

FY 2007 CDM/JI Feasibility Study (FS) Programme Report

Improving energy efficiency of public lighting systems in Ho Chi Minh City, Vietnam
Executive Summary

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Summary of Feasibility Study on Improving energy efficiency of public lighting systems in Ho Chi Minh City, Vietnam

1. Basic Elements for the implementation of the Project

1.1. Summary of the proposed project and background of the project proposal

This project's goal is to improve energy efficiency of the public lighting systems in Ho Chi Minh City, Vietnam by installing efficient lighting systems at alleys.

The public lighting systems of Ho Chi Minh City is divided into two parts: the major public lighting system (MPLS) and the civil public lighting system (CPLS). MPLSs are located on major streets and managed by a public lighting company, while CPLSs are not managed by the public lighting company because of the small size and low traffic level of alleys where CPLSs locate. Local residents install CPLSs according to their own needs. For this specific reason, the lamps used for CPLS have low efficiency and mostly located inappropriately, i.e. distance between lamps, height, wiring connection are not suitable to effectively provide sufficient brightness at alleys. Insufficient brightness in the alleys is causing traffic accidents and also crimes during nighttime.

The Project aims to solve current issues and improve the efficiency of CPLSs in Ho Chi Minh City. The Energy Conservation Center Ho Chi Minh City (ECC) which was established based on the decision made by Ho Chi Minh City people's committee (Decision No.51/2002/QD-UB) in 2002. ECC loaned money from Ho Chi Minh City to finance the initial cost for installing new lighting systems at 24 alleys in district 2 and district 3 as a pilot project. After reviewing the effect and benefit of this pilot project, ECC will expand the Project to all 24 districts in Ho Chi Minh City.

1.2. Description of the host country

During recent years, Vietnam has been promoting further changes towards a market economy and integration to the international economy. Along with the rapid economic growth, electric power demand is growing faster than the forecasted supply. Vietnamese government is working on actions to save power in order to respond rapid increase of demand as well as expanding the output capacity.

Ho Chi Minh City is the biggest commercial city in Vietnam and is the main contributor to country's economy. Ho Chi Minh City was authorized to autonomously make decisions in some areas, such as land use, budget management, and reform of administrative organization without

waiting an approval from the central government after “the governmental decision regarding decentralization in certain area for Ho Chi Minh City” was announced in December 2001. Therefore, Ho Chi Minh City plays a key role to implement pilot projects for improving business environment, especially the environment for foreign investment. Given this position of Ho Chi Minh City, the success of the Project in Ho Chi Minh City would have a strong impact to other cities in Vietnam.

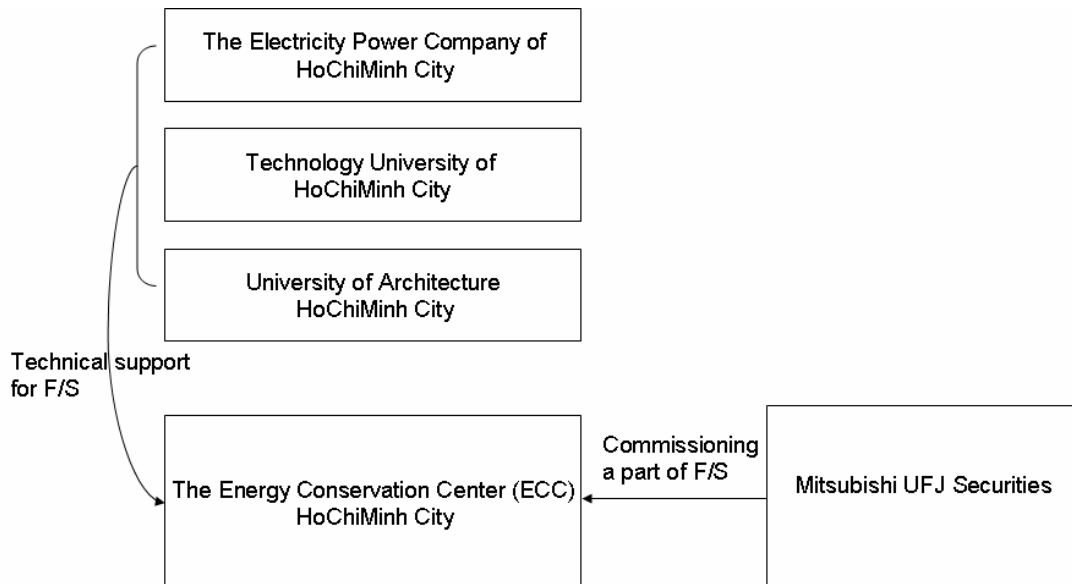
1.3. CDM/JI approval criteria of the host country, establishment of DNA, CDM policy and status

Vietnam ratified Kyoto protocol on September 25, 2002. Ministry of Natural Resources and Environment (MONRE) was assigned as National Focal Agency for UNFCCC and Kyoto protocol. International Cooperation Department of MONRE was assigned as CDM National Authority (CNA) in March 2003. This CNA plays role as DNA.

Vietnam has national criteria to provide host country’s approval. A proposed project is reviewed based on “exclusive criteria” which evaluates sustainability and additionality, and then “priority criteria” to see economic and social sustainability as well as commercial feasibility.

1.4. Implementation framework of the study (domestic, host country, others)

The implementation framework of this study is as follows.



2. Project planning

2.1. Detailed description of the Project

This project aims to improve efficiency of public lighting system and reduce energy consumption in Ho Chi Minh City in Vietnam. The project activity consists of designing and installing new lighting systems. The project contributes not only to reduce GHG emission but also to improve the quality of local people's life and urban development by reducing the number of traffic accidents and crimes at night. Therefore, this project has a potential as "Co-benefit CDM project".

The new lighting system is designed to satisfy Vietnamese standard for public lighting system "TCXDVN 259: 2001-Human lighting for roadway and square design standard". The appropriate type, power, and distribution of luminaries are identified to satisfy this standard for each alley depending on the characteristics of alley by using public lighting design software.

2.2. Coordinating entity of the Project

The coordinating entity of this Project is the Energy Conservation Center (ECC) Ho Chi Minh City.

2.3. Project site

The Project aims to implement new lighting systems in 24 districts of Ho Chi Minh City. Prior to the project implementation in all 24 districts, ECC assigned 10 districts as model districts and conducted study to understand the current situation of CPLSSs. ECC also held meetings with local people in model districts to explain about the Project in order to have agreements to implement the Project. As a result, ECC could have agreements from local people in district 2 and district 3. Therefore, ECC started project implementation in district 2 and district 3 as a pilot project.

In this study, we will investigate the feasibility of the project implementation in 24 districts in Ho Chi Minh City based on information obtained from this pilot project.

2.4. Applying Programme of Activities to the Project

In this project, ECC will install new lighting systems in district 2 and 3 as a pilot project and review the result of the pilot project, and then expand the project activities to all 24 districts in Ho Chi Minh City. The project activities in all 24 districts of Ho Chi Minh City will be a PoA (programme of activities). The project in district 2 and district 3 will be the first CPA (CDM programme activity) under the PoA. The collection of alleys, at which project activities can be

started on a same day, will be accounted as one CPA. ECC will add new CPA under the PoA, when the number of alleys to participate the program becomes sufficient to secure financial resources for implementation.

3. Summary of project design document (PDD)

3.1. Project boundary

Project boundary of the PoA is Ho Chi Minh City. The boundary of the first CPA is 24 alleys in district 2 and 3. In future, ECC will add new CPAs which contain the project activities at several alleys where the project activities will be implemented at a same day.

3.2. Project period

The maximum length of a PoA is 28 years according to EB guideline. During 28 years, the relevant CPAs will be added into a PoA. The length of this PoA will be 28 years from 2008 to 2035. The length of each CPA will be 7 years, which can be renewed twice. Therefore, the maximum length of a CPA will be 21 years. The period of the first CPA in district 2 and district 3 will be from 2008 to 2014 and renewed after 2014.

3.3. Baseline methodology

AMS-II.C.” Demand-side energy efficiency activities for specific technologies” is applied to the PoA and all CPAs related to this PoA.

3.4. Calculation of baseline emission

In accordance with AMS-II.C, the energy baseline is calculated as follows if the energy displaced is electricity.

$$E_B = \sum_i (n_i \cdot p_i \cdot o_i)$$

Where:

E_B = annual energy baseline (kWh/year)

\sum_i = the sum over the group of “i” devices replaced

n_i = the number of devices of the group of “i” devices replaced for which the replacement is operating during the year

p_i = the power of the devices of the group of “i” devices replaced. In the case of a retrofit activity, “power” is the weighted average of the devices replaced. In the case of new installations, “power” is the weighted average of devices on the market (kW)

o_i = the average annual operating hours of devices of “i” devices replaced (hours)

In AMS-II.C., baseline is that the existing fuel consumption or the amount of fuel that would be used by the technology that would have been implemented otherwise. Therefore, the energy baseline of the Project is the scenario that local residents will install 40W tube fluorescent lamps which are the most commonly used in order to provide sufficient brightness.

Baseline emission is calculated as followings.

$$BE_y = E_B \times EF_{\text{grid}} \times 1/1000$$

Where:

- BE_y = annual baseline emissions in year y (tCO₂)
- E_B = annual energy baseline (kWh/year)
- EF_{grid} = emission factor of the connected grid (kgCO₂/kWh)

The energy baseline of this CPA project in district 2 and district 3 is 108,672kWh. By applying emission factor of Vietnamese national grid 0.69009, the baseline emission is calculated as follows.

$$108,672 \times 0.69009 \times 1/1,000 = 74.99$$

3.5. Project emission

The ex-ante calculation of project energy consumption is as follows.

$$E_p = \sum_i (n_i \cdot p_i \cdot o_i)$$

Where:

- E_p = annual energy consumption by project (kWh/year)
- \sum_i = the sum over the group of “i” devices installed
- n_i = the number of devices of the group of “i” devices installed
- p_i = the power of devices of the group of “i” devices installed (kW)
- o_i = the average annual operating hours of devices of “i” devices installed (hours)

The project emission is given by following equation:

$$PE_y = E_p \times EF_{grid} \times 1/1000$$

Where:

PE_y = annual project emissions in year y (tCO₂)

E_p = annual electricity consumption in project scenario (kWh)

EF_{grid} = emission factor of the connected grid(kgCO₂/kWh)

The energy consumption of new public lighting system in district 2 and district 3 is estimated as 73,019kWh, and so the project emission is calculated as follows.

$$73,019 \times 0.69009 \times 1/1,000 = 50.39$$

3.6. Leakage

In accordance with AMS-II.C, leakage is to be considered if the energy efficiency technology is equipment transferred from another activity or if the existing equipment is transferred to another activity. In this project, replaced lamps will be scrapped. Therefore, no leakage is considered from this CPA and PoA.

3.7. Emission reduction

The emission reduction from this CPA is calculated as followings:

$$\begin{aligned} ER_y &= BE_y - PE_y \\ &= 74.99 - 50.39 \\ &= 24.60 \quad (\text{tCO}_2/\text{year}) \end{aligned}$$

3.8. Additionality

1) Additionality of the PoA

Investment barrier

There are investment barriers to improve CPLS. For this project, ECC loaned from Ho Chi Minh City to finance the initial cost for implementing the first CPA. Electricity cost savings resulted from the CPA will be considered as part of the repayment scheme of this debt and the revenues from the sale of CERs will be used to subsidize the cost for equipment maintenance. However, there is no finance reserved to implement the second CPA in another alley in Ho Chi Minh City. ECC is planning to use the CER revenue from the first CPA as leverage to attract further investment to expand the project activities. Without the PoA registered, it will be difficult to operationalize the first CPA and implement the subsequent CPAs.

Barriers due to common practice

There are no national or local regulations for CPLS. Although Vietnamese government set the standard to improve public lighting efficiency, CPLSs are not included in the target and will not be considered in a near future, either. CPLSs are the lighting systems wherein local residents purchase lamps and install them as they like without any authorization. Because local residents connect lamps to transmission lines outside of their properties, the local government pays for the electricity consumed by these unregulated lamps. Because of this current practice that local residents install low efficiency lamps but do not pay electricity expense, they do not care about the energy efficiency of CPLS.

Faced with these investment barrier and common practice, the project will not be carried out in the course of regular business, and is, therefore considered additional.

2) Additionality of the CPA

Additionality of this CPA is demonstrated based on investment barrier and barriers as well as the additionality of the PoA.

Investment barrier

There are investment barriers to improve CPLS. Because electricity rate is inexpensive in Vietnam (approximately 0.061 USD per 1kWh), there are not enough incentives for Ho Chi Minh City to plan and implement energy saving measures and reduce their CPLS-related expenditure. In addition to initial investment, operation and maintenance costs for a CPA further make the project activities less attractive to Ho Chi Minh City and districts without CDM.

Barriers due to common practice

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Faced with these investment barrier and common practice, the project will not be carried out in the course of regular business, and is, therefore considered additional.

3.9. Monitoring plan

The monitoring methodology for AMS-II.C is applied for the CPA and the PoA. The methodology consists of followings:

1. Meter electric consumption at each alley
2. Monitor the number and power of replaced lamps
3. Annual check to ensure that systems are still operating

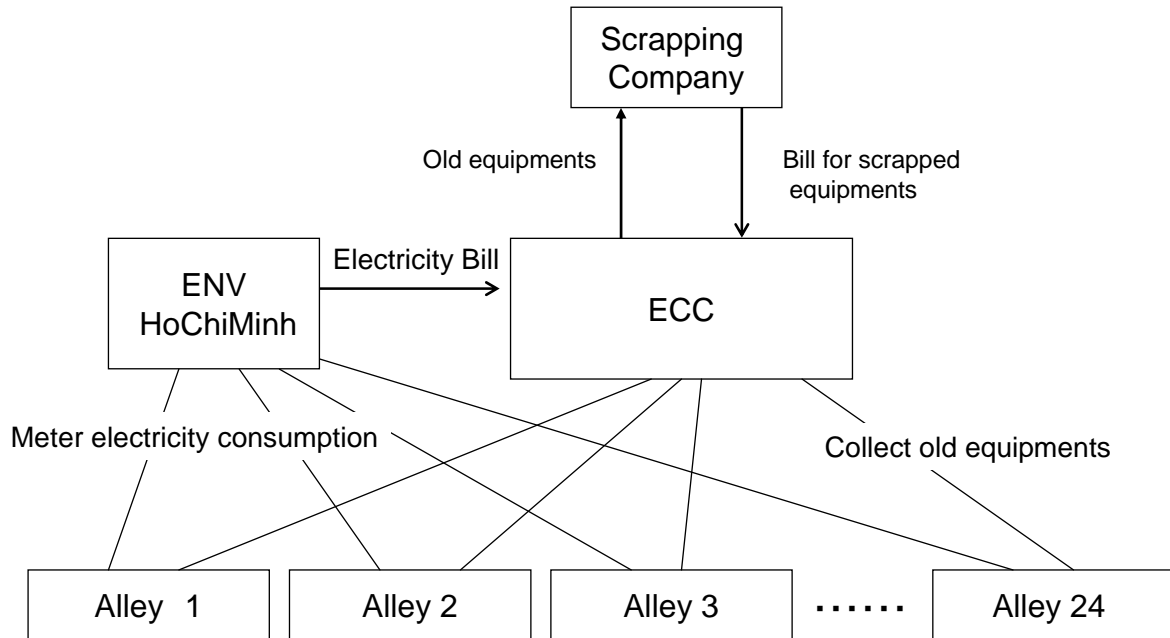
In addition, the monitoring of scrapped equipment is required for the following conditions in a project under a programme of activities.

4. In case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, and independent monitoring of scrapping of replaced equipment needs to be implemented.

The table below indicates the items need to be monitored.

	Data Variable	Data Unit	Source of Data	Recording Frequency
1	Energy consumption at each alley	kWh	Electricity bill from Electricity of Vietnam Ho Chi Minh	Monthly
2	New lamps installed	Pieces	Bills from lighting company	Monthly
3	Old lamps collected	Pieces	ECC count number of lamps collected from each district	Monthly
4	Number of scrapped lamps	Pieces	Bills from local scrapping company	Monthly
5	Type of new lamps installed	Type/W	Bills from lighting company	Monthly
6	Type of old lamps collected	Type/W	ECC checks type of lamps when they collected from each district	Monthly

The monitoring structure on this CPA is shown below.



3.10. Environmental Impact

Environmental Impact Assessment is not required by the Vietnam’s law for this type of project activity. The only possible concern is related to mercury. Fluorescent lamps contain small quantities of mercury. Mercury will be released and have negative environmental impacts if used or replaced fluorescent lamps are not disposed properly. ECC will collect all replaced fluorescent lamps and compact fluorescent lamps from all alleys, and hand them over to local recycle company. There mercury will be properly collected for recycling. Therefore, mercury will not be released and so there is no negative impact from this project.

3.11. Stakeholders’ comment

Stakeholders’ comments are provided at each CPA level. Comments were collected through meetings with representatives of district 2 and 3, and local power company for the first CPA.

The meeting for district 2 was conducted on January 31 and the meeting for district 3 was conducted on January 30. Most of local residents appreciated the Project because new lighting systems made alleys brighter and improved social security, traffic, and cleanness of alleys. Some concerns regarding operation and maintenance of new systems were received. ECC answered questions from local residents carefully.

3.12. Towards implementation

Financing is a major concern for implementation of the Project. The loan from HoChiMinh City is only for the first CPA and not enough to expand project activities to the other alleys and districts. It will be necessary to use the CER revenue from CPAs as leverage to attract further investment and support from companies to expand the project activities.

The other concern is Vietnamese emission factor of the connected grid. Electricity of Vietnam (EVN) does not disclose data, and so it is very difficult to obtain national grid data. At the validation stage of CDM approval process, the credibility of grid data will be strictly reviewed. Therefore, it is important to obtain credible data which is authorized by EVN in order to implement this project as a CDM project.

Although the guideline has been approved by CDM executive board (EB), no project has been registered. Therefore, there are some concerns and issues will be expected to implement the project. The first one is programme coordinator. It is important to assign a responsible entity to manage PoA for its long project period and distribute CERs among project participants. Secondly, it is important to set an appropriate unit of CPA in order to expand the project activities in whole PoA boundary considering financial and institutional capability. The well-managed monitoring scheme is also important to ensure the amount of CERs from each CPAs. Lastly, the selection of DOE is also important for implementation of programmatic CDM. Due to complicated process of CDM, there is only one DOE which has conducted validation so far. To implement programmatic CDM, it is necessary to keep good relationship with DOE for entire project period because a DOE needs to validate all CPAs under a PoA.