CLEAN DEVELOPMENT MECHANISM

CDM-MP60-A14

Draft Large-scale Methodology

AM00XX: Distribution of efficient light bulbs to households

Version 01.0 - Draft

Sectoral scope(s): 03

United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The Executive Board (hereinafter referred to as the Board) of the clean development mechanism (CDM) at its seventy-third meeting requested the Methodologies Panel (hereinafter referred to as the Meth Panel) to revise or develop large-scale methodologies for installation of efficient lighting systems and distribution of low greenhouse gas water purification systems. Public inputs are sought for the revisions and questions are presented in the body of the draft methodology.

2. Purpose

2. The draft methodology proposed in this document aim to:

   (a) Include simplified procedures and objective criteria to demonstrate additionality while maintaining environmental integrity; and

   (b) Introduce further simplifications to the methodology which result from the additionality related simplifications;

   (c) Increase consistency with small-scale CDM methodologies which deal with similar technologies.

3. The purpose of the call for public input is to allow the Meth Panel to take into account feedback/comments received on the revision of the methodologies.

3. Key issues and proposed solutions

4. None.

4. Impacts

5. The standardized approach for additionality demonstration will facilitate the implementation of CDM project activities apply distributed units, which is very relevant for the least developed countries (LDCs) and other regions that are underrepresented in the CDM.

5. Proposed work and timelines

6. The Meth Panel, at its 60th meeting, agreed on the draft new methodology. After receiving public inputs on the document, the Meth Panel will continue working on the draft methodology, at its 61st meeting, for recommendation to the Board at EB 76.

6. Budget and costs

7. No budget implication.

7. Recommendations to the Board

8. Not applicable (call for public input).

8. References (If relevant)

(a) Large-scale methodology “AM0046: Distribution of efficient light bulbs to households”;

(b) Small-scale methodology “AMS-II.J: Demand-side activities for efficient lighting technologies”;

(c) Decision 5/CMP.8 Paragraph 35 “encourages the CDM Executive Board to continue its work on the simplification and streamlining of methodologies, with the aim of reducing transaction costs for all project activities and programme of activities, especially those in regions underrepresented in the clean development mechanism;

(d) Workplan for panels and working groups for 2013 (EB 72, annex 4), MAP project 164.

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1. Introduction

1. The following table describes the key elements of the methodology:

Table 1. Methodology key elements

Typical projects	Self-ballasted compact fluorescent lamps (CFLs) and light-emitting diode (LED) lamps are sold or distributed to households to replace incandescent lamps (ICL) in households
Type of GHG emissions mitigation action	Energy efficiency: Displacement of less-efficient lighting by more-efficient technology

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology is applicable to project activities that enhance energy-efficient lighting in households. The project activity is implemented by a project coordinator who is the project participant. The project coordinator sells, at a reduced price, or donates energy efficient light bulbs to households within a distinct geographical area, thereby replacing less energy efficient incandescent light bulbs. The individual households that use the efficient light bulbs distributed or sold under the project activity are not the project participants.

3. A project activity implementation plan which specifies how the project is implemented shall be established and documented in the CDM-PDD, including, inter alia, information on:

   (a) The type of light bulbs that are distributed or sold by the project coordinator, including information on the manufacturer, any label, the product number, the lumen, the power rating, etc.;

   (b) The total number of project activity light bulbs by type that are planned to be distributed by the project activity over the duration of the crediting period;

   (c) Conditions under which households are eligible to participate in the project activity (e.g. households that are customers of an electric utility, households with a certain income, etc.);

   (d) How the light bulbs will be distributed or sold to household consumers;

   (e) Whether the project light bulbs are directly installed or not directly installed, the project design document shall define actions to be taken to encourage the project light bulbs being installed in locations within the residences where the utilization hours are relatively high, for example common areas. For project light bulbs not directly installed these actions can include educating the project light bulb recipients of the best uses for project light bulbs.

2.2. Applicability

4. The methodology is applicable under the following conditions:

   (a) A project light bulb sold or distributed to a household by the project coordinator shall be a self-ballasted CFL or self-ballasted LED lamp;

   (b) The total lumen output of a project light bulb shall be equal to or more than that of the ICL being replaced; lumen output of ICL & the project light bulb shall be determined in accordance with relevant national or international standard/s. Values in Table 2 may be used as an alternative option to such standards. If a lamp wattage is not in Table 2, linearly interpreted value shall be used to determine the minimum light output requirements for example 493 Lumens for a 45 W lamp.

Table 2. Light output requirements

Baseline technology - Incandescent Lamp (Watt)	Minimum light output (Lumen)
25	230
40	415
50	570
60	715
75	940
90	1,227
100	1,350
150	2,180
200	3,090

5. The project light bulbs utilized under the project activity shall be marked, in addition to the standard lamp specifications[1], for clear unique identification for the project.

6. The project design document shall explain the proposed method of distribution of project light bulbs and ICL collection (e.g. exchanged for project light bulbs) and destruction[2] will be conducted and documented. The project design document shall also explain how the proposed procedures eliminate double counting of emission reductions, for example due to project light bulb manufacturers, wholesale providers or others possibly claiming credit for emission reductions for the project light bulbs.

7. The project activity shall be designed to limit undesired secondary market effects (e.g. leakage) and free riders by ensuring that replaced lamps are collected and destroyed.

[1] For example power rating, lumen output, correlated colour temperature, voltage, power factor, frequency.

[2] Proposed method for collection and destruction shall allow for verification. An example method is collection of ICLs, recording of ICL wattage and destruction in decentralised or centralised locations, and destruction documented via witnessing by local environmental officials or time stamped video records. With recorded documentation of ICL destruction, the destruction can precede verification.

Further project participants are required to undertake at least one of the following actions:

(a) Directly install the project light bulbs;

(b) Charge at least a minimal price[3] for the project light bulbs;

(c) Restrict the number of lamps per household distributed through the project activity to six.

8. The households are connected to a national or regional electricity grid.

9. In addition, the applicability conditions included in the tools referred to below apply.

2.3. Entry into force

10. Not applicable (call for public input).

3. Normative references

11. This methodology is based on the project activity "Ghana efficient lighting retrofit project", whose baseline and monitoring methodology and project design document were prepared by Perspectives Climate Change GmbH, Hamburg, Germany.

12. For more information regarding the proposal and its consideration by the Executive Board (hereinafter referred to as the Board) of the clean development mechanism (CDM) please refer to:

(a) “NM0150-rev: Ghana efficient lighting retrofit project” on <http://cdm.unfccc.int/goto/MPpropmeth>;

(b) “AMS-II.J: Demand-side activities for efficient lighting technologies”.

13. This methodology also refers to the latest version of the approved:

(a) “Tool to calculate the emission factor for an electricity system”;

(b) The methodological tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period".

3.1. Selected approach from paragraph 48 of the CDM modalities and procedures

14. “Existing actual or historical emissions, as applicable”.

4. Definitions

15. The definitions contained in the Glossary of CDM terms shall apply.

16. For the purpose of this methodology, the following definitions apply:

[3] For example cost equivalent of an incandescent lamp being replaced.

(a) **Life (of an individual lamp)** - the length of time during which a complete lamp operates:

(i) To burn out; or

(ii) Any other criterion of life performance defined in IEC 60696 or an equivalent national standard applied;

(b) **Average life (life to 50 per cent failures)** - the length of time during which 50 per cent of the lamps reach the end of their individual life;

(c) **Rated average life (rated life to 50 per cent failures)** - the life declared by the manufacturer or responsible vendor as being the expected time at which 50 per cent of any large number of lamps reach the end of their individual lives.

5. Baseline methodology

5.1. Project boundary

17. The spatial extent of the project boundary encompasses the physical, geographical location of each project light bulb installed in the project area and the spatial extent of the electricity system(s) that the households are connected to as defined in the "Tool to calculate the emission factor for an electricity system".

18. Table 3 below illustrates which emission sources are included in the project boundary.

Table 3. Emission sources included in or excluded from the project boundary

Source		Gas	Included	Justification/Explanation
Baseline	Power plants servicing the electricity grid	CO_2	Yes	
		CH_4	No	Minor source
		N_2O	No	Minor source
Project activity	Power plants servicing the electricity grid	CO_2	Yes	
		CH_4	No	Minor source
		N_2O	No	Minor source

5.2. Identification of the baseline scenario and demonstration of additionality

19. If the project light bulb sold or distributed to a household by the project coordinator is self-ballasted LED lamps, the project activity is considered to be automatically additional.

20. If the project light bulb sold or distributed to a household by the project coordinator is self-ballasted CFLs, additionality shall be demonstrated using the latest version of the "Tool for the demonstration and assessment of additionality" that is available on the UNFCCC web site. Step 2 (Investment analysis) shall be used to demonstrate additionality. The investment analysis shall be applied from the perspective of the project coordinator undertaking the project activity. Step 4 (Common practice analysis) shall be assessed from the perspective of the users of the project light bulbs. The proposed

project activity is considered as “common practice”, if the market penetration of CFLs in the geographical area of the project activity is greater than X%.

Note: public input is sought regarding additionality determination for CFL lamps, as well as suitable common practice criteria with due justifications.

21. The assumed baseline scenario is that lighting in the households in the total project area would have utilised the currently used incandescent light bulbs, in the absence of the project activity

5.3. Emission reductions

22. The project activity enhances the efficiency of lighting in households and thereby reduces electricity consumption of the households. Emission reductions are calculated based on the grid emission factor ($EF_{CO2,ELEC,y}$) and the quantity of electricity saved by the households as a result of the project activity. Project proponents may replace the default values by project specific values arrived through research, studies or surveys, as applicable. One project light bulb group shall include project light bulbs of the same technical specification and installed within a defined period equal to or smaller than twelve months.

23. Emission reductions are calculated as follows:

$$ER_y = NTG \times \frac{EF_{CO2,ELEC,y}}{1 - TDL_y} \times \left[\sum_j \sum_i (P_{i,BL} - P_{i,PJ}) \times O_j \times LFR_{j,y} \right] \quad \text{Equation (1)}$$

Where:

ER_y	=	Emission reductions in year *y*, CO_2/y
$EF_{CO2,ELEC,y}$	=	Grid emission factor in year *y* calculated following the guidance in the latest approved version of “Tool to calculate the emission factor for an electricity system”, MWh/CO_2
TDL_y	=	Technical distribution loss in year *y*, fraction
i	=	Project light bulbs in group *j*
j	=	Group of project light bulbs
$P_{i,BL}$	=	Rate power of baseline incandescent bulb for project light bulb *i*, W
$P_{i,PJ}$	=	Rate power of project light bulb *i*, W
O_j	=	Daily operation hours of project light bulb group *j*
$LFR_{j,y}$	=	Lamp failure rate of project light bulb group *j* in year *y*
NTG	=	Net-to-gross adjustment factor, a default value of 0.95 is to be used unless a more appropriate value based on a lighting use survey from the same region and not older than two years is available

5.3.1. Ex ante determination of lamp failure rate $LFR_{j,y}$

24. The average life or the rated average life of each project light bulb group shall be known ex ante. IEC 60969 (Self Ballasted Lamps For General Lighting Services - Performance Requirements), IEC 62612 (Self-ballasted LED lamps for general lighting services with supply voltages > 50 V - Performance requirements), or an equivalent national standard shall be used to determine the average life. The project design document shall cite the standard used.

25. The lamp failure rate of project light bulb group *j* that have failed during year *y* ($LFR_{i,y}$) is estimated based on the average life or the rated average life as follows:

$$If(\ y \times O_j \times 365) < L_j, LFR_{ex\ ante,j,y} = y \times O_j \times 365 \times \frac{100 - R}{100 \times L_j} \quad \text{Equation (2)}$$

$$If\ (\ y \times O_j \times 365) \geq L_j, LFR_{ex\ ante,j,y} = 1$$

Where:

$LFR_{ex\ ante,j,y}$	=	Lamp failure rate of project light bulb group *j* in year *y,* determined ex ante
L_j	=	Average life (or rated average life if average life value is not available) for light bulb group *j* (hours)
R	=	% of lamps operating at the end of average life or the rated average life (use a value of 50)
O_j	=	Daily operation hours of project light bulb group *j*

5.3.2. Ex post determination of $LFR_{j,y}$ and L_j

26. Lamp failure rate ($LFR_{j,y}$) are monitored through surveys consisting of identifying project light bulbs that are installed and operating within of light bulb group *j.* Only project light bulbs with an original marking can be counted as installed. While project light bulb *i* replaced as part of a regular maintenance or warranty program can be counted as operating, the replacement shall not be undertaken as part of this monitoring survey process and neither the replacement nor the original light bulb shall be included in the emission calculations. The monitoring shall be conducted at the following frequency:

(a) First ex post monitoring survey shall be carried out within the first year after installation of all efficient lighting equipment of light bulb group *j*;

(b) Until $y = L_j/(O_j \times 365)$, subsequent ex post monitoring surveys are carried out at the following intervals (choose either of the following two options that define the minimum requirement for the frequency of the survey):

(i) Once every three years;[4] or

[4] For example assuming a rated lifetime of 10,000 hours and annual hours of operation of 1,278, since the first ex post monitoring survey is done first year after installation of all efficient lighting equipment, the subsequent surveys take place every three years.

(ii) Once for every 30 per cent of the elapsed Rated Average Life or Average Life of the lamp. If the average life value is not available ex ante and the *rated* average life is used for ex ante calculations, the average life value (L_j) shall be determined ex post, before or at the same time that the results of the second ex post monitoring survey for $LFR_{j,y}$ are available for verification. As soon as average life values (L_j) are available, subsequent year $LFR_{ex\ ante,j,y}$ values shall be recalculated from average life value according to equation (2).

27. Lamp failure rate ($LFR_{j,y}$) shall be determined to be the maximum value among $LFR_{ex\ ante,j,y}$ and all the past monitored values for project light bulb group *j* from the surveys.

5.4. Generic instructions for conducting sampling

28. Standard for "Sampling and surveys for CDM project activities and programme of activities" shall be followed while conducting the sampling.

29. A project database shall be established containing all relevant information for estimating baseline emissions and sampling the project light bulbs, including, inter alia:

(a) Details of each user of the project light bulbs (name, address, contact details);

(b) Model, power rating, and unique serial number of the project light bulb;

(c) Life span of the project light bulb;

(d) Power rating of the returned ICL;

(e) Date of installation/distribution of the project light bulb;

(f) The group to which the project light bulb belongs. Each group of light bulbs should be installed within 12 months and of the same manufacturer specifications (e.g. model, power rating);

(g) Dates of expiration, replacement or drop-out of the device if such events occur;

(h) Dates of checking whether the project light bulb is working.

30. In addition, the following survey principles shall be followed for activities related to determining number of CFLs placed in service and operating under the project activity and, if required, determining the number of operating hours of baseline and project lamps:

(a) The sampling size is determined by minimum 95 per cent confidence level and the 10 per cent maximum error margin; the size of the sample shall be no less than 100;

(b) Sampling must be statistically robust and relevant that is the survey has a random distribution and is representative of target population (size, location);

(c) The method to select respondents for interviews is random;

(d) The survey is conducted by site visits;

(e) Only persons over age 12 are interviewed;

(f) The project document must contain the design details of the survey.

5.5. Leakage

31. Scrapping of replaced equipment to avoid leakage is addressed under applicability conditions, therefore no specific requirements are indicated.

5.6. Changes required for methodology implementation in 2nd and 3rd crediting periods

32. Project participants shall apply the methodological tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period".

5.7. Data and parameters not monitored

6. Monitoring methodology

33. All data collected as part of monitoring should be archived electronically and be kept at least for two years after the end of the last crediting period. All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.

34. Furthermore, all parameters required by tools referred to by this methodology shall be monitored.

6.1. Data and parameters monitored

Data / Parameter table 1.

Data / Parameter:	**Project database**
Data unit:	-
Description:	Household and light bulb information as detailed in section 5.4.
Source of data:	Database
Measurement procedures (if any):	-
Monitoring frequency:	Database shall be maintained continuously
QA/QC procedures:	Project proponents shall ensure that information is registered correctly, controlled and updated with stringent measures
Any comment:	The database is the source for, inter alia, $P_{j,PJ}$

Data / Parameter table 2.

Data / Parameter:	**O_j**
Data unit:	h
Description:	Daily operation hours of project light bulb group *j*

Source of data:	Operating hours shall be determined as either (a) A default value of 3.5 hours per 24 hours period; or (b) An average measured value determined from measurements of a representative sample conducted once, prior to or concurrent with the first ex post monitoring survey for determining the lamp failure rate
Measurement procedures (if any):	A continuous measurement of usage hours of baseline or project lamps for a minimum of 90 days at representative sample households is required. The days selected for measurement of operating hours shall either be representative of the annual variation of daylight hours in the region or a correction shall be applied to account for annual variation in daylight. For further instructions on sampling and surveys see the latest version of the "Standard for sampling and surveys for CDM project activities and programme of activities"
Monitoring frequency:	-
QA/QC procedures:	In no case may a value greater than five hours per 24 hour period shall be used under this methodology
Any comment:	The project participant shall decide prior to the first ex post measurement whether to use the 3.5 hours default value or ex post measured operating hours for determining O_j. If the project participant is undecided prior to the first ex post measurement as to which option to use, approaches to each option under consideration should be described in the PDD, with details of a sampling plan. However, once an approach is implemented, the project participant may not switch options. In particular, it is not possible to collect measured operating hour data (which may, for example, show three hours per day of operation) and then switch back to use the default value of 3.5 hours

Data / Parameter table 3.

Data / Parameter:	**L_j**
Data unit:	h
Description:	Average life of project light bulb group *j*
Source of data:	-
Measurement procedures (if any):	The laboratory conducting and certifying the tests to determine project light bulb average life shall comply with the requirements of a relevant national or international standard, for example ISO/IEC 17025
Monitoring frequency:	Once - before or at the same time that the results of the second ex post monitoring survey for $LFR_{j,y}$ are available
QA/QC procedures:	-
Any comment:	Not applicable if the value is available ex ante

Data / Parameter table 4.

Data / Parameter:	**$LFR_{j,y}$**
Data unit:	-
Description:	Lamp failure rate
Source of data:	Survey

Measurement procedures (if any):	See sections on ex post determination of $LFR_{i,y}$ and generic instructions for conducting sampling
Monitoring frequency:	See section on ex post determination of $LFR_{i,y}$
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 5.

Data / Parameter:	**$TDL_{y\ scrapping/destruction\ of\ ICLs}$**
Data unit:	-
Description:	Technical distribution losses in the electricity grid serving the household consumers that participate in the project during the monitoring interval *y* (kWh of technical electric losses in the electricity grid/kWh of electricity generated)
Source of data:	The average annual technical grid losses shall be determined using recent, accurate and reliable data available for the host country. This value can be determined from recent data published either by a national utility or an official governmental body. Reliability of the data used (e.g. appropriateness, accuracy/uncertainty, especially exclusion of non-technical grid losses) shall be established and documented by the project participant. A default value of 10 per cent shall be used for average annual technical grid losses, if no recent data are available or the data cannot be regarded accurate and reliable
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	The average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations where the devices are installed, expressed as a fraction, shall not include non-technical losses such as commercial losses (e.g. theft/pilferage)

Data / Parameter table 6.

Data / Parameter:	**Scrapping/destruction of replaced ICL light bulbs**
Data unit:	-
Description:	-
Source of data:	-
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

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Document information

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