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## LED Streetlight Deployment Model for ERP - for Efficient Outdoor and Street Lighting Technologies

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*On this page: LED Streetlight Deployment for efficient outdoor and street lighting technologies leveraging an Existing-Refurbish-Finance-Bulk-Fees - Model 3 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:** Energy - Power

**Applicable Project Methodology:** AMS.II.L Demand-side activities for efficient outdoor and street lighting technologies

This model describes project seeks to boost energy efficiency in public lighting infrastructure through the replacement of current luminaires with light-emitting diode (LED) lighting. It encompasses the installation, maintenance, expansion, replenishment, operation, and management of all public lighting infrastructure within the project area. Usage of more energy efficient luminaires reduces energy consumption hence

minimizing greenhouse gas (GHG) emissions

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

The project will be leveraging an **Existing-Refurbish-Finance-Bulk-Fees** model. This will involve a municipal government or state-owned entity granting an experienced private sector entity a concession to replace the existing lighting in the target location. The private sector entity will be raising financing given that the assumed payment arrangements from the government or state- owned entity 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	<i>New</i>	This model assumes that a competitive bidding among experienced project companies will take place
	<i>Existing</i>	
Construction	<i>Build</i>	The model involves the project company taking over and refurbishing current lighting infrastructure
	<i>Refurbish</i>	
Private Funding	<i>Finance</i>	The project company will be tasked with raising the funds for the installation of the LED lighting
Service	<i>Bulk</i>	The project company will be collecting payments from the government or state-owned entity for the service of replacing the current lighting
	<i>User</i>	
Revenues	<i>Fees</i>	Revenues in this model will originate from the pre-agreed payments of the municipality to the private company for the service of replacing the current lighting
	<i>Tariffs</i>	

## Proposed risk allocation of the Public Private Partnership Model

Risk allocation	Public	Private
Design		●
Build		●
Financing		●
Operations and maintenance		●
Demand/Revenue Upside		●

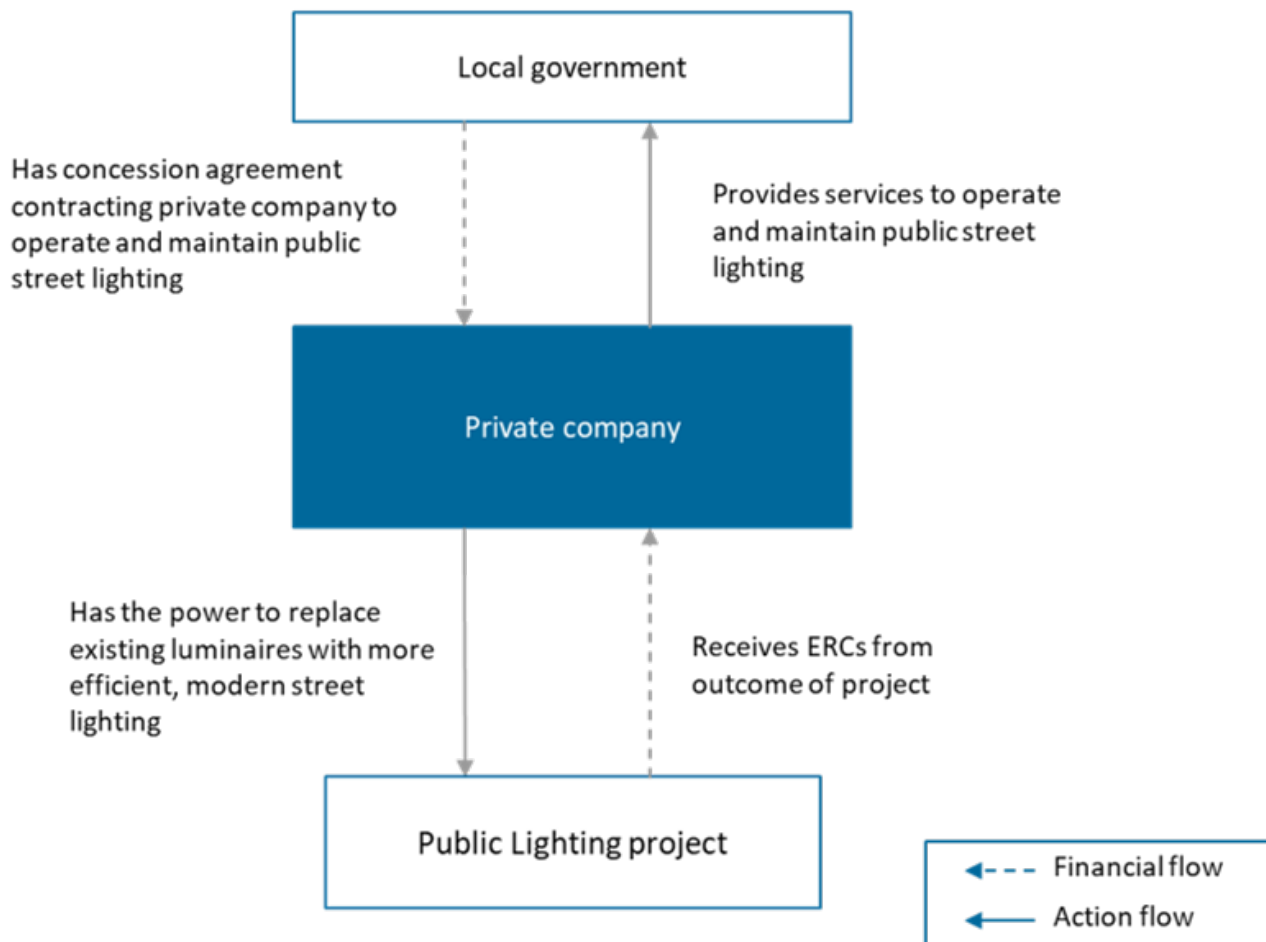
### Key features of PPP structure

- Private sector entity to design, build, finance, operate and maintain public street lighting infrastructure via a concession 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 a concession fee from operations and maintenance from government or state-owned entity as well as any potential emission reduction credits (ERCs) generated from modernization of public street lighting to be more energy efficient

### Key considerations/risks for proposed project

- Extensive stakeholder engagement required to ensure buy-in from local municipality as well as local citizens
- Need to comply with any local street lighting standards
- 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*



## Case study: Public Lighting Service in San Salvador, El Salvador

### Project description

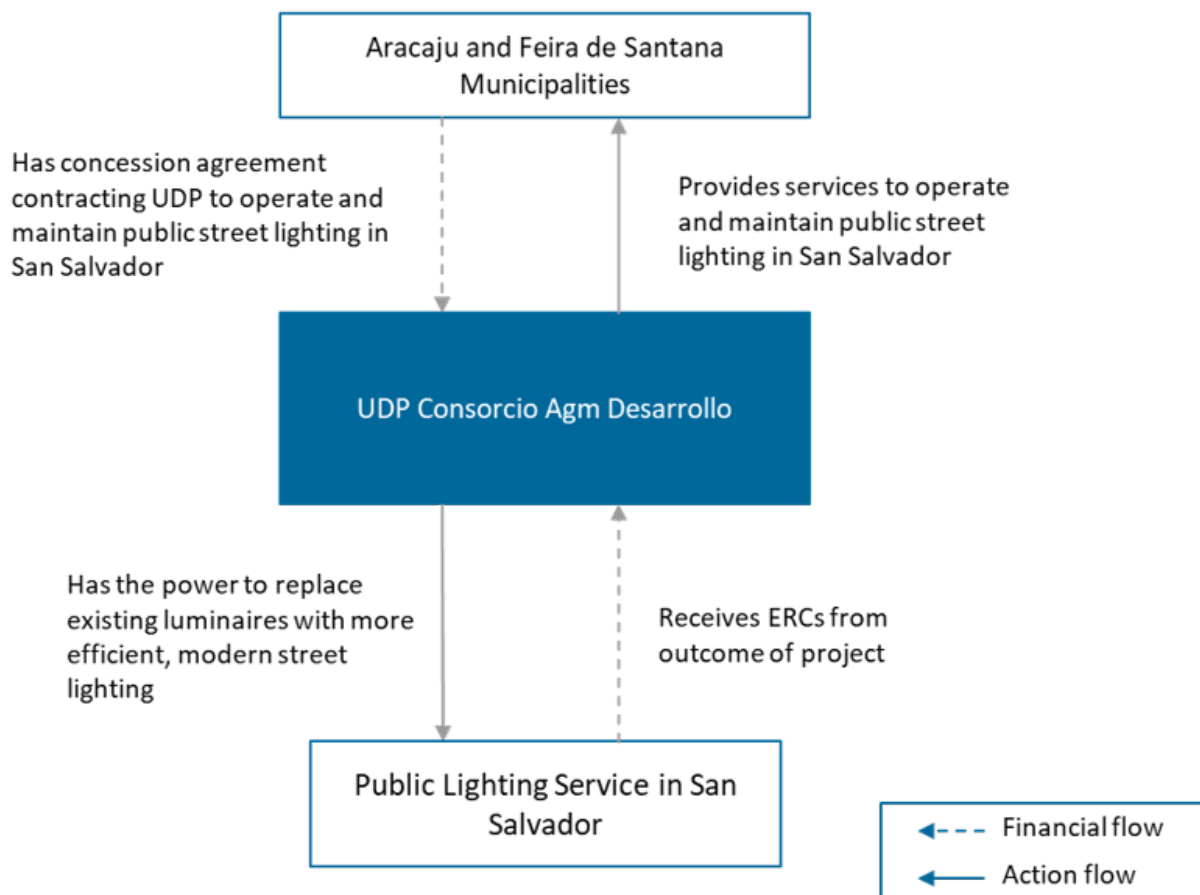
The project sought to enhance energy efficiency in public lighting infrastructure by replacing existing luminaires with LED lighting in the urban area of San Salvador, El Salvador and was commenced in early 2017. It involves the installation, maintenance, expansion, replenishment, operation, and management of all public lighting infrastructure in the municipality. The project comprises two stages: Stage I involves replacing 27,436 old technology luminaires (16,088 Hg luminaires; 11,348 Na luminaires), while Stage II entails repowering and installing 7,510 new luminaires, totaling 34,946 luminaires.

San Salvador has an urban area of 72.25 km sq and a population of around 2.4 million (M) residents that benefit from this energy efficiency project.

### Impact

The annual average estimate of GHG emission reductions and removals is 8,640,90 tonnes with the total for the crediting period being 86,408,98 tonnes. Given the small scale of the project in achieving savings below 20 gigawatts per hour, it was assessed to be additional by the verification body Colombian Institute for Technical Standards and Certification (ICONTEC). Aside from the emission reductions going towards El Salvador's nationally-determined contributions (NDCs), the project improved the sense of security among the residents of the area in public spaces where the previous lighting were not functional.

Figure 2: Structure of Case Study PPP



The project proponent holds a concession contract with the Municipality of San Salvador, granting them temporary authority over the supply, installation, maintenance, expansion, modernization, replacement, operation, and administration of the municipality's lighting infrastructure. This grants UDP Consorcio Agm Desarrollo (UDP) the power to replace existing luminaires with LED lighting and to earn the ERCs associated with the reduced consumption of energy.

## Summary of the model financials

Assuming a similar scale as the case study of replacing ~35,000 luminaires 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 \$0.3M<sup>1</sup>. With ERC cashflows, the total project will have a greater positive NPV of \$0.4M, which potentially increases the attractiveness of these type of projects for investors. There is also substantial NPV value for users that benefit from this projecting approximately \$5.4M 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
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ERC revenues or inflows	<ul style="list-style-type: none"> <li>• Three issuances across the project's 10-year crediting period, at year 3, year 7 and year 10</li> <li>• \$7.35 per tonne today for 28,803 estimated tonnes of ERCs likely generated in the first issuance</li> <li>• 10% price increase to \$8.09 for 57,606 estimated tonnes of ERCs likely generated for the second issuance</li> </ul>	Average price of Energy Efficiency project in Asia, Verified Carbon Standard (VCS) and Gold Standard (GS)
Non-ERC revenues or inflows	<ul style="list-style-type: none"> <li>• Estimated annual net electricity consumption savings: 8,493 MWh</li> <li>• Tariff cost: \$0.195/KWh</li> </ul>	San Salvador Public Lighting case study benchmark, World Bank – Cost of Doing Business study
Project investment and implementation cost	<ul style="list-style-type: none"> <li>• LED luminaires investment and installation cost: \$1,959,668</li> <li>• Operating and maintenance costs assumed to be 10% of total investment and installation costs</li> </ul>	San Salvador Public Lighting case study benchmark, Singapore LED replacement <sup>2</sup> case study benchmark
ERC generation	<ul style="list-style-type: none"> <li>• \$10,000 for the project's registration and first issuance</li> <li>• \$15,000 for each verification process across two issuance cycles</li> <li>• \$0.14 per tonne generated for issuances</li> </ul>	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	677,759	677,759

Components	Sum of initial outlays	Sum of in- or outflows from crediting period	Total cashflow
Costs/Outflows	0	-67,097	-67,097
Net value	0	610,662	610,662
<b>Primary/Non-ERC Component</b>			
Revenues/Inflows	0	4,554,371	4,554,371
Costs/Outflows	-1,959,668	-195,967	-2,155,635
Net value	-1,959,668	4,358,404	2,398,737
<b>Net Present Values</b>			
NPV		\$442,683	
NPV (ERC Component)		\$183,244	
NPV (Non-ERC Component)		\$259,439	
NPV (Net user benefit)		\$5,378,349	

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

*Footnote 2:* [VCS 1712](#)

#### 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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