



Client:.....City of Los Angeles (“the City”)
 Project:.....Replacement of 140,000 city street light fixtures with LED fixtures, and installation of remote monitoring system
 Lead Agency:.....Los Angeles Bureau of Street Lighting
 Estimated Total Project Cost:.....\$57 million

Projected Annual Energy & Maintenance Savings (Post Retrofit):...\$10 million
 Projected Annual Energy Savings (Post Retrofit):.....68,640,000 kWh/year
 Projected Annual CO2 savings:.....40,500t / CO₂ /year
 Installation Timeline:.....5 years
 Expected Payback:.....7 years

SYSTEM DESCRIPTION

- The City’s street lighting system is owned and maintained by the Los Angeles Bureau of Street Lighting — part of the Los Angeles Department of Public Works. With over 209,000 street lights in its control, the City boasts the second largest municipally-owned street lighting system in the United States. The Los Angeles Bureau of Street Lighting was established in 1925; today it employs 250 people.
- The Los Angeles Bureau of Street Lighting pays a variable rate per fixture to the Los Angeles Department of Water and Power, the municipal utility company. Rates for street light fixtures are calculated by the Department of Water and Power depending upon real kWh draw of that fixture.
- The City’s residents pay the Los Angeles Bureau of Street Lighting for street lighting service through an annual tax assessment.
- The City has accrued vast fixture testing experience via its New Technology Group.

TECHNOLOGIES

- LED
 - An LED (light-emitting diode) is a semiconductor light source that generates light at a precise wavelength when a current is applied; multiple LEDs are networked together in a single fixture to in combination generate the appropriate light output for each particular application. In recent years LEDs have begun to penetrate the street and area lighting market; rapid improvement in the efficacy of white-light LEDs, innovations in fixture design — particularly optical efficiency and thermal management — and extended fixture warranties have together contributed to this market growth. Many modern LED fixtures boast warranty lifetimes of 50,000 hours, or almost 11.5 years when operated 12 hours per night. Unlike all other street lighting technologies save incandescent, LED fixtures contain no mercury.
- Remote Monitoring System
 - A remote monitoring system collects and centrally reports real-time performance data for each fixture outfitted with the technology. Equipment failures are tracked, logged and synchronized with the Bureau’s maintenance work orders. As part of the fixture performance data the monitoring system will return the measured kilowatt-hour usage for each fixture.

PROJECT CHALLENGES

- The City needed to quantify the potential cost and savings for a project, already having tested and been convinced of the efficacy of LED technology.
- The City needed to assess alternative financing mechanisms with a specific focus on energy savings due to its already-burdened balance sheet.
- The City needed to coordinate several city agencies — the Los Angeles Bureau of Street Lighting, the Los Angeles Department of Water and Power, and the Los Angeles Mayor’s Office — to organize the project.
- The City needed to vet its internal projections of retrofit project economics.
- The City needed to continue its rollout of a remote monitoring system to measure and verify fixture energy consumption and performance.
- The City requested CCI assistance to address these Project Challenges.

FINANCING OUTCOME

- The measurable cost savings, the long equipment life, the positive relationship with the City, and the awareness that this is the first of many future domestic and global opportunities, stimulated significant interest from Financial Institutions (FIs).
- CCI successfully solicited proposals, on behalf of the City, from a series of FIs. The proposals outlined a range of ideas from basic tax-exempt leasing to non-recourse debt/equity structures focused solely on energy and maintenance savings and carbon credits were also discussed though not formally proposed.
- The depth of informal finance proposals validated to the City that this project was a meaningful use of funds. The City will secure a 7-year, \$40MM loan for the project; the Department of Water & Power will contribute a rebate of \$0.24 per kWh reduced by the project, totaling \$16.4MM. The Bureau of Street Lighting will directly contribute \$3.5MM at the onset, too.

PROJECT OUTCOME

- In October 2008, Los Angeles' Mayor Villaraigosa approved the retrofit project, allowing the Los Angeles Bureau of Street Lighting to commence formal rollout by means of internal funding.
- In November 2008, the City apprised prospective LED street light fixture manufacturers of a two-month final product evaluation, to occur during January and February 2009, during which it would verify its prior pilot testing and identify the LED products to be used for the first wave of installation. These manufacturers were invited to send 3 to 4 fixtures for testing to the Bureau of Street Lighting at no cost or significantly reduced cost to the City.
- The project will be executed from 2009 to 2013 in five discrete yearlong phases:
 - Year 1 will begin in July 2009 and encompass 20,000 fixtures.
 - Years 2 thru 5 will each encompass 30,000 fixtures, totaling 140,000 fixtures. The Los Angeles Bureau of Street Lighting will carry out all work for both the Pilot Project and the Full Retrofit.
- Due to the rapid evolution of LED fixtures, for each yearlong project phase the City will reevaluate LED products on the market to determine which products it should install; this affords the City an enviable flexibility in its product selection process.
- The City will dramatically reduce its street lighting maintenance costs due to the long life of LED fixtures.
- The City will install remote monitoring devices on each of its 140,000 new street lights, allowing the Los Angeles Bureau of Street Lighting to collect real-time data on its system performance at the fixture level. The City will be able to centrally monitor its street light network, verifying energy savings and performance of new LED fixtures, and optimizing equipment maintenance.

KEY PROJECT DEVELOPMENT STEPS

- To analyze the feasibility of a retrofit project, CCI and the City undertook these key project development steps:
 - Conduct Economic Analysis to produce information for Financing Analysis based on system data, including:
 - Total installed streetlights to be replaced
 - Cost per street light for new equipment
 - Cost per street light for operation and maintenance (\$)
 - Useful life of old and new equipment (years)
 - Solicit Financing Proposals by communicating:
 - Total project size (\$ US; generated from Economic Analysis)
 - "Cash Flows" produced from energy and maintenance savings (\$ US; generated from Economic Analysis)
 - Current Funds Flows within existing system (how are payments made for street lighting between the customers, the city and the utility)
 - Primary financing objectives for City (pricing vs. structure or both)
 - Preferred financing structure(s) (In this case, proposals needed to focus on energy savings)
 - Required financing term (years)
 - Timeline and deadline for financing proposals
- Based on the economic analysis and financing proposals, the City could develop a Business Case for the project.