This is a new section of the Public-Private Partnership Resource Center website and is currently in draft form. Your feedback is welcome: If you would like to comment on the content of this section of the website or if you have suggestions for links or materials that could be included please contact us at ppp@worldbank.org.

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LED Streetlight Deployment Model for ERP - for Specific Technologies, solar lighting

# LED Streetlight Deployment Model for ERP - for Specific Technologies

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***On this page:*** *LED Streetlight Deployment for Specific Technologies leveraging an Existing-Refurbish-Finance-Bulk-Fees model - Model 5 in the ERP Project Guidelines. Read more below, or visit Strategic Guidance for Country System Assessments, Guidance for Countries in Assessing ERC Projects, or Mobilizing ERC Finance.*

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**Project Type:** Energy efficiency

**Sector:** Power

**Applicable Project Methodology:** AMS-II.C. Demand-side energy efficiency activities for specific technologies

The project activity type seeks to improve the energy efficiency of building lighting systems by substituting existing luminaires with lighting fixtures that use Light Emitting Diodes (LEDs), which are more energy efficient. The reduction in energy consumption will reduce the amount of greenhouse gas (GHG) emissions emitted.

## Proposed Structure of this Public Private Partnership (PPP) Model

The project will be leveraging an **Existing-Refurbish-Finance-Bulk-Fees** model. This will involve the Town Councils, supported by the local municipal governments, contracting an experienced private sector entity to replace the existing lighting in the target locations. The private sector entity will be raising financing given that the assumed payment arrangements from the Town Councils will be a percentage of the power consumption savings resulting from the project through a 10-year period.

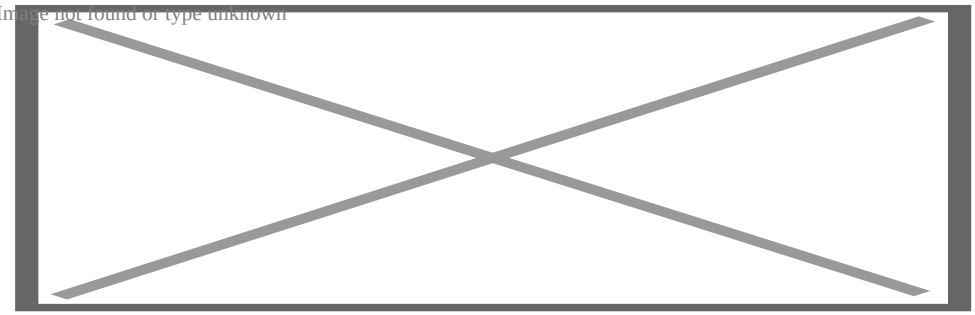
*Table 1: Model Attributes*

| Dimension | Attribute | Description |
|---|---|---|
| Business | *New* | This model assumes that a competitive bidding among experienced project companies will take place |
| | *Existing* | |
| Construction | *Build* | The model involves the project company taking over and refurbishing current lighting infrastructure |

| Dimension | Attribute | Description |
|---|---|---|
| *Refurbish* | | |
| Private Funding | *Finance* | The project company will be tasked with raising the funds for the installation of the LED lighting |
| Service | *Bulk* | The project company will be collecting payments from the Town Councils for the service of replacing the current lighting |
| | *User* | |
| Revenues | *Fees* | Revenues in this model will originate from the pre-agreed payments of the Town Councils to the project company for the service of replacing the current lighting |
| | *Tariffs* | |

**Proposed risk allocation of the Public Private Partnership Model**

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**Key features of PPP structure**

- Private sector entity to design, build, finance, operate and maintain building lighting systems via contractual agreement with the ministry/ government or state-owned entity
- The private sector entity acts as the implementation partner, and is responsible for all activities related to the implementation, management, monitoring and reporting of the project over the project crediting period
- In exchange, private sector entity can earn proceeds from emission reduction credit (ERC) sale

**Expected ERC end use**

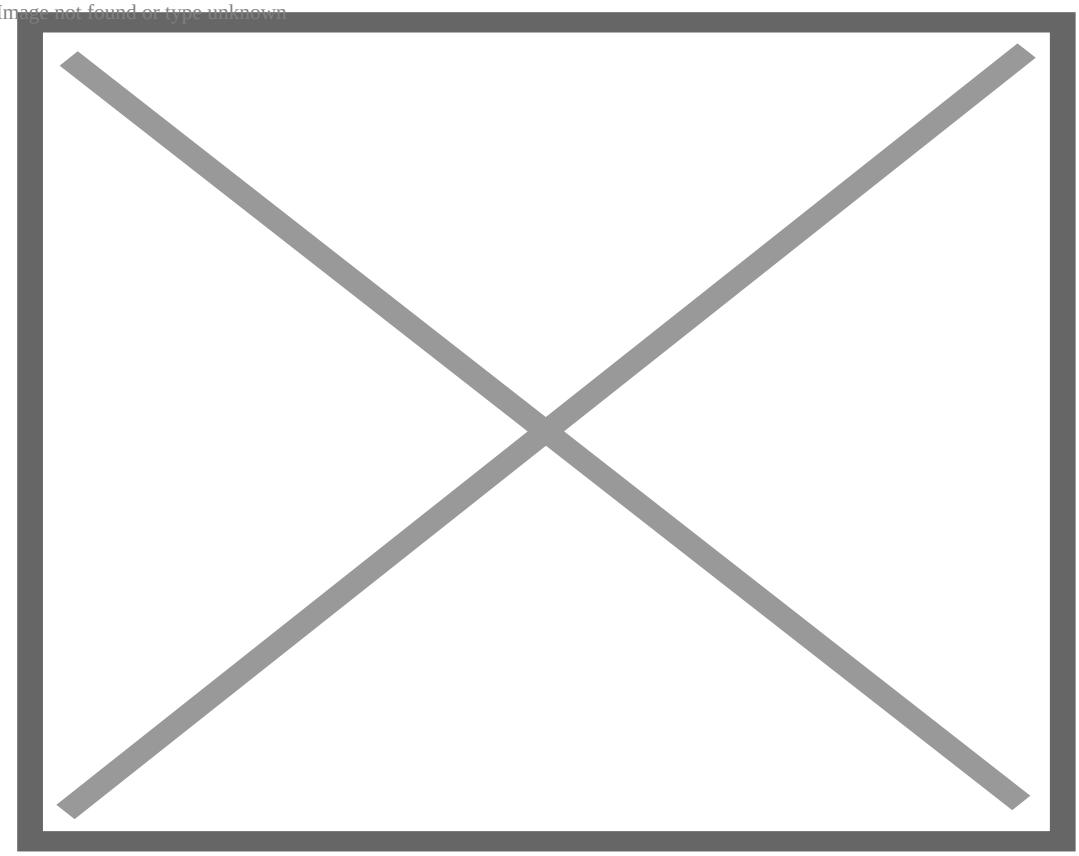
- End use can belong to project developer as part of additional revenue stream

**Key considerations/risks for proposed project**

- Extensive stakeholder engagement required to ensure buy-in local stakeholders (e.g., town councils, residents) which may include education sessions, roadshows
- Need to ensure that there is no regulation that imposes upon the government or state- owned entity partner to reduce emissions from public lighting or through energy efficiency activities in which this project can be reasonably assumed to be within scope
- Partnering with a service provider for the project's marketing, sales and pricing is needed to identify potential offset buyers, negotiate contracts, and secure good target price per tonne to enable the financial viability of ERC generation
- Contracting a monitoring, verification and reporting (MRV) service provider with experience in conducting MRV and preparing the necessary documents for generating ERCs in a voluntary carbon market standard will reduce risk of registration and issuance delays or bottlenecks, and strengthen credibility of project's carbon integrity quality

*Figure 1: Financing and Activity Flows for the Model*

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## Case study: Replacement of existing luminaires with LED lighting luminaires in several buildings across 12 Town Councils, Singapore

### Project description

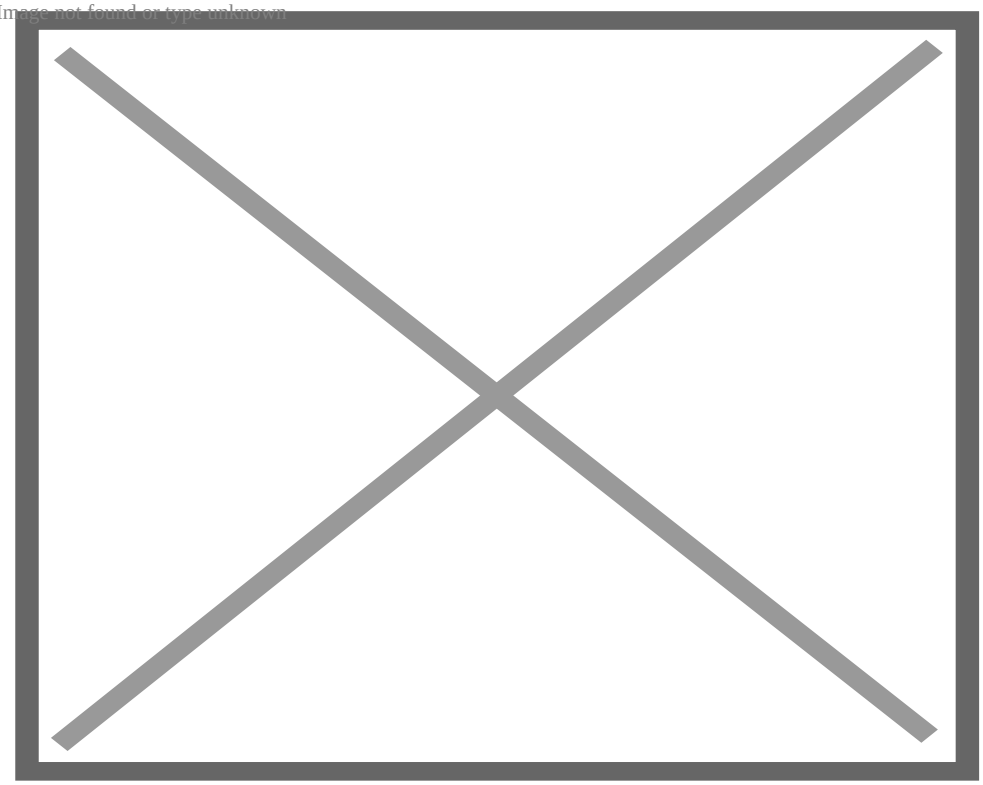
The project aimed to enhance the energy efficiency of building lighting systems by replacing current luminaires with more energy-efficient "Light Emitting Diodes" (LEDs) lighting fixtures in the corridors, staircases, and void decks of numerous existing buildings situated across 12 Town councils throughout the country. To be specific, the project will involve replacing of 668,723 existing luminaires by LED luminaires in the corridors, void decks, and staircases of the existing Housing & Development Board (HDB) buildings. By replacing the current luminaires with LED lighting fixtures, it is possible to achieve a reduction of GHG emissions.

### Impact

Expected annual ERCs credits generated from the program will be 13,158 tonnes through a 10- year crediting period. The financing from the voluntary carbon markets was judged to be essential to overcoming the investment barrier of a lower-than-benchmark equity internal rate of return (IRR) if relying solely on the payments provided by the Town Councils, as assessed by DTZ Facilities & Engineering (S) Limited.

*Figure 2: Structure of Case Study PPP*

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A contract has been signed between the 12 Town Councils and DTZ Facilities & Engineering (S) Limited, which outlines the terms and conditions of the project and confirms the ownership of the project to DTZ. DTZ Facilities & Engineering (S) Limited has the rights to manage the project, which means that they are responsible for overseeing the implementation and execution of the project. As the project developer for this project, DTZ is responsible for ensuring that the project meets Verified Carbon Standard (VCS) requirements.

## Summary of the model financials

Assuming a similar scale as the case study of replacing ~690,000 luminaries in total, the project's Net Present Value (NPV) without ERC in- and outflows – only considering non-ERC inflows through other revenue streams or cost savings enabled by the project – is positive at $ 0.01 Million (M)[1]. With ERC cashflows, the NPV improves substantially to positive NPV of $ 0.4M, which provides added value to make LED lightbulb projects more financially attractive. There is also substantial NPV value for users that benefit from this projecting approximately $ 0.3M for net user benefit. This accounts for the estimated annual net electricity consumption savings.

*Table 2: Summary of sources of inflows and outflows and key assumptions*

| Value component | Assumptions | Sources |
|---|---|---|

| | | |
|---|---|---|
| ERC revenues or inflows | • Three issuances across the project's 10-year crediting period, at year 3, year 7 and year 10<br>• $7.35 per tonne today for 43,860 estimated tonnes of ERCs likely generated in the first issuance<br>• 10% price increase to $8.09 for 87,720 estimated tonnes of ERCs likely generated for the second and third issuance | Average price of Energy Efficiency project in Asia, VCS |
| Non-ERC revenues or inflows | • Estimated annual electricity consumption savings of 31,946 megawatt hours (MWh)<br>• Electricity tariff used 0.261 Singapore dollars (SGD) per kilowatt hour (KWh)<br>• Expected inflation in electricity tariff of 3.7% | DTZ case study benchmark |
| Project investment and implementation cost | • Installation and maintenance of LED luminaires costs of $37,500,000 | DTZ case study benchmark |
| ERC generation | • $10,000 for the project's registration and first issuance<br>• $15,000 for each verification process across three issuance cycles<br>• $0.14 per tonne for subsequent issuances | Verra Fee Schedule |

*Table 3: Net cashflows summary (in USD)*

| Components | Sum of initial outlays | Sum of in- or outflows from crediting period | Total cashflow |
|---|---|---|---|
| ERC Component | | | |
| Revenues/Inflows | 0 | 1,031,587 | 1,031,587 |
| Costs/Outflows | 0 | -73,421 | -73,421 |
| Net value | 0 | 958,166 | 958,166 |
| Primary/Non-ERC Component | | | |
| Revenues/Inflows | 0 | 54,675,579 | 54,675,579 |
| Costs/Outflows | -37,500,000 | 0 | -37,500,000 |
| Net value | -37,500,000 | 54,675,579 | 17,175,579 |
| Total Net Value | | | |
| NPV | $375,754 | | |
| NPV (ERC Component) | $362,948 | | |
| NPV (Non-ERC Component) | $12,806 | | |
| NPV (Net user benefit) | $7,089,985 | | |

*Footnote 1*: All prices are expressed in United States Dollars (USD)

**Related Content**

- **Guidance for Countries in Assessing ERC Projects (Download PDF version)**

**Additional Resources**

- Climate-Smart PPPs
- Finance Structures for PPP

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