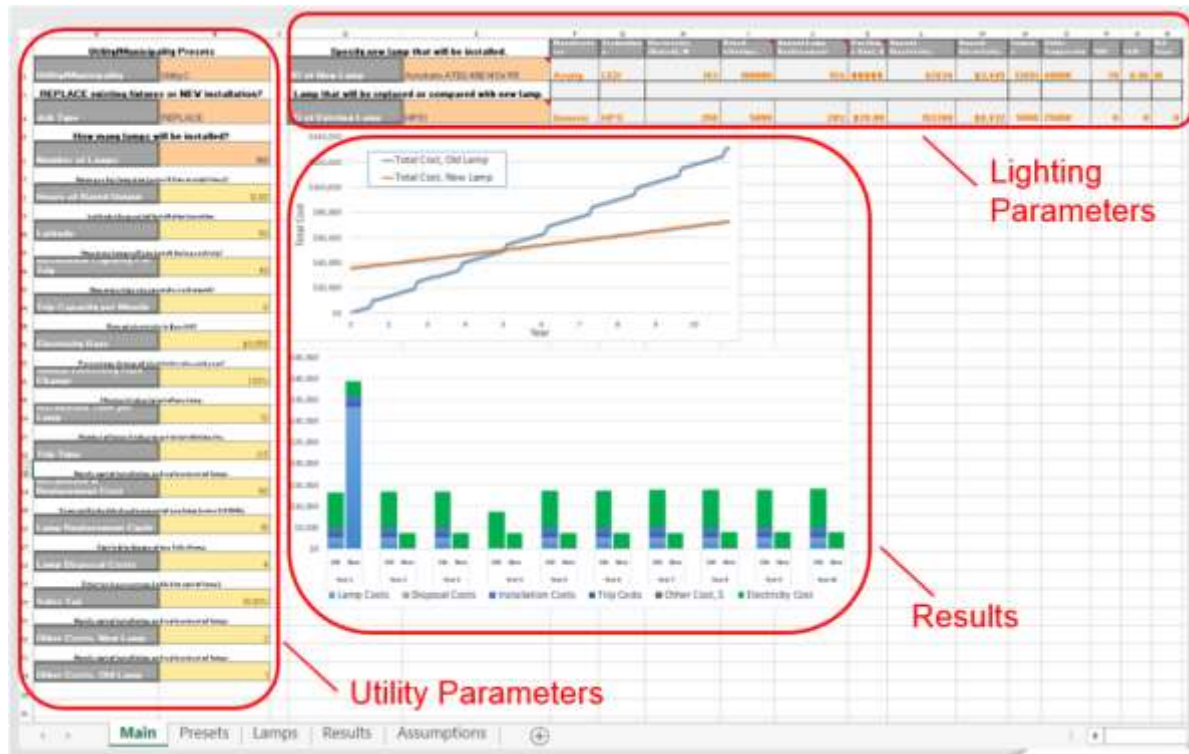
For the complete DSTAR Project 15-7: LED Street Lighting Analysis and Tool Final Report, visit www.dstar.org.

LAVELLE FREEMAN
GE Energy Consulting
Technical Director
DSTAR Program Manager

GE Power
1 River Road
Schenectady, NY 12345
(518) 385-3335

CONTACT ME
Lavelle.Freeman@ge.com