CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-SSC-PoA-DD) Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for the submission of a CDM PoA whose CPAs apply a small scale approved methodology.

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

SECTION A. General description of small-scale programme of activities (PoA)

A.1 Title of the small-scale programme of activities (PoA):

Improving energy efficiency of public lighting systems in Ho Chi Minh City

A.2. Description of the small-scale programme of activities (PoA):

Ho Chi Minh City is the biggest commercial city in Vietnam and the main contributor to the country's economy. The GDP of Ho Chi Minh City accounted for 20.1% of country's GDP in 2006. The year-to-year growth rate of GDP in 2006 recorded 12.2%. According to a decision of Ho Chi Minh City People's Committee, Ho Chi Minh City will try to achieve an annual industrial growth rate of 13% from 2006 to 2010. Having this rapid economic growth, the electricity demand is growing faster than the forecasted supply. Vietnamese government is working on energy saving and improvement of energy efficiency in order to ensure a stable electricity supply. This proposed programme of activities will directly contribute to the government's efforts.

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 government because of the small size and 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 located inappropriately, i.e. distance between lamps, height, wiring connection are not appropriate to effectively provide sufficient brightness at alleys. Furthermore, lighting duration is controlled manually by local residents, and so lights are sometimes not turned off even in the day time. As a result, CPLSs are not energy efficient and consume 46% of the total energy consumption of public lighting system in Ho Chi Minh City. Although Vietnamese government introduced standard for public lighting to enhance efficient lighting system, CPLSs are not the target of this standard.

This project is a voluntary initiative coordinated by Energy Conservation Center of Ho Chi Minh City (ECC). ECC was established in 2002 through decision by People's committee of Ho Chi Minh City aiming to improve energy efficiency, promote renewable energy, research and development and develop human resources. ECC aims to improve energy efficiency of CPLSs at alleys in Ho Chi Minh City by this project.

This project activity comprises of:

1. Designing of energy efficient lighting system
    - Design appropriate distribution of street lighting luminaries
    - Select appropriate equipment to maximize the lighting effect
2. Installing new lighting system
    - Remove low efficient and broken lamps
    - Install new high-efficient lamps, according to the distribution plan designed above
    - Replace old and dull reflectors with new reflectors
    - Install electronic ballast
    - Install automatic controllers

The project activities will contribute to sustainable development of Vietnam in following areas:

Economic dimension –The electricity supply is not enough for the demand and development target of Vietnam. Especially in Southern region, the government is working on energy saving as well as expanding the capacity of electric supply in order to support the rapid economic development. The project activities will reduce energy consumption of CPLSs in Ho Chi Minh City.

Currently, Ho Chi Minh City allocates to districts the budget for the public lighting system. This project helps alleviate the expenditure of the districts and Ho Chi Minh City by reducing energy consumption. On the local level, the project activities enhance the economic activities at night by securing sufficient brightness and safety on the streets.

Environmental dimension – The project activities reduce electricity consumption by promoting energy efficient public lighting system, and thereby reduce the amount of greenhouse gases (GHGs) produced by fossil fuel combustion at a national electricity grid.

Social dimension –The project activities will improve the quality of public lighting systems in Ho Chi Minh City. The sufficient brightness on the streets at night will reduce the number of traffic accidents, secure the safety of passers-by, and reduce the number of crimes at night. Improvement of electric wire connection avoids short circuits and accidents of electric shock which occurred often in rainy season, thereby provides safety of local residents.

A.3. Coordinating/managing entity and participants of SSC-POA:

The coordinating entity for this PoA is Energy Conservation Center of Ho Chi Minh City (ECC).
ECC will also coordinate CPAs under this PoA.

A.4. Technical description of the small-scale programme of activities:

A.4.1. Location of the programme of activities:

A.4.1.1. Host Party(ies):

Vietnam

A.4.1.2. Physical/ Geographical boundary:

The geographical boundary of the project is Ho Chi Minh City.

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

The project activity for all CPAs in this PoA uses AMS-II.C. "Demand –side energy efficiency activities for specific technologies" (version 09) and AMS-I.D. "Grid connected renewable electricity generation" (version 13).

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Also, the proposed project activity for all CPAs in this PoA will comprise of:

1. Designing of an energy efficient lighting system
    - Design appropriate distribution of street lighting luminaries
    - Select appropriate equipment to maximize the lighting effect
2. Installing new lighting system
    - Remove low efficient and broken lamps
    - Install new high-efficient lamps, according to the distribution plan designed above
    - Replace old and dull reflectors with new reflectors
    - Install electronic ballast
    - Install automatic controllers

Ulysse software is employed to design the new lighting system. By inputting features of alleys and luminaries to be installed as well as their locations in the alleys, the software can calculate luminance

distribution and design the lighting system to meet the public lighting standard of TCSDVN 259:2001 "Human lighting for roadway and square design standard" (Table 4.2.1). The lamps and other equipment are selected based on the advice from professionals to maximize the lighting effect.

Table 4.2.1 Standard of public lighting system for street

The Traffic level (vehicles/day)	200-500	<200
Minimum Luminance (cd/m2)	0.6	0.4
Minimum Illuminance (lux)	12 lux	8 lux
Equalization $U_0 = L_{min}{}^{*1} / L_{av}{}^{*2}$	≥0.4	≥0.4
Equalization on vertical $U_1 = L_{min} / L_{max}{}^{*3}$	≥0.7	≥0.7

*1: minimum luminance, *2: average luminance, *3: maximum luminance

Based on the Ulysse analysis and professional advice, the following lamps will be used with the distribution shown in table 4.2.2.

Width of alley	Light bulb	Number of light bulbs per luminary	Height of luminaries	Space between two luminaries
<5m	CFL-18W	2	4～5m	8～12m
5～7m	HPS-70W	1	5～7m	15～25m
>7m	HPS-100W	1	7～8m	20～30m

After designing the new lighting system, old lamps and equipments are removed and replaced by new systems. The new lighting systems have automatic controllers to manage lighting time properly. Also, the new systems have one meter per each alley to monitor the electric consumption of luminaries.

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

Criteria for inclusion of a CPA in the PoA include:
- The proposed CPA must be within Ho Chi Minh City.
- The lighting systems at alleys of the proposed CPA must not be managed and invested by the government.
- The proposed CPA will be implemented by ECC.

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a SSC-CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

The proposed PoA is a voluntary coordinated action led by ECC. In the absence of the registered PoA, no CPA will be implemented due to the following barriers:

Investment barrier:

There are investment barriers to improve CPLS. Because electricity rate is heavily subsidized and inexpensive in Vietnam (approximately 0.061 USD per 1 kWh), 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 the local government without CDM.

For this project, ECC will loan 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. 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 near future, either. CPLSs are the lighting systems which 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.

Due to the absence of civil planning or consideration of energy efficiency, local residents purchase low price, thus low efficient lamps, such as incandescent lamps, and install too many lamps in one place for some area. These activities cause very high energy consumption. The local electric company sometimes cuts off cables of lamps installed by local residents to reduce energy consumption. Because of this current practice that local residents install low efficient 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.

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

ECC is the only one entity to coordinate this PoA. Therefore, all CPAs under this PoA will be also implemented by ECC. In order to initiate this project, ECC will talk to local residents of the specific alleys included in a CPA and have an agreement from them to implement the project 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.
ECC will keep a record of the names of all alleys which are included in each CPA under this PoA. In addition, ECC will electronically keep the data on inventories of currently existing luminaries and newly installed luminaries with I.D. number. Because ECC is the only entity to coordinate the project and also no other similar CDM project activity has been undertaken in Ho Chi Minh City, a new CPA is not a de-

bundled component of another CDM program activity or CDM project activity. For the same reason, new CPAs will not be confused with another CDM project or PoA. ECC will be solely responsible to keep the record of each CPA and also all CPAs under the PoA.

A.4.4.2. Monitoring plan:

The monitoring methodology for the category AMS-II.C. "Demand-side energy efficiency activities for specific technologies" (version 09) is applied in this PoA. The methodology consists of the following:

1. Meter electricity consumption per street where new lighting system is installed
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 activity 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, an independent monitoring of scrapping of replaced equipment needs to be implemented.

For the emission factor from the grid, AMS-I.D. "Grid connected renewable electricity generation" (version 13) is used for monitoring methodology.

Sampling method will not be applied. Monitoring will be conducted to ensure that no double accounting occurs and that the status of verification can be determined anytime for each CPA. ECC will manage monitoring database to keep records of variables

Detailed monitoring information and management structure of the monitoring will be given in each SSC-CPA-DD.

A.4.5. Public funding of the programme of activities (PoA):

Public funding: 119,200USD will be loaned from Ho Chi Minh City for the first CPA as a demonstration project. This is not a diversion of ODA.

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

January 2008

B.2. Length of the programme of activities (PoA):

28 years

SECTION C. Environmental Analysis

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

1. Environmental Analysis is done at PoA level ✔
2. Environmental Analysis is done at SSC-CPA level ☐

The environmental analysis is not required by the Vietnam's low for this type of project activity. The only possible concern is related mercury. Fluorescent lamps contain small quantities of mercury. Mercury is released and will 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 district 2 and 3, and hand them over to recycle company. There mercury will be properly collected for recycling. Therefore, mercury will not be released.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The program well takes into consideration of waste management and recycling when scrapping old and newly installed lamps to ensure that there are no significant environmental damage from certain materials used for luminaries, e.g. mercury in CFLs.

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

According to the national and local regulations, Environmental Impact Analysis is not required for a typical CPA included in this PoA.

SECTION D. Stakeholders' comments

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D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

1. Local stakeholder consultation is done at PoA level ☐
2. Local stakeholder consultation is done at SSC-CPA level ✔

Local stakeholder consultation is done at SSC-CPA level. Because the situation is different from each district and each alley, local stakeholder consultation needs to be done at SSC-CPA level.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

Comments from local residents in a concerned CPA will be collected through meetings.
Detail information is described in SSC-CPA-DD.

D.3. Summary of the comments received:

Detail information is provided in SSC-CPA-DD.

D.4. Report on how due account was taken of any comments received:

Detail information is provided in SSC-CPA-DD.

SECTION E. Application of a baseline and monitoring methodology

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

Baseline and monitoring methodologies applied to the SSC-CPA included in this PoA are:

- AMS-II.C. "Demand-side energy efficiency activities for specific technologies" (version 09); and
- AMS-I.D. "Grid connected renewable electricity generation" (version 13).

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

The CPAs included in this PoA improve energy efficiency of the public lighting system, and they are demand-side activities. Aggregate energy saving of one CPA of the PoA is less than 60GWh per year. Therefore, AMS-II.C. "Demand-side energy efficiency activities for specific technologies" (version 09) is applicable to the SSC-CPAs.

Since this is the project activity results in grid electricity replacement, AMS-I.D. "Grid connected renewable electricity generation" (version 13) is used as directed by AMS-II.C. (version 09).

E.3. Description of the sources and gases included in the SSC-CPA boundary

The gas reduced through these CPAs under this PoA is CO_2. The project activities reduce electricity consumption by promoting energy efficient public lighting system, and thereby reduce the amount of CO_2 produced by fossil fuel combustion at the electricity grid.

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

Given a rapid economic growth in Ho Chi Minh City with its 12% GDP increase in 2006 from the previous year, it is assumed that the demand of lighting at alleys will increase to enhance their economic activities at night. Hence, it is also assumed that local residents install more and more lamps at alleys around their houses. Because local residents do not pay electricity bills and neglect energy efficiency, they are currently buying cheap lamps, such as 40W tube fluorescent lamps, and expected to do so in the future. In fact, 40W tube fluorescent lamps are the most commonly used street lamps in the city. Therefore, the baseline scenario is the installation of 40W fluorescent lamps in absence of the PoA. The distribution of luminaries with 40W tube fluorescent lamps for the baseline scenario was estimated using Ulysse software, which calculates luminance distribution with the information of alley feature and type and distribution of luminaries. The distribution is based on the minimum requirements by the public

lighting standard of TCSDVN 259:2001 "Human lighting for roadway and square design standard" (see Section A.4.2.1). In the case the current electricity consumption is higher than the scenario with 40W fluorescent lamps, the current electricity consumption is applied as baseline scenario for these alleys instead of 40W fluorescent lamp scenario because it is difficult to assume that local residents remove lamps which have already installed or change them to high efficiency ones.

The energy baseline and baseline emissions are calculated as follows in accordance with AMS-II.C. (version 09).

The energy baseline

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

Where:

E_B	Annual energy baseline in kWh per year (kWh)
$\sum_i$	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 devices of the group of "i" devices replaced.
o_i	The average annual operating hours of devices of "i" devices replaced (4380 hours)

The average operating hours are estimated as 12 hours per day and 4380 hours per year based on the study conducted by ECC.

Baseline emissions

$$BE_y = E_B * EF_{grid} * 1/1000$$

Where:

BE_y	annual baseline emissions in year y (tCO_2)
E_B	annual electricity consumption in baseline scenario (kWh)
EF_{grid}	emission factor of the connected grid (kg CO_2/kWh)

Emission factor of the connected grid is calculated using AMS I.D. (version 13).The baseline emission factor is calculated as the combined margin, consisting of combination of operating margin and build margin factors calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" as follows.

Step 1. Identify the relevant electric power system
The electricity displaced by the project activity will be delivered from the Vietnamese national grid, the only grid exist in the country.

Step 2. Select an operating margin (OM) method

As no dispatch data is available and must-run/low cost resources constitute less than 50% of total grid generation over the past 5 years, the simple OM method is used (See table 1 in Annex 3). For the simple OM, ex-ante option is selected.

Step 3. Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated based on fuel consumption and net electricity generation of each power plant/unit (Option A). Following formula is used to calculate Simple OM.

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{\sum_{m} EG_{m,y}}$$

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,m,y}$	=	Amount of fuel type *i* consumed by power plant/unit *m* in year *y* (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
$EG_{m,y}$	=	Net electricity generated and delivered to the grid by power plant/unit *m* in year *y* (MWh)
m	=	All power plants/units serving the grid in year *y* except low-cost/must-run power plants/units
i	=	All fossil fuel types combusted in power plant/unit *m* in year *y*
y	=	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option)

The operating margin emission factor calculations are performed ex-ante using available official data on fuel consumption and electricity generation for each plats connected to the Vietnamese national grid in 2004-2006. All the data is summarized in table 2 in Annex3.

The “Operating Margin” emission factor will be:

$$EF_{OM} = \frac{\sum_{i,m} FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{\sum_{m} EG_{m,y}}$$

$$= \frac{1}{3}\left(\frac{20{,}218}{28{,}749} + \frac{25{,}763}{36{,}714} + \frac{28{,}070}{40{,}685}\right)$$

$$= 0.6983 ktCO_2 / GWh$$

$$= 0.6983 tCO_2 / MWh$$

Step 4. Identify the cohort of power units to be included in the build margin

For the project activity, the sample group of power units *m* used to calculate the build margin consists of the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. In terms of vintage of data, Option 1 (ex-ante) was selected for the project activity.

Step 5. Calculate the Build margin emission factor

The build margin is calculated as the generation-weighted average emission factor (tCO_2/MWh) of sample of power plants as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit m in year *y* (MWh)
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year *y* (tCO_2/MWh)
m	=	Power units included in the build margin
y	=	Most recent historical year for which power generation data is available

For the proposed project, Option 1 shall be chosen: Calculate the Build Margin emission factor $EF_{grid,BM,y}$ *ex-ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group of power unit *m* used to calculate the build margin consists of the set of power capacity additions in the electricity system that comprise 20% of the system generation (in GWh) and that have been built most recently. Data for the build margin calculation is shown in the table 3 in Annex 3.

The build margin emission factor will be:

$$EF_{BM} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

$$= \frac{8{,}476}{12{,}431}$$

$$= 0.68187 ktCO_2 / GWh$$

$$= 0.68187 tCO_2 / MWh$$

Step 6. Calculate the combined margin baseline emission factor

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

Where:

$EF_{grid,BM,y}$	=	Emission factor of the build margin
$EF_{grid,OM,y}$	=	Emission factor of the operating margin
w_{OM}	=	Weighting of the operating margin emission factor (%)
w_{BM}	=	Weighting of the build margin emission factor (%)

Where the weights w_{OM} and w_{BM}, by default, are 50%

So the baseline emission factor will be:

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

$$= (0.5) \cdot (0.6983 tCO_2 / MWh) + (0.5) \cdot (0.68187 tCO_2 / MWh)$$

$$= 0.69009 tCO_2 / MWh$$

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA): >>

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

There are currently no regulations to control CPLSs which are installed by local people at small alleys. Although Ho Chi Minh City recognizes the need of their energy saving to ensure the future electricity supply, it is difficult to implement project activities without implementing as a CPA and being included in a registered PoA due to the following barriers.

Investment barrier

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

For this project, ECC will loan from Ho Chi Minh City to finance the initial cost for implementing the first CPA. Electricity cost saving resulted from the CPA will be considered as part pf the repayment scheme of this debt. The revenues from the sale of CERs will be used to subsidize the cost for equipment maintenance. Therefore, without CDM, it will be difficult to implement the project activity for Ho Chi Minh City.

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 which 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 CPLSs.

Due to the absence of civil planning or consideration of energy efficiency, local residents purchase low price, thus low efficient lamps, such as incandescent lamps, and install too many lamps in one place for some area. These activities cause very high energy consumption. The local electric company sometimes cuts off cables of lamps installed by local residents to reduce energy consumption. 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 CPLSs.

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

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

Future SSC-CPA should demonstrate additionality based on the following criteria:

- No national and local laws and regulations require or establish a standard of energy saving for CPLS more efficient than the baseline scenario set in the registered PoA.
- The proposed SSC-CPA included in this PoA should apply the same technology and baseline and monitoring methodology, AMS-II.C. and AMS-I.D., as other CPAs of the registered PoA. Versions of the baseline and monitoring methodology may change according to most recent guidance provided by the CDM Executive Board.
- The proposed CPA should apply the same baseline scenario as other CPAs of the registered PoA, so the energy baseline will differ only according to number of alleys and feature of individual alleys included in a CPA.
- The proposed CPA has access to financial resource leveraged by CERs of other CPAs under registered PoA.

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

A typical CPA is eligible as a small scale project category AMS-II.C. "Demand-side energy efficiency activities for specific technologies" (version 9). The baseline and monitoring methodology of AMS-II.C. (version 9) are applied for a typical SSC-CPA. Versions of the baseline and monitoring methodology may change according to most recent guidance provided by the CDM Executive Board.

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

The energy displaced is grid electricity in a typical SSC-CPA. Therefore, following equation is applied to calculate project emissions according to AMS-II.C. (version 9) and AMS-I.D. (version 13).

The energy baseline

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

Where:

E_B Annual energy baseline in kWh per year (kWh)
$\sum_i$ 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 devices of the group of "i" devices replaced.
o_i The average annual operating hours of devices of "i" devices replaced (hours) = 4380 hours

Baseline emissions

$$BE_y = E_B * EF_{grid} * 1/1000$$

Where:

BE_y Annual baseline emissions in year y (tCO_2)
E_B Annual electricity consumption in baseline scenario (kWh)
EF_{grid} Emission factor of the connected grid (kg CO_2/kWh)＝0.69009kg CO_2/kWh

For details, please see Section E.4. and Annex 3.

Project emissions

$$PE_y = E_P * EF_{grid} * 1/1000$$

Where:

PE_y Annual project emissions in year y (tCO_2)
E_P Annual electricity consumption in project scenario (kWh)
EF_{grid} Emission factor of the connected grid (kg CO_2/kWh)＝0.69009kg CO_2/kWh

Leakage

Replaced lamps will be scrapped. Therefore, there is no leakage from this project activity.

Emission reduction

Emission reduction of a SSC-CPA is calculated by the following equation:

$$ER_y = BE_y - PE_y$$

Where:
ER_y Annual emission reductions in year y (tCO_2)
BE_y Annual baseline emissions in year y (tCO_2)
PE_y Annual project emissions in year y (tCO_2)

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

Data / Parameter:	**EF_{grid}**
Data unit:	tCO_2/kWh
Description:	Emission factor of the connected grid
Source of data used:	Calculated based on the most recent data.
Value applied:	0.69009
Justification of the choice of data or description of measurement methods and procedures actually applied :	The grid emission factor is calculated using the "Tool to calculate the emission factor for an electricity system," according to AMS.I.D. (version 13). A combined margin is selected, and the simple OM method is applied. For OM, ex-ante option of Step 2 and Option (A) of Step 3 of the Tool are selected for the calculation. For BM, Option 1 of Step 4 is selected. See Annex 3 for details.
Any comment:	

Data / Parameter:	**n_i**
Data unit:	Units
Description:	The number of lamps replaced.
Source of data used:	ECC
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	ECC will count the number of old lamps replaced.

Any comment:	

Data / Parameter:	**p_i**
Data unit:	kW
Description:	Power capacity of old lamps replaced.
Source of data used:	ECC
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	ECC checks the power capacity of old lamps replaced.
Any comment:	

Data / Parameter:	**o_i**
Data unit:	hours
Description:	The average annual operating hours of lamps.
Source of data used:	ECC
Value applied:	4380
Justification of the choice of data or description of measurement methods and procedures actually applied :	Operation hours per day are estimated as 12 hours.
Any comment:	

E.7. Application of the monitoring methodology and description of the monitoring plan:

D.7.1. Data and parameters to be monitored by each SSC-CPA:

Data / Parameter:	**E_P**
Data unit:	kWh
Description:	Annual electricity consumption in project scenario
Source of data to be used:	Electricity bill from electricity of Vietnam Ho Chi Minh (EVN-HCMC)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods	EVN-HCMC meters the electricity consumption per each alley. ECC will collect bills on monthly basis from ENV-HCMC and record the consumption data.

and procedures to be applied:	
QA/QC procedures to be applied:	Data will be collected and stored for the crediting period of CPA by ECC.
Any comment:	

Data / Parameter:	n_{Pi}
Data unit:	Units
Description:	The number of new lamps installed
Source of data to be used:	ECC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This variable is not considered for calculation
Description of measurement methods and procedures to be applied:	ECC will collect data from lighting company which installs new public lighting system.
QA/QC procedures to be applied:	Data will be collected and stored for the crediting period of CPA by ECC.
Any comment:	

Data / Parameter:	n_{Bi}
Data unit:	Units
Description:	The number of old lamps collected
Source of data to be used:	ECC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This variable is not considered for calculation
Description of measurement methods and procedures to be applied:	ECC will collect lamps from district and count them.
QA/QC procedures to be applied:	Data will be collected and stored for the crediting period of CPA by ECC.
Any comment:	

Data / Parameter:	n_{Si}
Data unit:	Units
Description:	Number of scrapped lamps

Source of data to be used:	ECC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This variable is not considered for calculation
Description of measurement methods and procedures to be applied:	ECC will hand old lamps to local scrapping company. ECC will receive receipt from scrapping company and check the number of lamps scrapped.
QA/QC procedures to be applied:	Data will be collected and stored for the crediting period of CPA by ECC.
Any comment:	

Data / Parameter:	p_{Pi}
Data unit:	kW
Description:	Power capacity of new lamps installed
Source of data to be used:	ECC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This variable is not considered for calculation
Description of measurement methods and procedures to be applied:	ECC will receive the receipt which shows type of lamps newly installed from lighting company.
QA/QC procedures to be applied:	Data will be collected and stored for the crediting period of CPA by ECC.
Any comment:	

Data / Parameter:	p_{Bi}
Data unit:	Units
Description:	Power capacity of old lamps collected
Source of data to be used:	ECC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This variable is not considered for calculation
Description of measurement methods and procedures to be	ECC will collect old lamps from each district and count the number of them.

applied:	
QA/QC procedures to be applied:	Data will be collected and stored for the crediting period of CPA by ECC.
Any comment:	

Data / Parameter:	$FC_{i,m,y}$
Data unit:	Mass or volume unit
Description:	Amount of fuel type *i* consumed by power plant/unit *m* in year *y*
Source of data to be used:	Recapitulative Report on the Operation of Vietnam National Electricity System in Year 2006
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Values provided in Annex 3.
Description of measurement methods and procedures to be applied:	Monitored once for each crediting period using the most recent three historical years for which data is available.
QA/QC procedures to be applied:	
Any comment:	Used for calculation of the simple OM where fuel consumption data is available for all power plants/units as per equation in the "Tool to calculate the emission factor for an electricity system"

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/mass or volume unit
Description:	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data to be used:	Recapitulative Report on the Operation of Vietnam National Electricity System in Year 2006
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Value provided in Annex 3
Description of measurement methods and procedures to be applied:	Simple OM: Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the PDD to the DOE for validation. BM: For the first crediting period, once ex-ante following the guidance included in step 4 of the "Tool to calculate the emission factor for an electricity system". For the second and third crediting period, only once ex-ante at the start of the second crediting period.
QA/QC procedures to be applied:	
Any comment:	Used for calculation of the simple OM where fuel consumption data is available for all power plants/units as per equation in the "Tool to calculate the emission factor for an electricity system"

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel type *i* in year *y*
Source of data to be used:	IPCC default values provided in 2006 IPCC Guidelines on National GHG Inventories.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Values provided in Annex 3
Description of measurement methods and procedures to be applied:	Simple OM: Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the PDD to the DOE for validation. BM: For the first crediting period, once ex-ante following the guidance included in step 4 of the "Tool to calculate the emission factor for an electricity system". For the second and third crediting period, only once ex-ante at the start of the second crediting period.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$EG_{m,y}$
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid by power plant/unit *m* in year *y*
Source of data to be used:	Recapitulative Report on the Operation of Vietnam National Electricity System in Year 2006
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Values provided in Annex 3
Description of measurement methods and procedures to be applied:	Simple OM: Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the PDD to the DOE for validation. BM: For the first crediting period, once ex-ante following the guidance included in step 4 of the "Tool to calculate the emission factor for an electricity system". For the second and third crediting period, only once ex-ante at the start of the second crediting period.
QA/QC procedures to be applied:	
Any comment:	

E.7.2. Description of the monitoring plan for a SSC-CPA:

The monitoring methodology for the category AMS-II.C. "Demand-side energy efficiency activities for specific technologies" (version 09) is applied for a SSC-CPA. The methodology consists of followings:

1. Meter electric use of streets where projects are implemented
2. Monitor the number and power of replaced lamps
3. Annual check to ensure that systems are still operating

ECC will keep record of all data required for monitoring. Figure 7 shows the monitoring structure for a SSC-CPA and each procedure is explained as below.

1. Meter electric use of streets where projects are implemented

EVN Ho Chi Minh will check the meter of electricity consumption for each alley every month and send bills to ECC. ECC will record the monthly electricity consumption for each alley in its database and also keep all bills from EVN Ho Chi Minh as evidences.

2. Monitor the number and power of replaced lamps

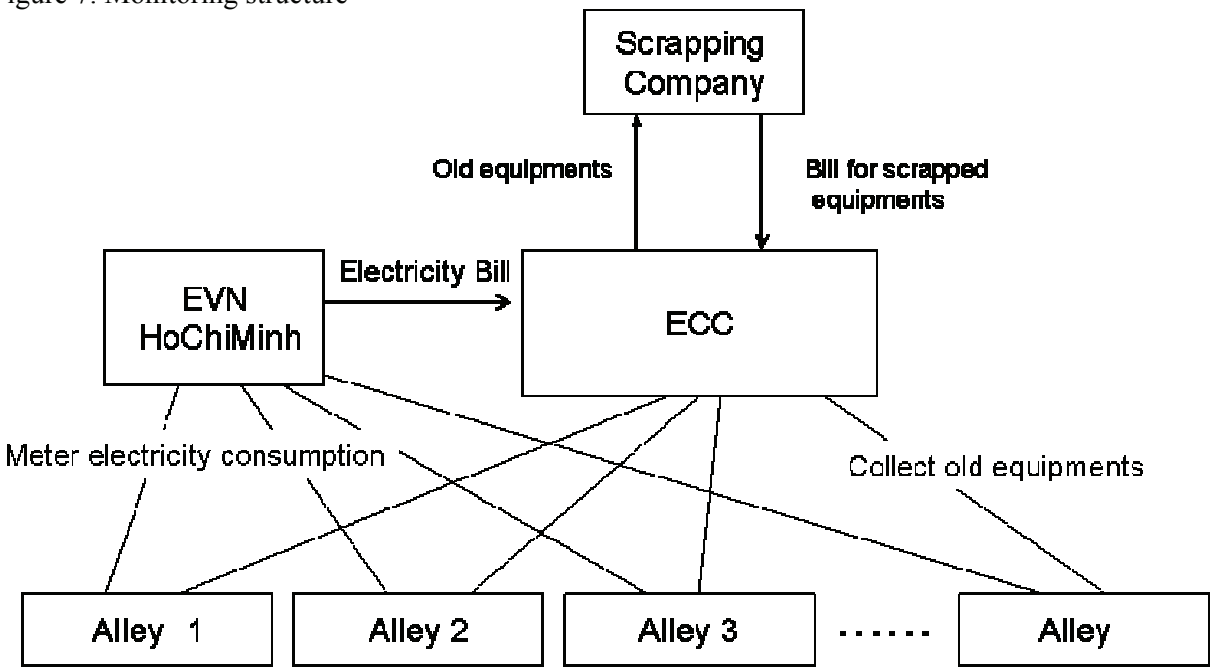
ECC will collect old equipments and check the number, type and power capacity of old lamps which are collected from each alley and send them to a local scrapping company. The local scrapping company will scrap all lamps and send bills to ECC. ECC will record the number of scrapped lamps to make sure that all old lamps collected from alleys are scrapped. ECC will record both the number of scrapped lamps and old lamps collected from each alley.

3. Annual check to ensure that systems are still operating

ECC will visit all alleys and check to ensure that systems are operating every year.

In addition to above, the baseline grid emission factor will be calculated *ex-ante* using historical data. After CDM registration, it will be necessary to monitor output of electricity to the EVN grid.

Figure 7. Monitoring structure



E.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

Simplified baseline and monitoring methodologies shown in AMS-II.C. (version 09) are employed.
Date of completion of the baseline is indicated in the baseline information in Specific CPA DD.

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Annex 1

CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY and PARTICIPANTS IN THE PROGRAMME of ACTIVITIES

Organization:	The Energy Conservation Center, HoChiMinh City (ECC)
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Represented by:	
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

119,200USD will be offered on loan from Ho Chi Minh City. This is not diversion of ODA.

Annex 3

BASELINE INFORMATION

Table 1: Rate of low cost/must-run sources based on generation[1]

Year	2002	2003	2004	2005	2006	Average
Hydro power generation (GWh)	18,205	19,034	17,759	16,221	19,209	18,086
Total (GWh)	36,415	41,304	46,508	52,935	59,894	47,411
Rate of low cost/must-run sources generation (%)	49.99	46.08	38.18	30.64	32.07	38.15

[1] Sources: Recapitulative Report on the operation of Vietnam Netional Electricity System in Year 2006, EVN/National Electricity system Dispatching Center - Department for Electricity System Operation, Hanoi, January 2007

Table 2: Electricity outputs and fuel consumptions of thermal power sources in 2004– 2006[2]

Fuel Type		2004	2005	2006
Coal	GWh	7,075	8,518	9,601
NCV=7000 kcal/kg	kt	2,921	3,480	3,921
CO2EF=94.6kgCO2/GJ-IPCC-2006	kt CO_2	8,087	9,632	10,852
Gas Turbine (Gas)	GWh	14,155	18,380	20,424
CO2EF=56.1kgCO2/GJ-IPCC-2006	GJ	173,468,228	224,679,439	251,139,260
	kt CO_2	9,732	12,605	14,089
Gas Turbine (Diesel Oil)	GWh	250	446	221
NCV=10,200 kcal/kg-Vietnam	kt	72	125	66
CO2EF=74.1kgCO2/GJ-IPCC-2006	kt CO_2e	226	395	208
Diesel Oil	GWh	43	16	25
NCV=10,200 kcal/kg-Vietnam	kt	11	4	7
CO2EF=74.1kgCO2/GJ-IPCC-2006	kt CO_2e	36	13	21
Fuel Oil	GWh	2,348	3431	3181
NCV=9,900 kcal/kg-Vietnam	kt	667	974	905
CO2EF=77.4kgCO2/GJ-IPCC-2006	kt CO_2e	2,138	3119	2900
Add on Power	GWh	4,839	5540	6267
Imported electricity	GWh	39	383	966
Total CO2 emission from Vietnam grid	kt CO_2e	20,218	25,763	28,070
Total thermal electricity output generated	GWh	28,749	36,714	40,685

[2] Sources: Recapitulative Report on the operation of Vietnam Netional Electricity System in Year 2006,
EVN/National Electricity system Dispatching Center - Department for Electricity System Operation, Hanoi, January 2007

Table 3: The power plant capacity additions in the electricity system that comprise 20% of the system generation (in GWh) and that have been built most recently[3]

No	Plant name	Commissioning year	Capacity (MW)	Outputs (GWh)	Energy type	Emission (kt CO2)
1	Se San 3	2006	260	614	Hydro	0
2	Cao Ngan	2006	115	62	Coal	70
3	Na Duong	2005	110	709	Coal	801
4	Srokphumieng	2006	51	10	Hydro	0
5	Dam Phu My	2005	18	45	Gas	31
6	Phu My 2-2	2004	733	4,855	Gas	3,349
7	Phu My 3	2004	733	4,110	Gas	2,835
8	Phu My 4	2004	468	2,026	Gas	1,390
	Total		2,488	12,431		**8,476**

Annex 4

MONITORING INFORMATION

Described in section E.7.2.

[3] Sources: Recapitulative Report on the operation of Vietnam Netional Electricity System in Year 2006,

EVN/National Electricity system Dispatching Center - Department for Electricity System Operation, Hanoi, January 2007