CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD)
Version 01

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NOTE:

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

(ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)[1,2] that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

[1] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[2] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of small scale CDM programme activity (CPA)

Note: This template contains highlighted text. The plain text cannot be edited by SSC- CPAs and is common to all SSC-CPAs. Only the highlighted sections shall be edited by the CPA owner.

A.1. Title of the small-scale CPA:

LED's save energy – CPA-XXX [indicate number]
Version Number: XX
Date: dd/mm/yyyy

A.2. Description of the small-scale CPA:

The proposed small-scale CDM programme activity (hereafter referred to as CPA) consists of the distribution and installation of LED lighting equipment under the 'LED's save energy' Programme of Activities (hereafter referred to as PoA). The goal of the CPA is to contribute to the sustainable development of India by increasing the energy efficiency of India's lighting sector.

include desciption of proposed targeted end-users

LED lighting equipment (LED stands for Light Emitting Diodes) under this CPA may include both an LED light source (lamp) as well as an LED luminaire (including lamp and corresponding power conversion electronics, thermal management, fixture etc.).

Under the CPA, LED lighting equipment will be installed in publicly, commercially, industrially or otherwise employed locations. The dissemination and installation of LEDs may involve two types of activities:

- Brownfield; replacement of existing lighting equipment with LED lighting equipment; and
- Greenfield; the installation of LED lighting equipment at new locations where LED equipment is not the common practice

The CPA end-users can obtain the LED lighting equipment at favourable conditions due to CER benefits.

The proposed SSC-CPA will abate greenhouse gas emissions through the increase in energy efficiency of the targeted lighting systems and the corresponding fossil fuel combustion avoided to generate the electricity. CPA-XXX is expected to reduce XXXXX tonnes of CO_{2e} over the selected ten year crediting period.

A.3. Entity/individual responsible for the small-scale CPA:

The entity responsible for the proposed CPA-XXX is XXX [include name of CPA owner], hereafter referred to as CPA owner.

A.4. Technical description of the small-scale CPA:

A.4.1. Identification of the small-scale CPA:

LED's save energy – CPA-XXX

A.4.1.1. Host Party:

Republic of India.

A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

The physical boundary of CPA-XXX is defined by the LED lighting equipment installed in facilities of the end-users that are participating in the CPA-XXX, i.e. that have installed LED equipment disseminated under CPA-XXX and that have ceded their carbon rights to the CPA owner, <name of CPA owner>.

Accordingly, the geographic boundary of the CPA-XXX coincides with the geographical boundary of the PoA.

Project participants will make sure that all equipment installed can be uniquely identified by means of its geographical location. Exact installation location will be described by a:

- Unique address or description of location (room number, name of terminal, industrial facility etc.
- If necessary, position of equipment in the operator's own record keeping system (based on constructional drawing, building or site design, road kilometre marks etc.)

When LED lighting equipment is installed under the CPA, this is recorded in the CPA data set by the parameter 'exact installation location'. This parameter is a unique address and/or description of the location where LED lighting equipment is installed.

All CPA data sets are aggregated at PoA level in a central database. At verification, the Coordinating or Managing Entity (CME) of the PoA reviews the CPA data sets and checks whether the parameter 'exact installation location' is unique.

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

The start date of any CPA is not, or will not be, prior to the commencement of validation of the programme of activities, i.e. the date on which the CDM-PoA-DD was first published for global stakeholder consultation, 1st of July 2011.
The starting date of CPA-XXX is set as dd/mm/yyyy, the date of the first LED lighting equipment installed under the activity, which is after the date on which the CDM-PoA-DD is first published for global stakeholder consultation.

A.4.2.2. Expected operational lifetime of the small-scale CPA:

10 years.

A.4.3. Choice of the crediting period and related information:

Fixed crediting period.

A.4.3.1. Starting date of the crediting period:

The starting date of the crediting period is set as dd/mm/yyyy, the date of the first LED lighting equipment installed or the date of including the CPA-XXX under the registered PoA.

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

Not applicable since fixed crediting period is chosen.

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

A fixed crediting period of ten years is chosen for the CPA-XXX. Over this period, the CPA-XXX is expected to generate greenhouse gas emission reductions of XXXXXX tonnes of CO_{2e}. Table 1 shows the estimated annual and total emission reductions.

Years	Estimation of annual emission reductions in tonnes of CO_2 e
20XX	XXXX
20XX	XXXX
20XX	XXXX
20XX	XXXX
20XX	XXXX
20XX	XXXX
20XX	XXXX
20XX	XXXX
20XX	XXXX
20XX	XXXX
Total estimated reductions (tonnes of CO_2 e)	XXXX
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	XXXX

Table 1 Estimated GHG emission reductions over crediting period

A.4.5. Public funding of the CPA:

The proposed small-scale CPA will not receive any public funding.

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

According to 'Guidelines on assessment of de-bundling for SSC project activities' (Version 03), a CPA is exempted from performing a de-bundling check if each of the independent subsystems/measures included in the CPA of a PoA is no greater than 1% of the small-scale thresholds defined by the methodology applied. In this programme, as well as this CPA, a single LED lighting equipment unit is the subsystem/measure. An LED lighting equipment unit will not entail more than 1% of the total energy savings of any CPA. Therefore the use of many LED lighting equipment units under one CPA is allowed regardless of the geographical location of the LED equipment units and is not regarded as de-bundling. However, the maximum savings of 60 GWh per year as upper limit of a small-scale CPA means that only a limited number of LED equipment units (hereafter LED lighting equipment) can be included within one CPA.

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

SSC-CPA status is indicated as below:

No	SSC-CPA status	Compulsory answer
1	This project will not be registered as an individual CDM activity and is not part of another registered PoA.	[add assessment result, prerequisite for inclusion is YES]
2	The LED lighting equipment is identified by the parameter: "exact installation location" describing the location where the LED lighting equipment is installed and ensuring that double counting of LED lighting equipment under the CPAs does not occur.	[add assessment result, prerequisite for inclusion is YES]

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

"LED's save energy" programme of activities registered under the reference number XXXXX

B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA:

CPA-XXX is eligible for inclusion under the "LED's save energy" programme if all eligibility criteria described under the PoA-DD are fulfilled. These criteria are presented in table 2. The CME shall check the Eligibility Criteria for Inclusion and summarise its findings in the Eligibility Check Report of the proposed CPA. This Report shall be signed by both the CME and the CPA-owner.

No	Eligibility Criteria 'information to be checked'	Verifiable data source	Result
1	Does the CPA regard solely distribution within the programme's geographic boundary as defined in the SSC-PoA-DD? 'geographical boundary'	GPS coordinates in Google-Earth/Google-Maps format.	[ok/not ok]
2	Shall the end user locations be uniquely identifiable by address and/or unique location description to avoid double counting of emission reductions? (new) 'avoid double counting'	Procedure and record keeping system for the specific CPA based on the monitoring templates as provided under Annex 4.	[ok/not ok]
3	Do the end users of the LED lighting equipment waive all their rights to CERs generated under the CPA to the respective CPA owner(s)? 'CER waiver'	Signed CER waiver by end-user(s) included under the CPA and the CPA owner.	[ok/not ok]
4	Does the CPA regard the installation of LED lighting equipment? which may or may not include an LED luminaire (including lamp and corresponding power conversion electronics, thermal management, fixture etc.)? 'LED lighting equipment'	Specsheet(s) of the proposed LED lighting equipment to be installed under the CPA.	[ok/not ok]
5	Will the CPA owner ensure that for each installed LED lighting equipment the rated capacity or output or level of service (e.g., lumen output) is not significantly smaller (maximum - 10%) than the baseline or significantly larger (maximum + 50%) than the baseline? 'level of service'	Specsheet(s) of the identified LED equipment data. Including a statement that the level of service (e.g., lumen output) is not significantly smaller (maximum - 10%) than the baseline or significantly larger (maximum + 50%) than the lighting equipment to be replaced.	[ok/not ok]
6	Has the CPA provided a forecast concerning the CPA start date supported through documentary evidence? 'start date'	The CPA owner shall provide the purchase order for the first LED lighting equipment to be installed for the first end-user under the applicable CPA (or similar e.g. purchase quotation or draft PO if the installations have not started)	[ok/not ok]
7	Has the CPA Owner confirmed that the CPA under the PoA is a voluntary action and is neither registered as an individual CDM project activity nor included in another registered CDM PoA? 'voluntary action, double counting'	The UNFCCC website shall be used to check whether a prospective CPA is already a registered CDM project or if the prospective CPA is already included in another registered CDM PoA. Signed statement by the CPA owner confirming the CPA under the PoA is a voluntary action.	[ok/not ok]

8	Does the CPA comply with the applicability criteria of methodology AMS-II.C "Demand-side energy efficiency activities for specific technologies" (version 13) used in the PoA? 'applicability criteria'	See eligibility criteria 4, 15 and 5. For the verfication of scrapping of old equipment: (a) a signed (or if installation has not started, a negotiated) contract between the CPA owner and the by the CME appointed scrapping actor, and (b) the procedure for scrapping of old lighting equipment includes data capture based on the template for scrapping as provided under Annex 4.	[ok/not ok]
9	Will the CPA meet the requirements pertaining to the demonstration of additionality as specified in EB 68, Annex 27, *Guidelines on the demonstration of additionality of small-scale project activities (Version 09)*? 'additionality'	The CPA owner is to provide the following: 1) Justification of the option(s) selected from the list of favourable conditions as described under the CPA-DD section B.3, 2) Signed (or if installation has not started, a negotiated) ERPA between the CPA owner and the CER buyer, 3) Signed (or if installation has not started, a negotiated) inclusion agreement between the CPA owner and the CME.	[ok/not ok]
10	Does the CPA rule out including facilities that are covered by an enforced government policy that includes mandatory adoption of LED lighting equipment? 'enforced government policy'	The CME is to provide a statement based on annual monitoring of the enforced government policy considering the mandatory adoption of LED lighting equipment. The CPA owner is to provide a description of the status of enforced government policy considering the mandatory adoption of LED lighting equipment for the identified facility/(ies).	[ok/not ok]
11	Is the market penetration of LED lighting in India below 33% at the time of inclusion of the CPA? 'market penetration'	Publicly available statistics or expert statement. If an expert statement is selected, the CPA owner shall provide information on the expert to allow verification on expertise, relevance and independence.	[ok/not ok]
12	Has the owner of the CPA provided an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance? 'ODA diversion'	Signed statement by prospective CPA owner affirming that funding from Annex I parties, if any, does not result in a diversion of official development assistance.	[ok/not ok]

13	Does the CPA involve the installation of LED lighting equipment for grid-connected use in publicly, commercially, industrially or otherwise employed locations? 'grid connected use'	The record keeping system shall include a template considering 'lamp replacement data'. In this template the LED lighting equipment shall be assigned to one of the two interconnected Indian electricity grids (NEWNE or the Southern grid). Only lighting equipment that is assigned to one of these two electricity grids can be included under the CPA.	[ok/not ok]
14	Does the CPA comply with the sampling requirements as per the sampling plan of the PoA, in accordance with the 'Standard for sampling and surveys for CDM project activities and programme of activities' (Version 03.0), EB 69, Annex 4? 'sampling'	The monitoring plan of the CPA-DD shall include at least 70 meters per respective stratum of LED lighting equipment. Signed (or if installation has not started, a negotiated) contract between the prospective CPA owner and the by the CME approved monitoring actor.	[ok/not ok]
15	Will the energy savings be capped at 60 GWh/per year? 'small scale limit'	Procedure and record keeping system for the specific CPA based on the monitoring templates as provided under Annex 4.	[ok/not ok]
16	Is the SSC-CPA approved by the CME and the DOE prior to its incorporation into the PoA? 'approval'	By the CME approved Eligibility Check Report and a positive validation (inclusion) opinion of the DOE regarding the prospective CPA.	[ok/not ok]
17	Does the SSC-CPA satisfy de-bundling rules for PoA through the fact that each installation accounts for less than 1% of the total energy savings of the SSC-CPA? (These rules are elaborated on in chapter A.4.4.1.) 'debundling'	Records of the rated wattage of the baseline lamp and the identified LED lighting equipment, based on the monitoring templates as provided under Annex 4.	[ok/not ok]

Table 2 CPA eligibility criteria, verifiable data source and result.

B.3. Assessment and demonstration of additionality of the small-scale CPA , as per eligibility criteria listed in the Registered PoA:

Additionality is determined at PoA level. The demonstration of the additionality is outlined in section A.4.2.2. of the SSC-PoA-DD.

Favourable conditions through which end-users can obtain their LEDs have been defined as a list of options under which the CPA end-user can obtain the LED lighting equipment. For each CPA the applicable option is to be selected.

- ☐ Promotion: awareness raising, information dissemination
- ☐ Energy audit
- ☐ Energy Performance Contract (ESCO Service)

- ☐ Matchmaking with appropriate technology provider
- ☐ Capacity building at the end-user
- ☐ Payment by the end-user in installments over time
- ☐ Discount on purchase price
- ☐ Support with identification of financing options
- ☐ Other, please describe:

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.

The table below shows the gases included in the SSC-CPA boundary and their respective sources.

Source		Gas	Included?	Justification / Explanation
Baseline	Power plants servicing the electricity grid	CO_2	Yes	Main source of emission.
		CH_4	No	Excluded for simplification. Minor source of emission. Conservative.
		N_2O	No	Excluded for simplification. Minor source of emission. Conservative.
Project Activity	Power plants servicing the electricity grid	CO_2	Yes	Main source of emission.
		CH_4	No	Excluded for simplification. Minor source of emission. Consistent with baseline.
		N_2O	No	Excluded for simplification. Minor Source of emission. Consistent with baseline.

Table 3: GHG sources included in the CPA boundary

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

Data / Parameter:	$EF_{CO2,ELEC,y}$
Data unit:	$kgCO_2/kWh$
Description:	CO_2 emission factor for displacement of electricity in the grid serving the end-users that participate in the SSC-CPA during the monitoring interval y,
Source of data used:	The latest version of CDM baseline CO_2 emission database by Central Electricity Authority (CEA), Ministry of power, Government of India
Value applied:	SSC-CPA to apply value as per the grid-connectivity
Justification of the choice of data or description of measurement methods and procedures actually applied:	The CO_2 emission factor shall be calculated according to the latest approved version of the 'Tool to calculate the emission factor for an electricity system. The SSC-CPA owner shall apply the latest grid emission factor database available on the CEA website and fix the value ex-ante at the time of CPA inclusion.
Any comment:	-

B.5.2. Ex-ante calculation of emission reductions:

Emission Reductions

The emission reduction achieved by the project activity shall be determined as the difference between the baseline emissions and the project emissions and leakage.

Calculation ER_y - Emission reductions from avoided electricity consumption in year *y* (tCO_2/y)			
$ER_y = (BE_y - PE_y) - LE_y$ (Equation 1)			
Parameter		Value applied	Source
BE_y	Baseline emissions from electricity consumption in year *y* (tCO_2/y)	XXX	Own calculations
PE_y	Project emissions from electricity consumption in year *y* (tCO_2/y)	XXX	Own calculations
LE_y	Leakage emissions in year *y* (tCO_2/y). The leakage effect of the use of the replaced equipment in another activity can be neglected if the replaced equipment is scrapped.	0	n.a.

Baseline

The emission baseline is determined as the product of the electricity consumption of the old equipment replaced (in case of brownfield) or the electricity consumption of the equipment avoided (in case of greenfield) and the emission factor for the electricity displaced.

Calculation BE_y - Baseline emissions in monitoring period y (tCO_2e)			
$BE_y = E_{BL,y} * EF_{CO_2,ELEC,y}$ (Equation 1)			
$E_{BL,y} = \frac{\sum_i (n_i * p_i * o_i)}{(1-l_y)}$ (Equation 2)			
Parameter		Value applied	Source
$BE_{,y}$	CO_2 emissions in the baseline (tCO2/year)	XXX	Own calculations
$E_{BL,y}$	Energy consumption in the baseline in monitoring period y (kWh)	XXX	Own calculations
$EF_{CO2,ELEC,y}$	Emission factor in monitoring period y calculated in accordance with "Tool to calculate the emission factor for an electricity system".(tCO_2/MWh)	XXX	Central Electricity Authority (CEA), Ministry of power, Government of India
n_i	The number of devices of the group of "i" devices replaced (brownfield) and "i" devices avoided installation (greenfield), for which the substituted energy efficient equipment is operating during the monitoring period.	XXX	Own calculations
p_i	The power of the devices of the group of "i" devices replaced (brownfield) and "i" devices avoided installation (greenfield).	XXX	Own calculations
o_i	The average operating hours during the monitoring period of the devices of the group of "i" devices replaced (brownfield) and "i" devices avoided installation (greenfield).	XXX	Own calculations
l_y	Average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations where the devices are installed.	XXX	Published data by an official governmental body or 10 % Default

Project Emissions

The project emissions are determined as the product of the energy consumption of the project and the emission factor for the electricity displaced.

Calculation PE_y - Project emissions in monitoring period y (tCO_2e)			
$PE_y = E_{p,y} * EF_{CO_2,ELEC,y}$ (Equation 3)			
$E_{p,y} = \sum_k (n_k * p_k * o_k)/(1 - l_y)$ (Equation 4)			
Parameter		Value Applied	Source
$PE_{,y}$	CO_2 emissions in the baseline (tCO2/year)	XXX	Own calculations
$E_{P,y}$	Energy consumption due to the project in monitoring period y (kWh)	XXX	Own calculations
$EF_{CO2,ELEC,y}$	Emission factor in monitoring period y calculated in accordance with "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)	XXX	Central Electricity Authority (CEA), Ministry of power, Government of India
n_k	The number of devices of the stratum of "k" LED lighting equipment that is operating during the monitoring period. This parameter will be corrected with the monitoring data on failure of devices throughout the monitoring period	XXX	Own calculations
p_k	The power of the devices of the group of "k" LED lighting equipment that is operating during the monitoring period	XXX	Own calculations
$o_{k,net,y}$	The average operating hours during the monitoring period of the devices of the stratum "k" of LED lighting equipment in year (y)	XXX	Own calculations
l_y	Average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations where the devices are installed.	XXX	Published data by an official governmental body or 10 % Default

Calculation ok_{net} – Net operating hours			
$o_{k,net,y} = o_{k,y} * (1 - (r_{failure,k,y} * of_{k,y}))$ (Equation 5)			
Parameter		Value Applied	Source
$o_{k,net,y}$	The average operating hours during the monitoring period of the devices of the stratum "k" of LED lighting equipment in year (y)	XXX	Own calculations
$o_{k,y}$	The metered operating hours of the devices of the stratum "k" LED lighting equipment in year (y)	XXX	Metered sample group(s)
$r_{failure,k,y}$	Lamp Failure rate is the % of lamps that have failed and are replaced within stratum "k" LED lighting equipment with comparable LED lighting equipment as part of a Warranty Scheme (guaranteed by the LED manufacturer), or part of a regular maintance scheme.	XXX	Periodic non-metered sampling survey(s).
$of_{k,y}$	Outage factor of LED lighting equipment within stratum "k" that discounts the operating hours, based on elapsed time between the failure of the LED lighting equipment and the replacement. A default value of 3 months (25%) is to be used.	XXX	Default value

B.5.3. Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tonnes of CO_2 e)	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reductions (tonnes of CO_2 e)
20XX	XXXX	XXXX	XXXX	XXXX
20XX	XXXX	XXXX	XXXX	XXXX
20XX	XXXX	XXXX	XXXX	XXXX
20XX	XXXX	XXXX	XXXX	XXXX
20XX	XXXX	XXXX	XXXX	XXXX
20XX	XXXX	XXXX	XXXX	XXXX
20XX	XXXX	XXXX	XXXX	XXXX
20XX	XXXX	XXXX	XXXX	XXXX
20XX	XXXX	XXXX	XXXX	XXXX
20XX	XXXX	XXXX	XXXX	XXXX
Total (tonnes of CO_2 e)	XXXX	XXXX	XXXX	XXXX

Table 4 Summary of the ex-ante estimation of emission reductions

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

The following paragraphs will describe the proposed monitoring and sampling method/procedure to be used for verification of the amount of emission reductions achieved under CPA-XXX.

The following parameters will be monitored for CPA-XXX.

Data / Parameter:	l_y
Data unit:	%
Description:	Average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations where the lighting equipment is installed.
Source of data to be used:	Published data by an official governmental body or 10 % Default
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A; available only *ex-post.*
Description of measurement methods and procedures to be applied:	THE SSC-CPA's database identify for eacht LED lighting equipment the relevant distribution company (DISCOM). The most recent availablel publication is to be used. The average annual grid losses will be determined upon installation of each LED lighting equipment and will be fixed throughout the crediting period.
QA/QC procedures to be applied:	By using official publications by DISCOMs or official governmental bodies the quality of the value of the data is ensured, as this is the best available source. A CME representative will perform spot-checks on data entries by the CPA-owner in order to minimise data entry errors.
Any comment:	-

Data / Parameter:	n_i
Data unit:	Number
Description:	Number of replaced equipment collected (brownfield) and number of avoided equipment installed (greenfield) under SSC-CPA XXX
Source of data to be used:	Database SSC-CPA XXX
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A; available only *ex-post*.
Description of measurement methods and procedures to be applied:	At the time of LED lighting equipment installation, the number of replaced equipment (brownfield) or avoided equipment (greenfield) will be recorded. A distinction between brownfield and greenfield installation will be made in the data entries, which allows for allocation at a later stage.

QA/QC procedures to be applied:	A CME representative will perform spot-checks on data entries by the CPA-owner in order to minimise data entry errors.
Any comment:	For the calculation of the emission reductions both brownfield and greenfield number are placed under the same parameter for simplicity. As per paragraph 12 of AMS II.C. Demand-side energy efficiency activities for specific technologies (v13) a representative sample of the replaced devices (including the number and "power") will be recorded to allow for physical verification by the DOE. The number and "power" of the replaced equipment to be recorded for physical verification is based on the identified samples within the metered sampling survey ($\mathbf{S_{metered,k}}$). That means, if a meter is installed the replaced lamp is collected and stored for verification.

Data / Parameter:	$\mathbf{n_{scrapped}}$
Data unit:	Number
Description:	Number of replaced equipment collected (brownfield) that is scrapped under SSC-CPA XXX
Source of data to be used:	Database SSC-CPA XXX
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A; available only *ex-post*.
Description of measurement methods and procedures to be applied:	As per the methodology AMS-II.C Demand-side energy efficiency programmes for specific technologies (version 13) replaced equipment (old lamps) must be scrapped, in order to prevent leakage and ensure correct disposal. The contracted scrapping entitiy will provide independently verified data on the scrapped equipment. This allows for a check whether the number of project activity equipment distributed by SSC-CPA XXX and the number of scrapped equipment correspond with each other. The scrapping of replaced equipment will be documented and independently verified
QA/QC procedures to be applied:	A CME representative will perform spot-checks on data entries by the CPA-owner in order to minimise data entry errors.
Any comment:	-

Data / Parameter:	$\mathbf{n_k}$
Data unit:	Number
Description:	Number of installed LED lighting equipment under SSC-CPA XXX
Source of data to be used:	Database SSC-CPA XXX
Value of data applied for the purpose of	N/A; available only *ex-post*.

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	At the time of installation, the number of LED lighting equipment installed will be recorded and subsequently entered into the database of SSC-CPA XXX.
QA/QC procedures to be applied:	A CME representative will perform spot-checks on data entries by the CPA-owner in order to minimise data entry errors.
Any comment:	-

Data / Parameter:	p_i
Data unit:	Watt
Description:	Power of the replaced equipment (brownfield) or the most conservative common practice power of the avoided equipment installed (greenfield) in the baseline.
Source of data to be used:	Database SSC-CPA XXX
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A; available only *ex-post*.
Description of measurement methods and procedures to be applied:	At the time of installation, the name plate wattage of replaced equipment (brownfield) or of the most conservative common practice as avoided equipment installed (greenfield) will be recorded.
QA/QC procedures to be applied:	A CME representative will perform spot-checks on data entries by the CPA-owner in order to minimise data entry errors.
Any comment:	As per paragraph 12 of AMS II.C. Demand-side energy efficiency activities for specific technologies (v13) a representative sample of the replaced devices (including the number and "power") will be recorded to allow for physical verification by the DOE. The number and "power" of the replaced equipment to be recorded for physical verification is based on the identified samples within the metered sampling survey ($S_{metered,k}$). That means, if a meter is installed the replaced lamp is collected and stored for verification.

Data / Parameter:	p_k
Data unit:	Watt
Description:	Power of the installed LED lighting equipment
Source of data to be used:	Database SSC-CPA XXX
Value of data applied for the purpose of calculating expected	N/A; available only *ex-post*.

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	At the time of installation, the name plate wattage of each installed LED lighting equipment will be recorded.
QA/QC procedures to be applied:	A CME representative will perform spot-checks on data entries by the CPA-owner in order to minimise data entry errors.
Any comment:	-

Data / Parameter:	$S_{metered,k}$
Data unit:	Number
Description:	Total number of metered samples for each stratum installed within a SSC-CPA in order to monitor mean operating hours of the installed LED lighting equipment under stratum k.
Source of data to be used:	Database SSC-CPA XXX
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined for SSC-CPA XXX, with a minimum of 70.
Description of measurement methods and procedures to be applied:	Sample size is determined with a confidence precision ratio of 90/10. This is in line with the requirements listed in the "General guidelines for sampling and surveys for small-scale CDM project activity (Version 1)". To be conservative the minimum number of installed metered samples per stratum k should be 70. SSC-CPA XXX may choose a sample size higher than the one calculated above.
QA/QC procedures to be applied:	The CPA owner has to hire a by the CME approved monitoring entity for the operating hours and execution of the non-metered sampling survey. This to ensure there are proper QA/QC in places for the monitoring.
Any comment:	-

Data / Parameter:	$S_{non-metered,k}$
Data unit:	Number
Description:	Total number of non-metered samples for each stratum installed within a SSC-CPA in order to monitor the mean failure rate of the installed LED lighting equipment under stratum k.
Source of data to be used:	Database SSC-CPA XXX
Value of data applied for the purpose of	To be determined for SSC-CPA XXX, with a minimum of 70.

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Sample size is determined with a confidence precision ratio of 90/10. This is in line with the requirements listed in the "General guidelines for sampling and surveys for small-scale CDM project activity (Version 1)". To be conservative the minimum number of installed metered samples per stratum k should be 70. SSC-CPA XXX may choose a sample size higher than the one calculated above.
QA/QC procedures to be applied:	The CPA owner has to hire a by the CME approved monitoring entity for the operating hours and execution of the non-metered sampling survey. This to ensure there are proper QA/QC in places for the monitoring. .
Any comment:	-

Data / Parameter:	o_k
Data unit:	Hours
Description:	Mean annual operating hours of LED lighting equipment installed.
Source of data to be used:	Metered sample group(s)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A; available only *ex-post*.
Description of measurement methods and procedures to be applied:	Continuous readings of monitoring equipment installed in metered sample group. Sub-populations to be monitored are stratified according to Lamp Classification. Specialised metering equipment is to be installed in monitoring sample group. This equipment will feed monitoring data back to the monitoring entity who digitalised and processes the incoming data and submits these to the CME.
QA/QC procedures to be applied:	All data entries will be checked on validity and correctness using dedicated software. A procedure has been developed to correct for non-valid data entries.
Any comment:	The number of meters to be installed per stratum k is defined under $S_{metered,k}$

Data / Parameter:	$r_{failure,y}$
Data unit:	%
Description:	Mean annual failure rate of the installed LED equipment.
Source of data to be used:	Periodic non-metered sampling survey(s).

Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A; available only *ex-post*..
Description of measurement methods and procedures to be applied:	Annual survey of non-metered sampling group for each stratum k. Sub-populations to be monitored are stratified according to Lamp Classification. Data will be aggregated and stored in the central database.
QA/QC procedures to be applied:	The survey will consist of identifying LED lighting equipment, based on their 'exact installation location' that are installed and operating. The exact installation location is the entry in the database that allows for a unique identification. While LED lighting equipment replaced as part of a regular maintenance or warranty program can be counted as operating, LED lighting equipment cannot be replaced as part of the survey process and counted as operating.
Any comment:	The number of LEDs to be included under the survey, per stratum k is defined under $S_{non\text{-}metered,k}$

Industry standard software, databases, infrastructure and backup procedures will allow full auditability with the aim of ensuring long-term data integrity and security so that data is not misreported, overwritten or lost. Data entry occurs decentralised at the point of LED lighting equipment installation. The full database is stored centrally.

Aggregated data will be stored in the central data base for at least two years after the crediting period or the last issuance of CERs to the programme, whichever occurs last.

Monitoring Procedures

Monitoring is performed at CPA level.

Four data streams can be distinguished with respect to the data collected during implementation and execution of the individual CPAs. These are:

1) Installation data including the details of lamp installation in particular the number and wattage of replaced (brownfield) or avoided (greenfield) equipment and the number and wattage of newly installed LED lighting equipment.
2) Scrapping data including the record on replaced and subsequently scrapped old lamp equipment.
3) Sampling data including the mean operating hours (metered samples) of the newly installed lamps and non-metered survey on failure rates.
4) If the devices installed replace existing devices (brownfield locations), the number and "power" of a representative sample of the replaced devices shall be recorded in a way to allow for a physical verification by DOE.

Both installation data and scrapping data are point measurements that are recorded once during the installation of new LED lighting equipment and the scrapping of replaced equipment, respectively. A dedicated scrapping entity that has been appointed by the CME is responsible for the disposal of the

replaced lamps generated out of the CPA-XXX. The scrapping entity will ensure that the replaced lamps will be disposed according to effective (enforced) applicable waste disposal regulations that exist in the project host country or region. The scrapping entity will also compile the necessary scrapping data and make it available for monitoring. Installation data is provided by the CPA owner who is responsible for the installation of LED equipment under their CPA. Sampling data is a continuous measurement. The CPA owner purchases monitoring services from a dedicated entity responsible for monitoring appointed by the CME. The monitoring entity is responsible for collecting the installation data from the CPA owner, the scrapping data from the scrapping entity and for sampling both operating hours and failure rate of the installed LED equipment as well as number and wattage of replaced equipment (brownfield). The monitoring entity subsequently sends the aggregated monitoring data (installation, scrapping and sampling data) of CPA-XXX to the CME who compiles a respective monitoring report which is sent to the DOE for verification and stored in the central database.

An overview of the monitoring set-up is provided in Table 5.

Roles under the programme	Name of entity fulfilling the role	Responsibilities
Coordinating and Managing Entity	Mabanaft Carbon India Pvt. Ltd.	• Operates and supervises central monitoring database • Checks aggregated CPA monitoring datasets to prevent double counting • Compiles monitoring reports per CPA and sends these to DOE for verification • Selects and proposes eligible entities to fulfil the monitoring and scrapping roles under the PoA
CPA Owner	XXX	• Delivers installation data to the entities fulfilling the monitoring role (parameters: n_i, n_k, p_i, p_k) • Must enter into a contract with monitoring and scrapping entities appointed by the CME to monitor according to the PoA monitoring plan
Monitoring Entity	XXX Qualified entity entered into agreement with CME	• Implements metered sampling to measure the mean operation time of installed LED lighting equipment (parameter: $S_{metered,i}$) • Whenever a meter is installed, the monitoring entity collects the replaced lamp. Collected lamps are stored for verification. • Implements non-metered sampling survey to determine the mean failure rate of installed LED lighting equipment (parameter: $S_{non\text{-}metered,i}$) • Collects all monitoring data: sampling data, installation data and scrapping data. Deliver the aggregated monitoring data to the CME
Scrapping Entity	XXX Qualified entity entered into agreement with CME	• Delivers scrapping data to monitoring entity fulfilling this role (parameter: r_i)

Table 5 Overview of monitoring roles and responsibilities

Sampling plan

See PoA-DD A.4.4.2. Sampling plan for a detailed description of the sampling plan.

Stratification of lamps used under CPA-001

Under the CPA-XXX LED lighting equipment is broadly divided into two categories: indoor and outdoor. Further these can be divided - as per the power mentioned on the nameplate data of the LED lighting equipment - into high power and low power.

Table 6: Lamp classification

Indoor		Outdoor	
Low power	High power	Low power	High power
<40 Watt	≥ 40 Watt	<20 Watt	≥ 20 Watt
IL (Indoor Low)	IH (Indoor High)	OL (Outdoor Low)	OH (Outdoor High)

Hence, all LED lighting equipment under the CPA-XXX will fall into one of the four strata: IL, IH, OL, OH identified above. These strata (classifications) are to be applied for the metered and non-metered sample groups.

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:

✕ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

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

Not applicable

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

Not applicable

SECTION D. Stakeholders' comments

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

✕ Please tick if this information is provided at the PoA level.
Sections D.2. to D.4. need not be completed in this form.

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

Not applicable. Stakeholder consultation is performed at PoA level

D.3. Summary of the comments received:

Not applicable. Stakeholder consultation is performed at PoA level.

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

Not applicable. Stakeholder consultation is performed at PoA level.

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE SMALL-SCALE CPA

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

CPA-XXX of the LED's Save Energy programme does not make use of public funding.

Annex 3

BASELINE INFORMATION

The latest available version (7.0) of the "BASELINE CARBON DIOXIDE EMISSIONS FROM POWER SECTOR" developed by the Central Electricity Authority is applied. The data is published on the CEA website:

http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

The methodological tool to calculate the emission factor for an electricity system determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system[3]. This is done by calculating the 'operating margin (OM)', the 'build margin (BM)' and the 'combined margin (CM)'. The operating margin refers to existing power plants whose electricity generation would be affected by the proposed CDM project activity. The build margin reflects the power units whose construction would be affected by the proposed CDM project activity. The tool follows sixsteps in order to calculate the operating margin, build margin and the combined margin:

Step 1: Identify the relevant electricity systems
Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)
Step 3: Select a method to determine the operating margin (OM)
Step 4: Calculate the operating margin emission factor according to the selected method
Step 5: Calculate the build margin (BM) emission factor
Step 6: Calculate the combined margin (CM) emission factor

Step 1: Identify the relevant electric power system

The Central Electricity Authority (CEA) (which is an official source of Ministry of Power, Government of India) has worked out baseline emission factors for various grids in India and made them publicly available. The Indian electricity system is divided into two power grids, the North- East- West- North-East (NEWNE) and the Southern grid. Since individual projects in the PoA can be located anywhere across India, the emission factor is calculated for both grids.

The baseline emission factor (including imports) of both regions published by CEA is considered for calculation of emission reductions due to displacement of electricity in accordance with the 'Tool to calculate the emission factor for an electricity system (Version 02.2.1)'.

[3] "Tool to calculate the emission factor for an electricity system" (Version 02.2.1).

NEWNE Grid				Southern Grid
Northern	**Eastern**	**Western**	**North-Eastern**	**Southern**
Chandigarh Delhi Haryana Himachal Pradesh Jammu & Kashmir Punjab Rajasthan Uttar Pradesh Uttarakhand	Bihar Jharkhand Orissa West Bengal Sikkim Andaman- Nicobar	Chhattisgarh Gujarat Daman & Diu Dadar & Nagar Haveli Madhya Pradesh Maharashtra Goa	Arunachal Pradesh Assam Manipur Meghalaya Mizoram Nagaland Tripura	Andhra Pradesh Karnataka Kerala Tamil Nadu Pondicherry Lakshadweep

Table 7: Geographical scope of the two electricity grids

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Under this step project participants may choose whether to include off-grid power plants to calculate the operating margin and build margin emission factor of the Indian electricity system. It was decided to not include off-grid power plants.

Step 3: Select a method to determine the operating margin (OM)

In accordance with the tool, the calculation of the operating margin emission factor ($EF_{grid,OM,y}$) must be based on one of the following methods:

a) Simple OM
b) Simple adjusted OM
c) Dispatch data analysis OM
d) Average OM.

For this programme the simple OM is selected. Of the four methods any can be used; however the simple OM method can only be used if low-cost/must-run resources constitute less than 50 % of total grid generation. The Tool states that:

"Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants."

The table below shows that 5-year average of low-cost/must-run power plants constitute 17,7% of the NEWNE grid and 24% of the Southern grid. Therefore the Simple OM method can be applied.

Table 8:Share of Must-Run (Hydro/Nuclear) (% of Net Generation) [4]

	2006-07	2007-08	2008-09	2009-10	2010-11	5-year average
NEWNE	18,5%	19,0%	17,4%	15,9%	17,6%	17,7%
South	28,3%	27,1%	22,8%	20,6%	21,0%	24,0%

For the Simple OM the emission factor can be calculated using either of the two following data vintages:

1. Ex-ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or
2. Ex post option: The year in which the project activity displaces grid electricity, required emissions factor to be updated annually during monitoring. If the data required calculating the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1, or y-2) should be used throughout all crediting periods.

The emission factor for this programme is calculated using the ex-ante option: i.e. using a 3-year average data. The OM is calculated using 3 year data calculated by Central Electricity Authority (CEA) in their CO_2 baseline database Version 7.0, January2012.[5]

Step 4: Calculation of the operating margin emission factor

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, **not including low-cost/must-run power plants/units.**

The simple OM may be calculated:
Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:

- The necessary data for Option A is not available; and
- Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
- Off-grid power plants are not included in the calculation.

For this programme, Option A has been used.

[4] Central Electricity Authority (CEA)-CO2 Baseline Database for the Indian Power Sector-Version 7.0, January 2012.

[5] Central Electricity Authority (CEA)-CO2 Baseline Database for the Indian Power Sector-Version 7.0, January 2012.

In the Simple OM method, the emission factor is calculated as generation weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. The data vintage option selected is the ex-ante approach, where a 3 year average OM is calculated. The CEA baseline is derived using the following formulae to calculate simple OM.

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y})}{EG_y}$$

Equation 2

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$FC_{i,,y}$	Amount of fossil fuel type *i*consumed in the project electricity systemin 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_y	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units,in year *y* (MWh)
i	All fossil fuel types combusted in power sources in the project electricity systemin year *y*
y	The relevant year as per the data vintage chosen in Step 3

The operating margin emission factor has been calculated using a 3-year data vintage from CEA database that uses the calculation approach described below.[6]

	2008-09	2009-10	2010-11	Weighted average
NEWNE	1,007	0,978	0,971	0,984
South	0,973	0,942	0,942	0,951

Table 9 Simple operating margin (tCO_2/MWh) (incl. imports)

Step 5: Calculate the build margin (BM) emission factor

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

[6]Central Electricity Authority (CEA)-CO2 Baseline Database for the Indian Power Sector-Version 7.0, January 2012.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

This programme of activity chooses to utilise Option 1 to calculate the build margin emission factor. The build margin emission factor is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period.
According to the *Tool to calculate the emission factor for an electricity system* (Version 02.2.1), the sample group of power units *m*is determined by:

a) Identifying $SET_{5\text{-units}}$: the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently, and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-units}}$, in MWh);

The following five power plants from the NEWNE grid have been identified:

Name of power plant	Data of commisioning	Electricitygeneration [MWh]
MEJIA TPS EXT	2011-03-26	1,446
FARAKKA STPS	2011-03-23	1,120
PRAGATI CCCP -III	2011-02-14	3,719
BARSINGAR LIGNITE	2011-01-25	135,429
KORBA STPS	2010-12-26	943,639
	AEGSET-5-units	1,085,353

The power plant Koteshwar (two units), located in the NEWNE grid, commissioned on 29 and 31 March 2011, has been excluded from the list above since its 2010-11 electricity generation was 0 MWh.

For the Southern gird the following five power plants have been identified:

Name of power plant	Data of commisioning	Electricity generation [MWh]
KAIGA	2011-01-20	204,149
RAYAL SEEMA	2010-12-31	145,494
STERLITE TPP (Unit 1)	2010-12-29	317,142
PRIYADARSHNI JURALA	2010-11-09	12,246
STERLITE TPP (Unit 2)	2010-10-14	579,128
	AEGSET-5-units	1,258,159

The power plant Simhadri, located in Southern grid, commissioned on 3 March 2011, has been excluded from the list above since its 2010-11 electricity generation was 0 MWh.

b) Identifying SET≥20%: the set of power units, excluding power units registered as CDM project activities, that started to supply the grid most recently and that comprise 20% of the annual

electricity generation of the project activity system (AEG_{total}, in MWh), and determine their annual electricity generation ($AEG_{SET\geq20\%}$, in MWh);

The following SET≥20% has been identified for the NEWNE grid

	Electricity generation [MWh]
AEG_{total}	579,181,175
20% of AEG_{total}	115,836,235
$AEG_{SET\geq20\%}$	**117,779,227**

The following SET≥20% has been identified for the Southern grid

	Electricity generation [MWh]
AEG_{total}	173,925,080
20% of AEG_{total}	34,785,016
$AEG_{SET\geq20\%}$	**35,267,933**

c) Determining SET_{sample} from $SET_{5\text{-units}}$ and $SET_{\geq20\%}$, by selecting the set of power units that comprises the larger electricity generation;

The values in sub-steps a) and b) shows that for the NEWNE and the Southern grid $AEG_{SET\geq20\%}$ is higher than $AEG_{SET\text{-}5\text{-units}}$. Therefore, in both cases, SET_{sample} equals $AEG_{SET\geq20\%}$. All power plants included in the SET_{sample} groups started to supply electricity to the grid less than 10 years ago. Therefore, SET_{sample} can be used to calculate the build margin for each grid.

Build Margin (tCO_2/MWh)	
	2010-11
NEWNE	0.859
South	0.734

Table 10 Build margin (tCO_2/MWh)

Step 6: Calculate the combined margin emission factor

The combined margin emission factor is determined with the following equation;

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

Equation 3

Where;

$EF_{grid,CM,y}$	Combined Margin CO_2 emission factor in year y ($EF_{grid,BM,y}$)
$EF_{grid,BM,y}$	Build Margin CO_2 emission factor in year y ($EF_{grid,BM,y}$)
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build margin emissions factor (%)

The following default values should be used for w_{OM} and w_{BM}:
Wind and solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods.

All other projects: w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

Considering that this programme of activity does not involve wind and solar power generation the default value used for w_{OM} and $w_{BM}$is 0.5. The resulting emission factor of the combined margin is illustrated in Table below..

	Simple Operating Margin	Build Margin	Combined Margin
NEWNE	0.984	0,859	0,921
South	0.951	0.734	0.843

Table 11 Combined margin (tCO_2/MWh)

$EF_{grid,CM,y}$ (NEWNE Grid) = 0.921 tCO_2/MWh

$EF_{grid,CM,y}$ (Southern Grid) = 0.843 tCO_2/MWh

Annex 4

MONITORING INFORMATION

A. SAMPLING

Sample size determination

To determine the amount of metering points per CPA, the sample size for each stratum under a CPA is to be determined based on the following formula, with a minimum of 70 samples. (*Guidelines for sampling and surveys for CDM project activities and programme of activities (version 02.0, EB 69 Annex 5)*, formula 21)

$$n \geq \frac{1.645^2 \times NV}{(N-1)\times 0.1^2 + 1.645^2 V}$$

equation 7

Where:

$$V = \left(\frac{SD}{mean}\right)^2$$

equation 8

n	Sample size
N	Total number of LEDs installed within a stratum, if unknown use 20,000*
1.645	Represents the 90% confidence required
0.1	Represents the 10% relative precision
SD	Is the overall Standard Deviation
mean	Is the overall mean

* 20,000 is based on varying N, obtained by filling in equation 7. If N increases over 20,000 no changes occur in the number of samples. And statistical software http://www.raosoft.com/samplesize.html that states under 'what is the population size' : If you don't know, use 20,000.

Table 12: Lamp classification

Indoor		Outdoor	
Low power	High power	Low power	High power
<40 Watt	≥ 40 Watt	<20 Watt	≥ 20 Watt
IL (Indoor Low)	IH (Indoor High)	OL (Outdoor Low)	OH (Outdoor High)

Meter

The operation time of the LED lighting equipment in the metered sample will be measured. The meter can be installed at the last point of control. For each monitoring period a mean value is calculated; this value is used for the operating hours of all LED lighting equipment within the respective stratum.

The meter to be used is designed to measure electrical parameters of LED lighting equipment. The measured data is stored and a) relayed to Central Server digitally or b) obtained by manual read out. It is possible to down load data on a computer using an interface cable This is explained in more detail below:

Two types of meters can be used:

1. GSM based metering wherein burning hours of lamps are measured for each switch on interval and relayed to the central server where in database is maintained.

2. Non GSM meters – Manual reading meters These meters measure cumulative time for which the lamp usage hours are recorded. These meters are non resettable. The monitoring entity shall visit such meters periodically and manually note down date of the reading and cumulative usage hours. Difference in cumulative usage hours on two dates divided by the number of days between two record dates shall give average usage hours of the lamp. This works similar to standard energy meter reading procedure.

Selecting the Location of meter installation.

The lamps in the project can be classified in following catagories

a. Individual lamp – These lamps are used individually and are switched 'ON' or 'OFF' depending up on the requirement of illumination due to such lamp only. For example – A outdoor lamp is only switched on on if lighting is required. Normally such lamps are controlled by a specific switch to control the lamp.

b. Lamp part of the group of lamps – In cases, it is required to switch on a group of lamps simultaneously. For example – The street Lights are normally switched 'ON' & 'OFF' in a group by means of a device in 'Street Light Pillar' which controls such action. This is also applicable to groups of office lamps..

1. In case if the sample lamp is an individual lamp (a), then a mete should be installed for this particular lamp.

2. If the sample lamp is a part of the lamp in group (b), Then a meter may be installed at the central switching cubical.

B. RECORD KEEPING SYSTEM

The CPA record keeping system shall be based on the templates included in this section.

a. Template end-user old lamp data

End User		Installation Location							To be replaced equipment (Data provided by installer)		
End User / Client Name	*Contact Details of End User*	*Facility name and address (where equipment is installed)*	*Description of location of equipment installation (room number, etc)*	*Installation Location within facility specific record keeping system*	*Strata*		*Grid*		*Equipment type*	*Rated Wattage of equipment*	*Amount of Lamps*
					Indoor	*Outdoor*	*Northern*	*Southern*			

b. Template identifed LED equipment data

End User		Installation Location							To be replaced equipment (Data provided by installer)			Identified LED lighting equipment		
End User / Client Name	*Contact Details of End User*	*Facility name and address (where equipment is installed)*	*Description of location of equipment installation (room number, etc)*	*Installation Location within facility specific record keeping system*	*Strata*		*Grid*		*Equipment type*	*Rated Wattage of equipment*	*Amount of Lamps*	*Equipment type*	*Rated Wattage of equipment*	*Amount of Lamps*
					Indoor	*Outdoor*	*Northern*	*Southern*						

c. Template lamp replacement data

End User		Installation Location							Old lamp status		Removed Equipment (Data provided by installer)				Installed LED equipment (Data provided by installer)									
End User / Client Name	*Contact Details of End User*	*Facility name and address (where equipment is installed)*	*Description of location of equipment installation (room number, street name, etc)*	*Installation Location within facility specific record keeping system*	*Strata*		*Grid*		*Old lamp status (working / Not working)*	*Eligible: yes/no (not eligible = Solar/ LED Lamp)*	*Removed equipment type*	*Rated Wattage of removed equipment*	*Amount of Lamps*	*Remark*	*Manufacturer of installed equipment*	*Type of installed equipment*	*Rated wattage of installed equipment*	*Amount of Lamps*	*Saving (Delta W) = Old Wattage minus New Wattage*	*Strata*		*Equipment Type ID (Sr.No./Batch No.)*	*Installation date dd/mm/yyyy*	*Installed by (Name of person)*
					Indoor	*Outdoor*	*N*	*S*												*High power*	*Low power*			

d. Template metering database

TEMPLATE METER DATABASE														
End User		Installation Location						Metered Sample Group			Sample Location			
End User / Client Name	*Contact Details of End User*	*Facility name and address (where equipment is installed)*	*Description of location of equipment installation (room number, street name, etc)*	*Installation Location within facility specific record keeping system*	*Equipment Type ID (Sr.No./ Batch No.)*	*Installation date (dd/mm/ yyyy)*	*Installed By (Name of person)*	*Index number of sample*	*Meter ID*	*Stratum*	*Description of location of sample (room number, street name, etc)*	*Location of sample within facility specific record keeping system*	*Date Of Deins tal-lation*	*Hours*

e. Template non-metered sample survey

NON METERED SAMPLE SURVEY													
End User		Installation Location						Non metered Sample Group		Sample Location			
End User / Client Name	*Contact Details of End User*	*Facility name and address (where equipment is installed)*	*Description of location of equipment installation (room number, street name, etc)*	*Installation Location within facility specific record keeping system*	*Equipment Type ID (Sr.No./ Batch No.)*	*Installation date (dd/mm/ yyyy)*	*Installed By (Name of person)*	*Index number of sample*	*Stratum*	*Description of location of sample (room number, street name, etc)*	*Location of sample within facility specific record keeping system*	*Replaced: yes/no*	*Date of replacement (dd/mm/ yyyy)*

f. template for scrapping of replaced equipment

RECEIPT OF LAMPS FROM END USER TO BE SCRAPPED/STORED

Name of end user:	
Contact number:	
Date & Time of hand-over from end user:	
Time of hand-over from end user:	

End user location address	
CPA ref number	

Removed Equipment		
Removed equipment type	***Rated Wattage of removed equipment*** (Data provided by installer)	***Amount of Lamps***

Note: A signed copy of this report shall be be forwarded to CME MCI.

Signature of end user
Name:
Date:

Signature of driver transporting lamps
Name:
Date:

Signature of storage/scrapping entity
Name:
Date:

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