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

CONTENTS

Annexes

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.

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[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)

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

Manufacture and Distribution of CFLs in, India (CPA-XXX)
Version ~~05~~06
Date: ~~07/06~~21/09/2012

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

Balaji Greentech Products Limited (BGPL) is planning to replace or facilitate to avoid using incandescent bulbs (ILs) with compact fluorescent lamps (CFLs) which are more energy efficient. BGPL has set up a manufacturing unit for CFLs in Nandikandi hamlet, Sadashivpet mandal, Medak district of Andhra Pradesh. BGPL will also be involved in distribution of these manufactured CFLs at different locations in India. The stated goal of a SSC-CPA within this PoA will be to increase the usage of energy efficient CFLs in the identified SSC-CPA region.

BGPL would be manufacturing Zora™ CFLs of different wattages and of different wattages. The shapes would be single, double, triple and spiral/quad. The wattage in these designs would vary between 5W and 45W. These CFLs consume approximately one-fifth of electricity when compared to the ILs of comparable lumen output[3]. In addition, the life of CFLs distributed as a part of the program will be of 10,000 - 20,000 hours[4] or more compared to ILs which has a life of only 750 - 2000 hours[5]. This project activity has been taken up as CPA under the PoA "Manufacture and Distribution of CFLs in India".

BGPL has selected <SSC-CPA region> as the CPA region. A baseline survey will be conducted in the region to determine the hours of operation of the ILs and the penetration factor of CFLs in the hamlet. This SSC-CPA involves distribution of CFLs to the following locations:

Locations	Number
Residences	XX
Office buildings	XX
Industries	XX
Townships	XX
Retail outlets	XX
Shops	XX
Other	XX

[3] http://www.bee-india.nic.in/bly/BLY_manual.pdf

[4] Page 15, http://www.ese.iitb.ac.in/~suryad/Lighting-CEP.pdf.

[5] Page 15, http://www.ese.iitb.ac.in/~suryad/Lighting-CEP.pdf.

About XXXX<< Calculated penetration level of CFLs in the identified region>> of the lighting devices used in the <SSC-CPA region> are energy efficient CFLs[6]. The type and number of each type of lighting in the <SSC-CPA region> is as follows:

Incandescent lamps (ILs)	XX
Compact Fluorescent Lamps (CFLs)	XX
Tubular lights	XX
Total lighting devices	XX

BGPL will raise the awareness about use of energy efficient lighting devices through print media (pamphlets / local newspapers) or local television channels / radio or public meetings in the region prior to the implementation of the project activity. The general public of the SSC-CPA region will be educated about the benefits of using an energy efficient CFL over an IL. They will be informed about the initiative taken up by BGPL through free distribution of high quality CFLs.

BGPL will form an internal team to conduct the baseline survey for the SSC-CPA region. Adequate records will be maintained for the baseline survey. The following details will be recorded during the baseline survey:

i. Location of the place where the CFL is distributed (The exact coordinates/address of the place is required).

ii. Name of the in-charge of the place.

iii. Service connection number of the place registered with the local distribution company.

iv. Number of un-used/new holders and other lighting devices used in the place.

v. Wattage of each IL in the place.

vi. Average usage hours of the IL.

The team identified for the baseline survey will be adequately trained for collection and proper recording of relevant data.

In the case of <SSC-CPA region> the distribution process would be door-to-door distribution. As per the approved methodology, the lumen output of the distributed CFLs will be in the range of -10% to +50% of the lumen output of replaced ILs. Each location within the SSC-CPA region will be identified by its unique service connection number. Each location representative will show their electricity bill of a particular month during the free distribution of CFLs. This electricity bill will be stamped by the BGPL distribution team and returned. This is to avoid handing over of CFLs to the same location more than once. Since it will be a door-to-door distribution, BGPL team will personally install the CFLs and collect the replaced ILs. Following data will be collected and recorded for the locations:

i. Date of CFL distribution

ii. Number of CFLs distributed

iii. Wattage of the distributed CFLs

[6] Based on the actual survey conducted at the location

iv. Wattage of replaced ILs

v. Awareness acceptance and undertaking by the recipient/beneficiary of the CFLs in the form of signatures to the effect that CERs for the energy saving measure would be claimed by BGPL.

A sample of 90% confidence interval and 10% error margin will be drawn from the total population of distributed CFLs using the software links mentioned in the PoA DD in the section A.4.4.2. The run time meters will be installed in the holders of these sample CFLs to capture the usage of the CFLs[7]. This sample is termed as metered sample. The sample size will be determined based on the '*Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities*', EB 65 Annex 2. After a period of ninety days, the runtime meters will be rotated to the next sample of CFLs. This will be repeated for the entire crediting period of the SSC-CPA at intervals of ninety days. The rotation of runtime meters to different samples within a year will capture the seasonal variations in usage of CFLs.

Another sample known as the non-metered sample, identified similar to the meter sample, will be drawn from the total population of distributed CFLs annually. The annual *ex post* monitoring survey will be conducted to determine the actual number of operating CFLs in <SSC-CPA region>.

The number of hours of CFL usage and the number of operating CFLs (result of the monitoring process carried out for metered and non-metered samples) will be used for calculation of actual energy savings achieved within <SSC-CPA region> due to implementation of the project activity.

The SSC-CPA would contribute to the sustainable development of the community in the following ways given below:

Sustainable Development

The project supports the sustainable development in the following ways

1. Social well being:
   - State of Andhra Pradesh, where the SSC-CPA region is located, faces a situation of peak power deficit[8]. Projects such as replacing ILs with energy efficient CFLs would reduce the load on the electricity grid and hence help minimize the deficit.
   - The project activity helps in increasing the penetration of energy efficient lamps in the region.
   - Reduces load on the ~~Southern~~electricity grid.
   - The project would generate indirect jobs in the hamlet, as it involves distribution and surveys at various stages of implementation.
2. Economic well being:
   - The project generates more business opportunities for third party who could be employed for carrying out the baseline survey, distribution, and monitoring survey.
   - The distributed CFLs would consume less power compared to the ILs, providing savings in the form of reduction of electricity bills for consumers.
3. Environmental well being:

[7] The runtime meters will be kept rotating with-in each CPA-DD. However after the crediting period, the runtime meters could be used in other CPAs or other locations.

[8] http://www.cea.nic.in/god/gmd/lgbr_report.pdf, Annex II, Annex III

- The distribution of CFLs would reduce the power consumption in the region for the same electricity load. The emission factor of the fossil fuel intensive Southern electricity grid (SG)/ NEWNE grid is 0.8557(SG) / 0.8031(NEWNE) tCO2 per MWh. Thus, decrease in the usage of grid power reduces the usage of grid power and greenhouse gas emissions associated with the electricity grid.

4. Technological well being:

- The penetration rate of CFLs is low in India (as well as the hamlet) because of the fact that low quality and high cost of CFLs have made it less viable for the common man. The CFLs distributed in the hamlet would have quality standards and specifications which are stated below:
- CFLs will conform to the IS 15111 of Indian Standards (BIS)
- Power factor of 0.8 or more.
- Rated lifetime of 6000 hrs.

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

The CPA implementer is the managing entity of PoA, i.e. Balaji Greentech Products Limited (BGPL). The contact details of BGPL are given in Annex-1.

Name of Party involved* ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	The Party involved wishes to be considered as project Participant (Yes/No)
Government of India (Host)	Balaji Greentech Products Limited (Private Entity)	No

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

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

CFLs manufactured at the BGPL's manufacturing unit in Nandikandi village will be distributed for free to replace and avoid the usage of ILs in <SSC-CPA region> According to the guidelines provided in the baseline methodology AMS II.C, the lumen output of the distributed CFLs would be between -10% and 50% of the lumen output of replaced ILs.

The region selected for distribution of energy efficient CFLs is <SSC-CPA region> in India. A baseline survey was conducted by the BGPL officials to estimate the type of lighting used in the hamlet, wattage of the lighting used, hours of operation of the lighting used, general awareness about the energy efficient lighting amongst the people in the hamlet. The team involved in the baseline survey also provided required awareness on the energy efficient lighting and the initiative taken by BGPL in this front. The baseline survey data can be summarized as follows:

Incandescent lamps	XXX
Zero wattage Incandescent lamps.	XXX
CFLs	XXX
Tubular lights	XXX
Total lighting devices	XXX

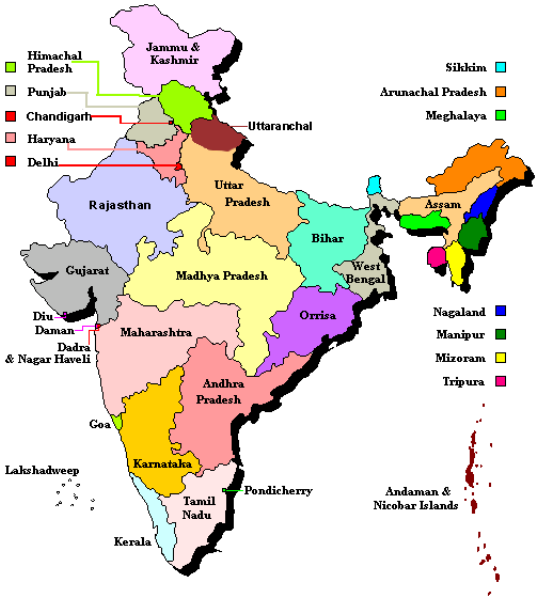
The penetration of the energy efficient CFLs in the <SSC-CPA region> is calculated to be << Calculated penetration level of CFLs in the identified region>> from the above data. As suggested by the data, the penetration of CFLs is quite low. This opportunity can be utilised to increase the penetration of CFLs in the region.

A.4.1.1. Host Party:

India

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

Geographic reference or other means of identification, Name/contact details of the entity/individual responsible for the CPA, e.g. in case of stationary CPA geographic reference, in case of mobile CPAs means such as registration number, GPS devices.



The coordinates of the <SSC-CPA region> are:
Latitude: <XX° XX' XX" N>
Longitude: <XX° XX' XX" E>
The coordinates of the <region> provide unique identification to the CPA region.

The above mentioned coordinates of <SSC-CPA-region> lie within the latitudes (35°30' N and 6°44' N) and longitudes (68°7' E and 97°25' E) which encompass India.

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

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

~~01/07/2012~~XX/XX/XXXX or the start date of the CPA would correspond to the actual date on which the process of distribution of CFL would start in the region.

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

10 years 0 months from the date of distribution of CFLs or the date of registration of SSC-CPA under the registered PoA, whichever is later. However the operational lifetime of the SSC-CPA would not extend beyond the life of the CFL.

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

Fixed crediting period

The crediting period chosen for the SSC-CPA is the fixed crediting period of 10 years. However, the CERs will be claimed for the <SSC-CPA-region> CPA till the lifetime of the distributed CFLs.

A.4.3.1. Starting date of the crediting period:

The expected date of CFL distribution is ~~01/07/2012~~XX/XX/XXXX. Hence the start date of the crediting period has been considered to be the date of completion of distribution activity of CFLs in SSC-CPA under SSC-PoA, or the date on which the CPA-DD gets added under the registered PoA, whichever is later.

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

The length of the crediting period is 10 years 0 months from the date of registration of SSC-CPA-DD under registered PoA-DD or end date of the PoA whichever is earlier.

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

Years	Annual estimation of emission reductions in tonnes of CO_2e
~~2012~~20XX	XX
~~2013~~20XX	XX
~~2014~~20XX	XX
~~2015~~20XX	XX
~~2016~~20XX	XX
~~2017~~20XX	XX
~~2018~~20XX	XX
~~2019~~20XX	XX
~~2020~~20XX	0
~~2021~~20XX	0
Total Estimated Reductions (tonnes of CO_2e)	XX
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	XX

A.4.5. Public funding of the CPA:

The CPA does not involve any public funding.

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

The proposed SSC-CPA has the same implementer as the coordinating entity of PoA "Manufacture and Distribution of CFLs in India", which is BGPL.

As per the PoA guidelines on de-bundling as stated in EB54 annex-13- "Guidelines on assessment of de-bundling for SSC project activities":

As per guideline on de-bundling, 1% of the small scale threshold of 60 GWh/annum is 0.6 GWh per annum. Since the calculated maximum energy saving achieved by a single CFL within this PoA will be less than 1% (0.000110 GWh (maximum value among 100W IL, 60W IL, 40W IL) for 100W IL replaced/avoided with 20W CFL) of the small scale limit, the SSC-CPAs included in the PoA are exempted from the de-bundling check.

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

The proposed SSC-CPA of distributing CFLs is not registered as a CPA of another PoA or individual CDM project.

This has been confirmed based on the projects which are at various stages of registration in UNFCCC and are listed in the below link(s):

http://cdm.unfccc.int/ProgrammeOfActivities/index.html

http://cdm.unfccc.int/Projects/index.html

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:

Title of PoA: "Manufacture and distribution of CFLs in India"

Methodology: AMS-II.C. - "Demand-side energy efficiency activities for specific technologies"

Version: 13

Sectoral Scope: 03 – Energy demand

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

The hamlet identified as the CPA region meets the criteria for inclusion of a SSC-CPA in the PoA "Manufacture and Distribution of CFLs in India". The eligibility criteria for the inclusion of SSC-CPA under the PoA is described in the SSC-PoA-DD, section A.4.2.2. The criterion has been furnished as follows:

Eligibility Criteria for the CPA to be included in the PoA	YES/NO
The CFLs should be distributed in an area within the physical boundary of India.	
In order to avoid double counting the CFL's manufactured by BGPL would have a unique Identification number (CPA name, XXXX)	
All the CFL's manufactured in BGPL follow standard certification (IS: 15111) and the level of service will be -10 % to +50 % of the IL according to methodology AMS-II C version 13 .	
The start date of the CPA will be later than 10th April, 2010 [9]. The documentary evidence provided for the start date of the CPA would be a through a production plan released to the concerned department of BGPL.	
The CPA will be eligible for inclusion if the applicability criteria as per methodology is satisfied as mentioned in the section E.2	

[9] http://cdm.unfccc.int/Reference/Procedures/PoA_proc01.pdf

The PP intends to demonstrate the addionaility at the PoA level. Demonstration of addionality for individual CPA is not carried out according to EB-60 annex-26.	
The project participant (BGPL) has stipulated that since the project involves manufacturing and distribution of CFL, local stakeholder consultation and environmental impact analysis has been carried out at PoA level. Further explanation on local stakeholder consultation and environmental impact analysis is given in section D of PoA DD.	
There is no funding from Annex-1 parties for the PoA as a whole. Evidence for investment and loan has been shown to DOE	
The target group in the project activity is residential, commercial, industrial identified from the electricity meter no/ service no. The distribution mechanism is replacement of IL with CFL or avoidance of IL with same service level as described in the methodology AMS-II C version 13	
An illustration of sampling in accordance with EB-65 annex-2 is explained in detail in section A.4.4.2 of the PoA DD which is applicable to all the CPA included in the PoA. Baseline survey would be carried for each CPA. The same is explained in section A.4.2 of the PoA. Each CPA to be included in the PoA will follow the same sampling and surveying procedure mentioned in the PoA DD section A.4.2.	
Each CPA in aggregate meets the small scale or micro scale threshold as mentioned in the methodology. This would be demonstrated in the emission reduction spreadsheet.	
It will be checked that the SSC-CPA is neither registered as an individual CDM project activity nor included as a CPA of another registered PoA involving energy efficient lighting initiatives. Each SCC-CPa will	

demonstrate that the debundling criteria as per the guideline.	
According to eligibility criteria mentioned in EB 65 annex 3 for CPA(If CFLs are distributed for free of cost they will be automatically addional)	

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

The proposed CPA is a voluntary coordinated action;	
If the CPA is implementing a mandatory policy/regulation, this would/is not enforced;	
If mandatory a policy/regulation is enforced, the CPA will lead to a greater level of enforcement of the existing mandatory policy/regulation.	

The above points suggests that the CDM revenue is imperative for the SSC-CPA as it is part of the PoA programme considered and for project activity to be sustainable for the project participant.

Hence the SSC-CPA is additional.

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.

	Emission source	Gas	Included / Excluded	Justification/Explanation
Baseline ~~Baseline~~	Electricity consumption due to manufacturing of IL	CO_2	Excluded	Excluded for simplification
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Electricity ~~generation,~~consumed at user end due to use of IL grid or	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification

	captive source			
	Emissions due to usage of propane	CO_2	~~Included~~Excluded	~~Main emission source~~Excluded for simplification
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Emissions due to usage of diesel in DG set	CO_2	~~Included~~Excluded	~~Main emission source~~Excluded for simplification
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
Project activity ~~Project activity~~	Electricity consumption due to manufacturing of CFL	CO_2	Excluded	Excluded for simplification
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Electricity ~~generation~~consumed at user end due to use of CFL, grid or captive source	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Emissions due to usage of propane	CO_2	~~Included~~Excluded	~~Main emission source~~Excluded for simplification
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Emissions due to usage of diesel in DG set	CO_2	~~Included~~Excluded	~~Main emission source~~Excluded for simplification
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification

B.5. Emission reductions:

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

Data / Parameter:	$Q_{CFL,propane}$
Data unit:	kg/CFL
Description:	The quantity of propane used as fuel in CFL manufacturing unit for one CFL
Source of data used:	Techno economic viability report / Plant records
Value applied:	0.063
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is initially taken from the Techno economic viability report . The value will be revised for actual CER calculation at the end of a monitoring period by taking yearly average value.
Any comment:	Data archived : Crediting period + 2 years

Data / Parameter:	$Q_{IL,propane}$
Data unit:	kg per IL manufactured
Description:	The quantity of propane used as fuel for manufacturing CFL
Source of data used:	Prefeasibility Report done for IL manufacturing unit
Value applied:	0.015
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is taken based on Prefeasibility Report done by the project participant for manufacturing of ILs. This value is fixed ex-ante.
Any comment:	--

Data / Parameter:	$Q_{CFL,diesel}$
Data unit:	kg per CFL manufactured
Description:	The quantity of diesel used as fuel for manufacturing of CFL
Source of data used:	Plant records

~~Value applied:~~	~~0~~
~~Justification of the choice of data or description of measurement methods and procedures actually applied :~~	~~The value is used for validation as the diesel is expected to be used only during the power outage. The value will be measured for actual CER calculation at the end of a monitoring period by taking yearly average value.~~
~~Any comment:~~	~~–~~

~~**Data / Parameter:**~~	~~$Q_{IL,diesel}$~~
~~Data unit:~~	~~kg per IL that would have been manufactured~~
~~Description:~~	~~The quantity of diesel used as fuel that could have been consumed during manufacturing of CFL~~
~~Source of data used:~~	~~Plant records~~
~~Value applied:~~	~~0~~
~~Justification of the choice of data or description of measurement methods and procedures actually applied :~~	~~The value is used for validation as the diesel is expected to have been used only during the power outage. The value measured for manufacturing of CFL would be considered for actual CER calculation at the end of a monitoring period by taking yearly average value.~~
~~Any comment:~~	~~–~~

~~**Data / Parameter:**~~	~~$EF_{propane}$~~
~~Data unit:~~	~~tCO_2e/tC_3H_8~~
~~Description:~~	~~Emission factor of propane~~
~~Source of data used:~~	~~Calculated~~
~~Value applied:~~	~~3~~
~~Justification of the choice of data or description of measurement methods and procedures actually applied :~~	~~One mole of propane when combusted releases three mole of carbon dioxide. As the molecular weight of propane and carbon dioxide are same (44), each tonne of propane when combusted will release three tonnes of carbon dioxide.~~
~~Any comment:~~	~~Data archived : Crediting period + 2 years~~

~~**Data / Parameter:**~~	~~EF_{diesel}~~

~~Data unit:~~	~~gCO_2/MJ~~
~~Description:~~	~~Emission factor of diesel~~
~~Source of data used:~~	~~CEA emission data (version 4.0).~~
~~Value applied:~~	~~72.6~~
~~Justification of the choice of data or description of measurement methods and procedures actually applied :~~	~~CEA emission data (version 4.0) which provides emission factor at national level has been used.~~ ~~The information can be soureed from~~ ~~http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm~~
~~Any comment:~~	~~--~~

~~**Data / Parameter:**~~	~~IE_{CFL}~~
~~Data unit:~~	~~kWh/CFL~~
~~Description:~~	~~Electricity consumed for manufacturing one CFL~~
~~Source of data used:~~	~~Techno economic viability report~~
~~Value applied:~~	~~0.547~~
~~Justification of the choice of data or description of measurement methods and procedures actually applied :~~	~~The value is initially taken from the Techno economic viability report. For calculation of CERs at the end of monitoring period, the import electricity figures will be taken as the yearly average.~~
~~Any comment:~~	~~Data archived : Crediting period + 2 years~~

~~**Data / Parameter:**~~	~~IE_{IL}~~
~~Data unit:~~	~~kWh per IL~~
~~Description:~~	~~Import electricity consumed for manufacturing one IL~~
~~Source of data used:~~	~~Prefeasibility report done for a IL manufacturing unit~~
~~Value applied:~~	~~0.207~~
~~Justification of the choice of data or description of measurement methods and procedures actually applied :~~	~~The value is taken based on Prefeasibility report done by the project participant for manufacturing of ILs. This value is fixed ex-ante.~~

~~Any comment:~~	~~–~~

Data / Parameter:	*I*
Data unit:	-
Description:	Number of different wattage ILs replaced with CFLs
Source of data used:	Baseline survey data
Value applied:	XX
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is based on baseline survey carried out in
Any comment:	The data will be kept for the entire crediting period + 2 years

Data / Parameter:	n_i
Data unit:	-
Description:	Number of ILs of type *i* replaced or avoided.
Source of data used:	Baseline survey data
Value applied:	40W: XX nos. 60W: XXX nos. 100W: XXX nos.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The baseline survey provides the number of ILs available for replacement in the <SSC-CPA-region>. The baseline survey is provided as Baseline survey data
Any comment:	The data will be kept for the entire crediting period + 2 years

Data / Parameter:	p_i
Data unit:	W
Description:	Power consumed by the ILs
Source of data used:	Baseline survey data
Value applied:	40 60 100
Justification of the choice of data or description of measurement methods and procedures actually	The data is based on baseline survey carried out in <SSC-CPA-region>

applied :	
Any comment:	The data will be kept for the entire crediting period + 2 years

Data / Parameter:	o_i
Data unit:	Hours/annum
Description:	Average operating hours per annum for the ILs
Source of data used:	Baseline survey data
Value applied:	XXX
Justification of the choice of data or description of measurement methods and procedures actually applied :	The baseline survey data will provide the average operating hours of installed ILs.
Any comment:	The data will be kept for the entire crediting period + 2 years

Data / Parameter:	l_y
Data unit:	%
Description:	Average annual technical grid losses
Source of data used:	Published data from DISCOMs/ Transmission and distribution agencies/Default
Value applied:	0.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	In the calculation of the baseline and project emissions, if any recent data is available for the grid in the SSC-CPA region for technical losses in the grid, the same would be used. In the absence of availability of such data, the project participant intends to use the default value of 0.1.
Any comment:	Data archived : Crediting period + 2 years

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

(A) Baseline emissions:

Emissions occurring due to power consumption by the users by ILs which would have been installed in the baseline scenario:

In the current CPA, CFLs will be distributed in the XXXX to replace existing ILs or avoid the usage of the ILs. The baseline emissions are the emissions taken place in the southern grid against consumption of electricity by ILs. The calculations are as follows:

$$BE_y = E_{BL,y} * EF_{CO_2,ELEC,y} + Q_{ref,BL} * GWP_{ref,BL}$$

$$E_{BL,y} = \sum_i (n_i * p_i * o_i)/(1 - l_y)$$

Where

Parameter	Description	Value taken
BE_y	Baseline emissions in year *y* (tCO_2e)	XX
$E_{BL,y}$	Energy consumption in the baseline in year *y* (MWh)	XXX
$EF_{CO_2,ELEC,y}$	Emission factor of the grid (tCO_2/MWh) The details of the emission factor are given in Annex 3	0.8557 (Southern grid) or 0.8031 (NEWNE grid)
$\sum_i$	Sum over the group of ILs of wattage "*i*" (e.g. 40W, 60W,100W ILs) replaced or avoided	XXX
n_i	Number of ILs replaced of wattage "*i*" (e.g. 40W, 60W,100W ILs)	40W: XX nos 60W: XX nos 100W: XX nos
p_i	Power of ILs replaced or avoided of wattage "*i*" (e.g. 40W, 60W, 100W ILs) (W)	40 W 60 W 100 W
o_i	Average annual operating hours of ILs (hours)	1241
l_y	Average annual technical grid losses (transmission and distribution) during year *y* for the grid. A default value of 0.1 has been used for average annual technical grid losses, as no reliable data is available	0.1 or monitored
$Q_{ref,BL}$	Average annual quantity of refrigerant used in the baseline to replace the refrigerant that has leaked. There are no refrigerants, hence the value has been taken as zero	0
$GWP_{ref,BL}$	Global Warming Potential of the baseline refrigerant. There are no refrigerants, hence the value has been taken as zero	0

$E_{BL,y}$ = XXXX

$BE_{y,}$ = XXX tCO_2

(B) Project emissions:

Emissions occurring due to power consumption by CFLs at the user end

$$PE_y = EP_{PJ,y} * EF_{CO_2,y}$$

Where $EP_{PJ,y} = \sum_i \left(n_i * p_i * o_i\right) / \left(1 - l_y\right)$

Parameter	Description	Value taken
$\sum_i$	Sum over the group of CFLs of wattage "*i*" (e.g. 9W, 15W, 20W CFLs) installed	XXX
n_i	Number of CFLs replaced or avoided of wattage "*i*" (e.g. 9W, 15W, 20W CFLs)	9W: XX nos 15W: XX nos 20W: XX nos
p_i	Power of CFLs replaced or avoided of wattage "*i*" (e.g. 9W, 15W, 20W CFLs)	9 W 15 W 20 W
o_i	Average annual operating hours of CFLs (hours)	1241
l_y	Average annual technical grid losses (transmission and distribution) during year *y* for the grid. A default value of 0.1 has been used for average annual technical grid losses, as no reliable data is available	0.1 or monitored
PE_y	Project emissions in year *y* (tCO_2e)	XXX
$EP_{Pj,y}$	Energy consumption in project activity in year *y*.	XXX
$EF_{CO_2,y}$	Emission factor of the grid (tCO_2/MWh) The details of the emission factor are given in Annex 3	0.8557 (Southern grid) or 0.8031 (NEWNE grid)

$EP_{Pj,y}$ = XXX

PE_y =XXX tCO_2

Leakage:

As there are no CFLs transferred from other location to project activity, leakage can be considered as zero.

$$LE_y = 0$$

Emission Reductions:

The emission reduction achieved by the project activity is determined as the difference between the baseline emissions and the project emissions as follows:

$$ER_y = BE_y - PE_y - LE_y \qquad \textbf{Equation 1}$$

Where

Parameter	Description	Value taken
BE_y	Baseline emissions in year *y* (tCO_2e)	XX
PE_y	Project emissions in year *y* (tCO_2e)	XX
ER_y	Emission reduction in year *y* (tCO_2e)	XX
LE_y	Leakage emissions in year *y* (tCO_2e) Since there are no leakages in the project, the value has been taken as zero.	0

~~**(A) Baseline emissions:**~~

~~The baseline emissions would correspond to emissions occurring in the manufacturing and distribution of ILs equivalent in number to the distributed CFLs in <SSC-CPA region>. These baseline ILs would have been manufactured in an IL manufacturing facility. The emissions which can be attributed to the manufacturing and distribution of ILs are as follows:~~

~~i. Emissions due to power consumption in manufacturing process of ILs:~~

~~The emissions due to power consumption in manufacturing of ILs will be calculated based on the total power expected to be consumed for manufacturing one IL, number of ILs to be considered in the baseline scenario and emission factor for the electricity grid.~~

~~Parameter~~	~~Description~~	~~Value taken~~
~~IE_{IL}~~	~~Amount of electricity consumed for manufacturing one IL~~	~~0.207 kWh/IL~~
~~n_i~~	~~Number of ILs in the baseline scenario replaced / avoided by the project CFLs distributed in the region~~	~~40W: XXnos. 60W: XXnos. 100W: XXnos.~~
~~$EF_{CO_2,ELEC,y}$~~	~~Emission factor of the grid (tCO_2/MWh)~~ ~~The details of the emission factor are given in Annex 3~~	~~0.8557(SG) / 0.8031(NEWNE) tCO2 per MWh~~

~~Emissions due to import of grid electricity for manufacturing ILs = XXXX~~
~~= XXXtCO_2~~

~~ii. Emissions due to consumption of propane used as fuel in manufacturing process:~~

~~The emissions due to propane consumption in manufacturing of ILs will be calculated based on the total propane expected to be consumed and emission factor for the propane.~~

~~Parameter~~	~~Description~~	~~Value taken~~
~~$Q_{IL,propane}$~~	~~Quantity of propane used as fuel for manufacturing one IL~~	~~0.015 kg/IL~~

~~n_i~~	~~Number of ILs in the baseline~~	~~40W: XX nos.~~ ~~60W: XX nos.~~ ~~100W: XX nos~~
~~$EF_{propane}$~~	~~Emission factor of propane, tCO_2e/tC_3H_8~~	~~3~~

~~Emissions due to use of propane for manufacturing ILs = XXX~~

~~iii. Emissions occurring due to power consumption by ILs which would have been installed in the baseline scenario:~~

~~In the current CPA, CFLs will be distributed in the <SSC CPA region>. to replace existing ILs or avoid the usage of the ILs. The baseline emissions are the emissions taken place in the southern grid against consumption of electricity by ILs. The calculations are as follows:~~

$$BE_y = E_{BL,y} * EF_{CO_2,ELEC,y} + Q_{ref,BL} * GWP_{ref,BL}$$ **Equation 1**

$$E_{BL,y} = \sum_i (n_i * p_i * o_i) / (1 - l_y)$$ **Equation 2**

~~Where~~

~~Parameter~~	~~Description~~	~~Value taken~~
~~BE_y~~	~~Baseline emissions in year y (tCO_2e)~~	~~21~~
~~$E_{BL,y}$~~	~~Energy consumption in the baseline in year y (MWh)~~	~~24.16~~
~~$EF_{CO_2,ELEC,y}$~~	~~Emission factor of the grid (tCO_2/MWh)~~ ~~The details of the emission factor are given in Annex 3~~	~~0.8557(SG) /~~ ~~0.8031(NEWNE)~~
~~$\sum_i$~~	~~Sum over the group of ILs of wattage "i" (e.g. 40W, 60W ILs) replaced or avoided~~	~~-~~
~~n_i~~	~~Number of ILs replaced of wattage "i" (e.g. 40W, 60W ILs)~~	~~40W: XXnos.~~ ~~60W: XXnos.~~ ~~100W: XXnos~~
~~p_i~~	~~Power of ILs replaced or avoided of wattage "i" (e.g. 40W, 60W ILs) (W)~~	~~40 W~~ ~~60 W~~ ~~100 W~~
~~o_i~~	~~Average annual operating hours of ILs (hours)~~	~~1241~~
~~l_y~~	~~Average annual technical grid losses (transmission and distribution) during year y for the grid. A default value of 0.1 has been used for average annual technical grid losses, as no reliable data is available~~	~~0.1~~
~~$Q_{ref,BL}$~~	~~Average annual quantity of refrigerant used in the baseline to replace the refrigerant that has leaked.~~ ~~There are no refrigerants, hence the value has been taken as zero~~	~~0~~

$GWP_{ref,BL}$	Global Warming Potential of the baseline refrigerant. There are no refrigerants, hence the value has been taken as zero	0

$E_{BL,y}$ =XX

$BE_{y, Total}$ = XX tCO_2

Total baseline emissions = $BE_{y,total}$ = BE_y + Baseline emissions due to manufacturing of ILs =XX

(B) Project emissions:

The project emissions would correspond to emissions occurring in the manufacturing and distribution of CFLs. The emissions which can be attributed to the manufacturing of CFLs and distribution are as follows:

i. Emissions due to power consumption in manufacturing process of CFLs:

The emissions due to power consumption in manufacturing of CFLs will be calculated based on the total power consumed in manufacturing process and emission factor for the electricity grid.

Parameter	Description	Value taken
IE_{CFL}	Amount of electricity consumed for manufacturing one CFL	0.547 kWh/CFL
n_i	Number of CFLs distributed as replacements for existing ILs and new installations	40W: XXnos. 60W: XXnos. 100W: XXnos
$EF_{CO_2,ELEC,y}$	Emission factor of the grid (tCO_2/MWh) The details of the emission factor are given in Annex 3	0.8557(SG) / 0.8031(NEWNE)

Emissions due to import of grid electricity for manufacturing CFLs = XXX tCO_2

ii. Emissions due to consumption of propane used as fuel in CFL manufacturing process:

The emissions due to propane consumption in manufacturing of CFLs will be calculated based on the total propane consumed in CFL manufacturing process and emission factor for the propane.

Parameter	Description	Value taken
$Q_{CFL, propane}$	Quantity of propane used as fuel for manufacturing one CFL	0.063 kg/CFL
n_i	Number of CFLs distributed as replacements for existing ILs and new installations	40W: XXnos. 60W: XXnos. 100W: XXnos
$EF_{propane}$	Emission factor of propane, tCO_2e/tC_3H_8	3

Emissions due to use of propane for manufacturing CFLs = XXX tCO_2

iii. Emissions occurring due to power consumption by CFLs

$$PE_y = EP_{PJ,y} * EF_{CO_2,y}$$ **Equation 3**

$$E_{PJ,y} = \sum_i \left(n_i * p_i * o_i\right) / \left(1 - l_y\right)$$ **Equation 4**

Parameter	Description	Value taken
$\sum_i$	Sum over the group of CFLs of wattage "*i*" (e.g. 9W, 15W, 20W CFLs) replaced or avoided	-
n_i	Number of CFLs replaced or avoided of wattage "*i*" (e.g. 9W, 15W, 20W CFLs)	40W: XXnos. 60W: XXnos. 100W: XXnos
p_i	Power of CFLs replaced or avoided of wattage "*i*" (e.g. 9W, 15W, 20W CFLs)	9 W 15 W 20 W
o_i	Average annual operating hours of CFLs (hours)	1241
l_y	Average annual technical grid losses (transmission and distribution) during year *y* for the grid. A default value of 0.1 has been used for average annual technical grid losses, as no reliable data is available	0.1
PE_y	Project emissions in year *y* (tCO_2e)	5
$E_{Pj,y}$	Energy consumption in project activity in year *y*.	5.93
$EF_{CO_2,y}$	Emission factor of the grid (tCO_2/MWh) The details of the emission factor are given in Annex 3	0.8557(SG) / 0.8031(NEWNE)

$E_{BL,y}$ = XXXX

PE_y = XXX tCO_2

Total project emissions = PE_{yTotal} = PE_y + Emissions in the manufacturing process of CFLs

= XX

Leakage:

As there are no CFLs transferred from other location to project activity, leakage can be considered as zero.

$$LE_y = 0$$

Emission Reductions:

The emission reduction achieved by the project activity is determined as the difference between the baseline emissions and the project emissions as follows:

$$ER_y = BE_y - PE_y - LE_y$$ **Equation 5**

~~Where~~

~~Parameter~~	~~Description~~	~~Value taken~~
~~BE_y~~	~~Baseline emissions in year y (tCO_2e)~~	~~XXX~~
~~PE_y~~	~~Project emissions in year y (tCO_2e)~~	~~XXX~~
~~ER_y~~	~~Emission reduction in year y (tCO_2e)~~	~~XXX~~
~~LE_y~~	~~Leakage emissions in year y (tCO_2e)~~ ~~Since there are no leakages in the project, the value has been taken as zero.~~	~~XXX~~

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	XX	XX	0	XX
20XX	XX	XX	0	XX
20XX	XX	XX	0	XX
20XX	XX	XX	0	XX
20XX	XX	XX	0	XX
20XX	XX	XX	0	XX
20XX	XX	XX	0	XX
20XX	XX	XX	0	XX
20XX	0	0	0	0
20XX	0	0	0	0
Total (tonnes of CO_2 e)	XX	XX	XX	XX

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

B.6.1. Description of the monitoring plan:

The distribution of project CFLs in the <SSC-CPA-region>. will be a door-to-door distribution by BGPL employees. During the distribution of CFLs in the hamlet, distribution data will be maintained by BGPL as follows:

i. Date of CFL distribution

ii. Wattage of the distributed CFLs

iii. Wattage of replaced ILs

iv. Awareness acceptance and undertaking by the recipient/beneficiary of the CFLs in the form of signatures to the effect that CERs for the energy saving measure would be claimed by BGPL.

The CFL distribution team will collect the above mentioned information during distribution of CFLs. The replaced ILs would be stored and further destroyed as per the standard practice in the region.

The monitoring plan for the SSC-CPA will include the following sampling procedures:

a. Metered sample: The project participant will draw out a sample of distributed CFLs from the total population[10]. The drawn sample will have a confidence interval of 90% with 10% error margin. The runtime meters will be shifted to a new sample after a period of ninety days. This process will be continued throughout the year to take care of the seasonal variations within the region. The runtime meter data will provide actual operating hours of project CFLs for the calculation of CERs. The major specifications of the runtime meters are as provided in Section A.4.2.1 of PoA-DD.

The specifications of the runtime meters may change according to the specification of the meters available in the market.

b. Non-metered sample: Another sample known as non-metered sample will be drawn, similar to the metered sample, from the population for the annual monitoring survey. The sample will have a confidence interval of 90% with 10% error margin. The sample size will be determined based on the STANDARD FOR SAMPLING AND SURVEYS FOR CDM PROJECT ACTIVITIES AND PROGRAMME OF ACTIVITIES', EB 65 Annex 2. The result of the annual monitoring survey will be the number of operating CFLs. The result will be used to calculate the actual emission reduction achieved by the SSC-CPA.

BGPL will collect and record the required data at all stages of project implementation.

The parameters involved in the entire process and the responsibilities of each team are as follows:

Components of monitoring	Tasks to be done	Executed by	Maintenance of records responsibility
1. Manufacturing of CFLs (para 11 of AMS-II.C version 13)	The total manufacturing process is taken care of by the manufacturing team as indicated above. The plant records are maintained by the shift engineers as log books in all shifts of operation. Regular maintenance activities and training practices will be	BGPL	Managing Director / Executive Director, BGPL

[10] A representative sample of CFLs will be derived from the total population of CFLs distributed in the SSC-CPA region. The sample size will be calculated using "STANDARD FOR SAMPLING AND SURVEYS FOR CDM PROJECT ACTIVITIES AND PROGRAMME OF ACTIVITIES', EB 65 Annex 2. 90 days has been chosen as the minimum number of days required for monitoring the operating hours of the installed CFL for a particular sample CFL. In a given monitoring year, a runtime meter is expected to be fixed at four different locations within a SSC-CPA region (i.e. 90x4=360). Hence if there are any seasonal variations in a year, the variations in usage of CFL operating hours will be captured by the run-time meters for determining the actual operating hours of the CFLs.

	followed by the manufacturing team. The QC supervisors are responsible to inspect all manufacturing processes involved in the CFL manufacturing unit and report any deviation from the quality norms. The manufacturing facility has the required testing facilities where the manufactured CFLs are tested by BGPL to check the quality of the CFLs. The following parameters are monitored and recorded by the manufacturing team: i. Number of CFLs manufactured ii. Quantity of propane used as fuel iii. Import electricity used for manufacturing of CFLs iv. Quality standards of manufactured CFLs in the test reports (1) Power Factor (2) CFL lifetime (hours)		
2. Baseline survey	Following information will be collected and recorded during the baseline survey: i. Name of the interviewee / owner / manager of the place ii. Full address of the place within SSC-CPA region iii. Type and number of lighting devices existing in the given place, i.e. number of ILs / CFLs / other lighting devices / unused holders in the place iv. Wattage of ILs existing in the place v. Average annual hours of operation of ILs in the place vi. Electricity bill / electricity meter / service connection number vii. Number of project CFLs allocated to that place (depending on the installed ILs and unused holders)	BGPL / third party	Managing Director, BGPL
3. Distribution of CFLs (para 12 of AMS-II.C version	The following parameters will be recorded during the distribution of CFLs: i. Date of CFL distribution	BGPL / third party	Managing Director, BGPL

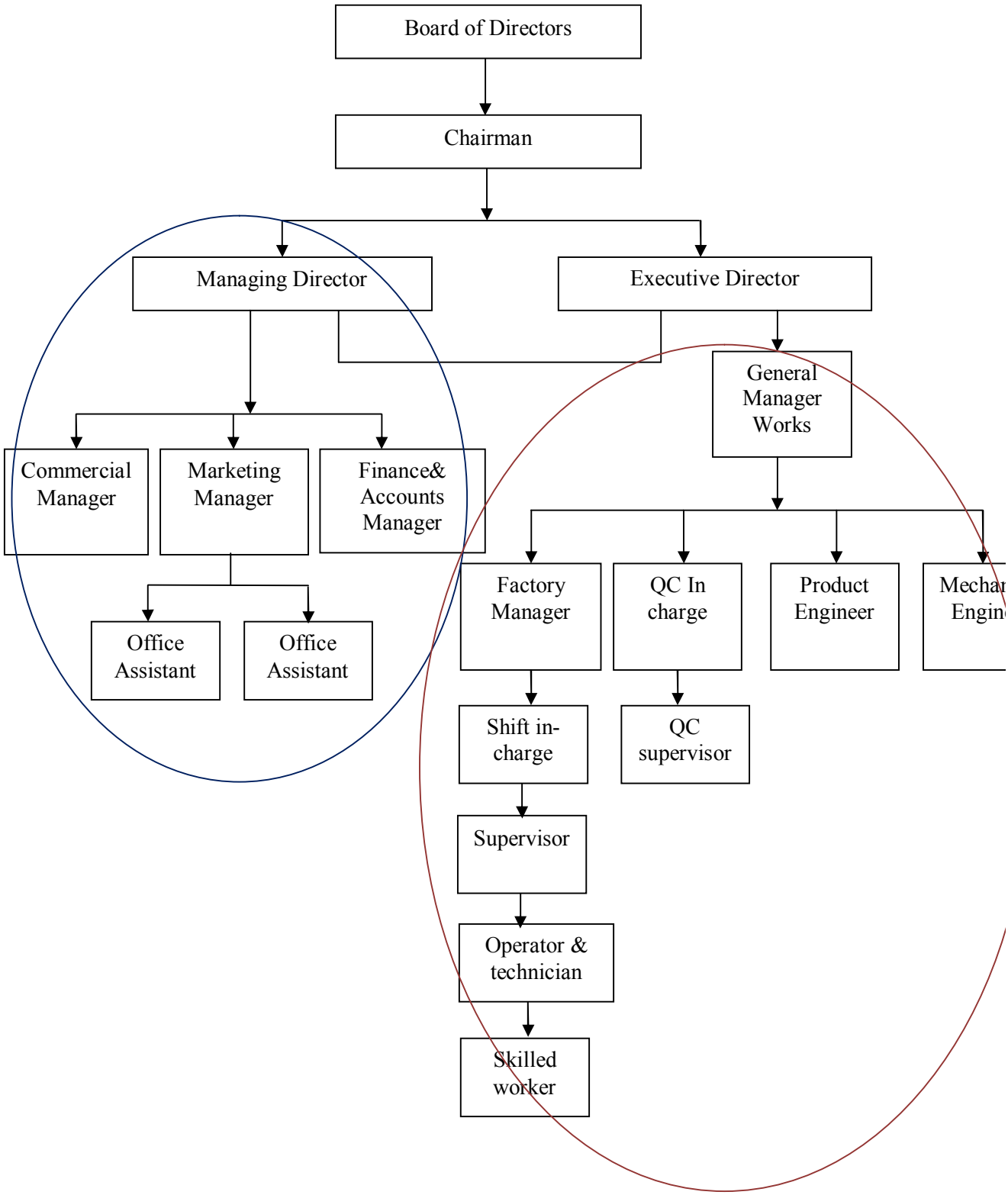
13)	ii. Wattage of the distributed CFL iii. Wattage of IL replaced by the project CFL iv. Awareness & acceptance by the recipient of the CFLs in the form of signatures to the effect that CERs for the energy saving measure would be claimed by BGPL. The CFLs will be distributed through a door-to-door survey or dedicated distribution centres.		
4. Ex post monitoring survey(para 13 and 14 of AMS-II.C version 13)	Sampling is done as per the EB guidelines to monitor the following: i. Actual number of operating CFLs – Annual ex-post survey for non-metered sample. ii. Operating hours of CFLs (metered using runtime meters) – The run time meters will be installed on the sample CFLs for a period of ninety days. These run time meters will be repeatedly shifted to new sample CFLs at the end of ninety days to take account of the seasonal variations. iii. Another random sample, identified similar to the sample meters, would be taken from the population of CFLs and termed as 'non-metered sample'. An ex post monitoring survey would be conducted annually by BGPL (or a third party appointed for the purpose) for the non-metered sample of installed CFLs to verify whether the distributed CFLs are operating.	BGPL / third party	Managing Director, BGPL
5. Devices which have variable current characteristics and monitoring for pumping systems (para 15 and 16 of AMS-II.C version 13)	Not applicable as the devices being installed (ie. the CFL lamps) do not have variable current characteristics and pumping systems.	-	-
6. Collection / disposal of used ILs[11] (para 17 of AMS-II.C version	Wattage of replaced IL will be recorded against the wattage of the distributed CFL. The ILs will be disposed as per the standard	BGPL / third party	BGPL

[11] The standard practice as prescribed by the respective regulatory body at the time of disposal will be adopted for the programme. The disposal procedure would be in line with the requirement of CPCB. An independent monitoring of scrapping of replaced equipment would be implemented, recorded and documented for independent verification.

13)	practice followed in the local SSC-CPA region.		

The collected data at different stages of monitoring would be collected and maintained by BGPL for the entire crediting period of the <SSC-CPA-region>. CPA plus two years.

The following team will be responsible for the monitoring of the project activity:


Board of Directors
Chairman
Managing Director
Executive Director
General Manager Works
Commercial Manager
Marketing Manager
Finance& Accounts Manager
Office Assistant
Office Assistant
Factory Manager
QC In charge
Product Engineer
Shift in-charge
QC supervisor
Supervisor
Operator & technician
Skilled worker

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.

Information is provided at the PoA level.

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

N/A

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:

N/A

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. In this case 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:

N/A

D.3. Summary of the comments received:

N/A

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

N/A

Annex 1

CONTACT INFORMATION ON ENTITY RESPONSIBLE FOR THE SMALL-SCALE CPA

Organization:	Balaji Greentech Products Limited
Street/P.O.Box:	--
Building:	KPR House, SP Road
City:	Secunderabad
State/Region:	Andhra Pradesh
Postfix/ZIP:	500 003
Country:	India
Telephone:	+91 40 2789 8206 / 2071
FAX:	+91 40 2781 6171
E-Mail:	info@zora.in
URL:	
Represented by:	--
Title:	Managing Director
Salutation:	Mr.
Last Name:	Reddy
Middle Name:	--
First Name:	G. Hemanth
Department:	--
Mobile:	+91 9866529067
Direct FAX:	+91 40 27816171
Direct tel:	+91 40 27890630
Personal E-Mail:	ghr@zora.in

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project (CPA) does not involve any public funding

Annex 3

BASELINE INFORMATION

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, in its Version 4, has estimated the Build Margin and the Simple Operating Margin for the Southern grid and NEWNE grid as detailed below:

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

http://www.cea.nic.in/planning/c%20and%20e/database_publishing_ver4.zip

Emission Factor

Simple Operating Margin (tCO_2/MWh) (incl. Imports)

	2005-06	2006-07	2007-08
NEWNE	1.02	1.01	1.00
South	1.01	1.00	0.99
India	1.02	1.01	1.00

Net Generation Total (GWh)

	2005-06	2006-07	2007-08
NEWNE	437,877	465,361	496,119
South	138,329	152,206	157,315
India	576,206	617,567	653,434

Build Margin (tCO_2/MWh) (not adjusted for imports)

	2005-06	2006-07	2007-08
NEWNE	0.67	0.63	0.60
South	0.71	0.70	0.71
India	0.68	0.65	0.63

Calculation of the Baseline Emission Factor

Step 1: Identifying the relevant electricity system

A "project electricity system" is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

A "connected electricity system" is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint. The tool requires the following considerations while determining whether significant transmission constraints exist or not:

- In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5 percent between the systems during 60 percent or more of the hours of the year.
- The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year.

In the Indian context, as no well established spot markets exist, the first criterion is not applicable. Similarly, a transmission line fulfilling the second criteria is an exception in Indian Context. Hence the use of these criteria does not result in a clear grid boundary. In such a scenario, the use of a regional grid definition in case of large countries with layered dispatch systems (e.g. provincial, regional/national) is recommended. Further, it states that a provincial grid definition may in many cases be too narrow given significant electricity trade among provinces that might be affected, directly or indirectly, by a CDM project activity.

The Indian power system is divided into two independent regional grids, namely Northern Eastern Western North-Eastern grid and southern grid. The southern grid covers four states and two Union Territories including the state of Andhra Pradesh, where the project activity is located.

Each state in a regional grid meets its own demand with its own generation facilities and also with allocation from power plants owned by the central sector. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The volume of the net transfers between the regions in India is relatively small and electricity is largely produced and consumed within the same states. Consequently, it is appropriate to assume that the impacts of the project activity will be confined to the regional gird in which it is located. Hence for the purpose of estimation of the baseline emission factor, the Southern grid has been chosen as the relevant electricity system.

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

The project participant wishes to choose Option I to calculate the operating margin and build margin emission factor. Hence project participant would follow the procedure contained in earlier version of this tool[12]

Step 3: Select a method to determine the Operating Margin method

The project participant wishes to use the Simple Operating Margin (OM) method for the estimation of the baseline. The use of the Simple OM method is justified as the share of the low cost/ run resources constitute less than 50% of the total grid generation. The Ex ante option has been chosen for the calculation of the Simple OM. In Ex ante option, a 3 year generation-weighted average based on the most recent data available at the time of submission of CDM PDD to the DOE for validation, without requirement to monitor and recalculate the emission factor during the crediting period has been used.

[12] Option I: Only grid power plants are included in the calculation.

Step 4: Calculate the operating margin emission factor according to the Simple OM method

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 data provided by the Central Electricity Authority (CEA), an official data source has been relied upon for the calculation of the OM[13]. The same has been detailed in Annex 3. The latest version of the database, Version 4 has been used. The OM calculations have been based upon generation data, fuel consumption and the Gross Calorific value (GCV) of the fuel.

Assumptions

The following assumptions have been in case of unavailability of data at station level:

Net generation: In case of stations where only gross generation data is available, CEA standard values for auxiliary consumption have been applied to calculate the net generation.

GCV: Default GCV values for some thermal power stations have been used for cases where station specific data was unavailable.

The following assumptions have been in case of unavailability of data at unit level:

Net generation: The data is not monitored at a unit level and hence the following assumptions have been made

1 The auxiliary consumption (in % of gross generation) of the unit was assumed to be equal to that of the respective stations in the following cases:

- All units of a station fall into the build margin; or
- All units of a station have the same installed capacity; or
- The units in the station have different capacities but do not differ with respect the applicable standard auxiliary consumption.

2. In all other cases, standard values for auxiliary consumption adopted by CEA were applied.

Fuel consumption and GCV: Fuel consumption and GCV are generally not measured at unit level. Instead, the specific CO_2 emissions of the relevant units were directly calculated based on heat rates.

Calculation Approach

The Simple OM has been calculated using the following formula:

Where:

$EF_{grid,Omsimple,y}$	=	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,m,y}$	=	Amount of fossil fuel type i consumed by power plant / unit m in year y (mass or volume unit)

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

$NCV_{i,y}$	=	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	=	either the three most recent years for which data is available at the time of submission of the PDD to the DOE for validation (for ex ante option)

The Operating Margin would be estimated ex ante. For Ex ante calculation, the average simple operating margin of the past three years (2006-07 to 2008-09) has been calculated.

OM = 0.9982 (Southern grid)

= 1.0086 (NEWNE grid)

The sample group of power units m selected for calculation of 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. The data pertaining to the units thus identified are detailed in the Version 4 of the Baseline Carbon Dioxide Emissions database of the CEA[14].

With regards to data vintage, the project participant wishes to use Option 1 viz., for the 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.

Step 5: Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available and will be calculated as follows:

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)

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

M	=	Power units included in the build margin
Y	=	Most recent historical year for which power generation data is available

The Build Margin would be calculated annually ex ante during the crediting period. For ex ante calculation the most recent data available (2008-09) has been used and the build margin thus calculated is 0.71.

Therefore,

BM = 0.7133 (Southern grid)

= 0.5977 (NEWNE grid)

Step 6: Calculate the combined margin emissions factor

The combined margin will be calculated as follows:

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

Where,

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$	=	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 default values to be used for Power projects other than using wind and solar energy as the source are

w_{OM}= 0.5 w_{BM}= 0.5

Hence, the Baseline Emission Factor is calculated as below:

EF = w_{OM} * OM + w_{BM} * BM

= 0.5 * 0.9982 + 0.5 * 0.7133 (Southern grid)

= 0.5 * 1.0086 + 0.5 * 0.5977 (NEWNE grid)

= 0.8557 tCO_2/MWh (Southern grid)

= 0.8031 tCO_2/MWh (NEWNE grid)

Annex 4

MONITORING INFORMATION

The information is provided in Section B.6.

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