

# PROVEN DELIVERY MODELS FOR LED PUBLIC LIGHTING

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## Six Unique Case Studies Illustrating Challenges and Solutions in Implementing LED Lighting Programs

LED lighting has several advantages when compared to alternative forms of public lighting. For instance, its electricity consumption costs tends to be 40 to 60 percent lower than those of existing lighting technologies. Operation and maintenance costs tend to be lower as well because LED luminaires last at least four times longer than traditional luminaires. Additionally, the quality of LED light is better, enabling economic growth by fostering business activity; improving safety by reducing crime and traffic accidents; and enhancing city aesthetics by accenting monuments, fountains, and landmarks. Most public lighting is concentrated in cities, where it can constitute up to 65 percent of municipal electricity budgets; thus LED public lighting can potentially help lower electricity consumption costs.

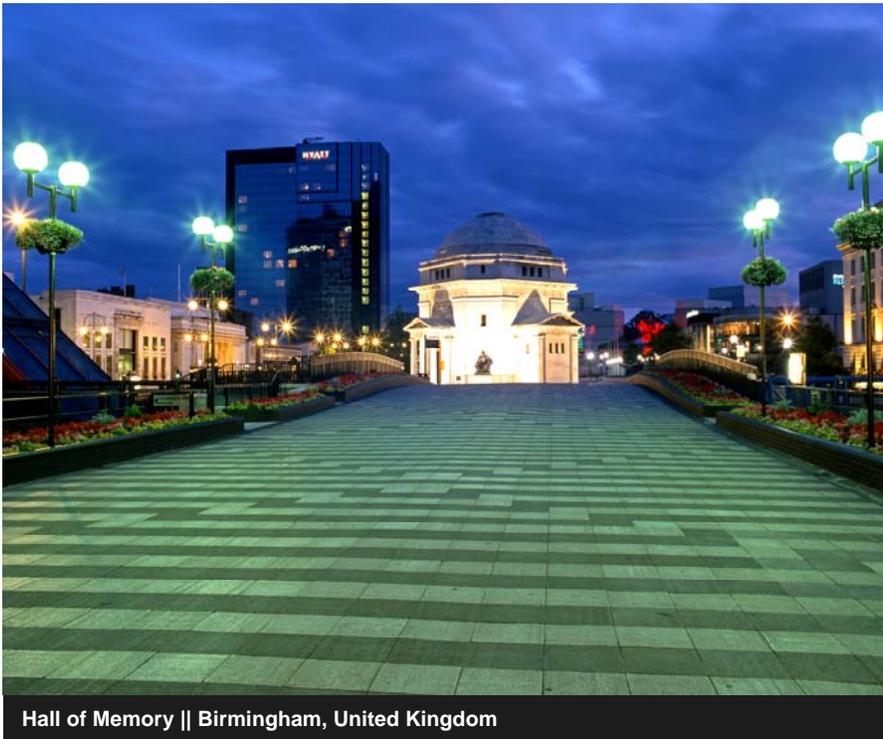
However, the cost of LED public lighting is still higher than that of traditional lighting options. LED luminaires are also fairly new; hence they are perceived as risky. As a result, risk-averse local governments have been hesitant to adopt the technology. This series of case studies documents six proven delivery models for LED public lighting in an attempt to help cities work through the challenges associated with implementing LED lighting programs.

*LED public lighting can be a cost effective option for cities while providing better lighting service over the lifetime of the investment.*



High-Pressure vs. LED lighting || London, Ontario

- Public lighting costs can constitute up to 65% of municipal electricity budgets
- LEDs consume 40 to 60% less electricity while providing better quality lighting



Hall of Memory || Birmingham, United Kingdom

## About ESMAP

The Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance program administered by the World Bank. It provides analytical and advisory services to low- and middle-income countries to increase their know-how and institutional capacity to achieve environmentally sustainable energy solutions for poverty reduction and economic growth. ESMAP is funded by Australia, Austria, Denmark, Finland, France, Germany, Iceland, Lithuania, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom, as well as the World Bank.

## A Synthesis of Six Case Studies

The synthesis report summarizes the crosscutting findings from the six case studies which document real-life experiences, challenges, and solutions encountered in implementing different LED lighting delivery models—super-ESCO, joint procurement, public-private partnership, ESCO, lease-to-own, and municipal financing. Crosscutting findings include various key roles played by governments, ranging from setting policies that support LED lighting programs to establishing an ESCO with a mandate to implement energy efficient programs while transforming the market. The report also highlights distinct ways used to mitigate technical, financial and performance risks by the cities. These span from requiring third-party product test results to completely outsourcing the lighting infrastructure, and procuring lighting as a service. It also highlights the importance of strategically engaging stakeholders—such as international partners, local utilities, non-profit groups, to name but a few—as the program advances.

The context in which decisions were made, the problems encountered, and subsequent solutions involved in each case are also summarized. The cases include:

- Real-life examples of cities managing to attract private sector participants to provide the necessary financing and technical expertise
- Programs implemented in municipalities that are not creditworthy and have limited policy and institutional support
- Programs involving small municipalities (>2,500 residents) as well as large cities
- Cities managing the perceived technical, financial, and performance risks
- Cities effectively handling the measurement and verification of electricity savings



LED installation, Guadalajara, MX



LED replacement || Vizag, India



Dragon Bridge || Danang, Vietnam

## Case Studies

### Super-ESCO Delivery Model Energy Efficiency Services Limited (EESL) || Vizag, India

As a super-ESCO, EESL was set up by the Ministry of Power in India, and has a significant public sector mandate and clientele. It also supports the capacity development and activities of other ESCOs. EESL developed a program in Vizag that replaced 92,000 traditional luminaires with LED luminaires after cyclone Hudhad had destroyed most of the city's infrastructure. Due to the emergency nature of the situation, the program was stripped down to three steps: (a) signing of an implementation agreement between EESL and Vizag; (b) definition of a payment mechanism; and (c) selection of an implementation partner. The entire replacement was accomplished in six weeks, illustrating that LED programs can be implemented quickly. This case study draws lessons for governments and cities interested in setting up super-ESCOs. It is also relevant for cities in urgent need of lighting.

### Public-Private Partnership (PPP) Delivery Model || Birmingham, United Kingdom

The LED public lighting program in Birmingham was part of a larger PPP encompassing bridges and roads. The private sector financed and implemented the project, then assumed ownership and maintenance of the infrastructure under a 25-year PPP contract in the context of the UK Private Finance Initiative (PFI) framework. The PFI - PPP legal, institutional, financial, and technical support framework—was vital for the success of this model. The framework provided contracting guidelines among the different stakeholders, an environment familiar enough for private investors to provide financing and technical assistance to parties to the PPP. The case study is particularly interesting as it describes the bundling of several infrastructure investments under one PPP contract, showing cities and governments ways to lower transaction costs.

## Joint Procurement Delivery Model | | Ontario, Canada

Local Authorities Services (LAS), a nonprofit company wholly owned by the Association of Municipalities of Ontario (AMO), implemented a model in which it competitively procured both the special purpose vehicle that implemented the programs, and the firm that supplied the LEDs to all municipalities. This removed the burden of having each municipality procure its own operator and LED luminaires, significantly cutting transaction costs. LAS also developed a framework agreement between the operator, the LED luminaire manufacturer, and the municipalities. The detailed photometric designs were unique to each city, and the municipalities negotiated their own terms with the operator and manufacturer. Additionally, the municipalities negotiated the details of the financing mechanisms, depending on their access to capital. The model is particularly relevant for small cities that can benefit from increased economies of scale by jointly procuring LED public lighting programs.

## Lease-to-Own Delivery Model | | Guadalajara, Mexico

In Guadalajara, a national lighting program provided technical assistance, a private company provided financing with a payment guarantee from the state government (using federal resources), another private company installed the LED luminaires (and assumed the technology and performance risks), and the municipality will assume maintenance. Being a national program with five key signatories—the Ministries of Finance and Energy, Barnobras, CONUEE, and CFE—the program had to be structured and simplified in order to improve implementation. This model is particularly relevant for cities involved in national programs, and governments developing national public lighting programs.

## Municipal Financing Delivery Model Case Study | | Quezon City, Philippines

In Quezon City, the municipality used its own capital funds to finance the investment. A special purpose vehicle oversaw the retrofits, and the luminaire supplier assumed the technology risk by providing an eight-year product warranty. This type of model tends to be relevant for municipalities that have sufficient resources or are creditworthy enough to easily access capital. The financing costs tend to be lower than the other models discussed, but the programs can take a long time, depending on municipal resources.

## The Privately-owned ESCO Delivery Model Case Study | | Asian Electronics Limited (AEL), Central and Northwestern India

In a typical ESCO arrangement, AEL financed the investment using its balance sheet along with carbon finance. The municipalities paid for the investments from electricity savings. However, AEL was one of the first ESCOs in India to provide efficient lighting programs and had to overcome several challenges without much of a national ESCO framework. For example, (a) the baselines were not clearly defined and consumption increased as the city better maintained existing lights and expanded coverage; (b) no provisions for external factors (e.g., irregular voltage, poor infrastructure) affecting the contracted lighting performance levels; and (c) the ESCO and carbon finance contracts had different measurement and verification methodologies. Despite these challenges, the cities managed to replace baseline fixtures with more efficient lighting. The model is relevant where ESCOs can obtain financing and where there are mechanisms and flexibility to recoup capital investments.

## Contact Us

For more information about ESMAP's Energy Efficiency program and activities, please visit us at: [www.esmap.org/Energy\\_Efficient\\_Cities](http://www.esmap.org/Energy_Efficient_Cities)

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LEDs on highway