CLEAN DEVELOPMENT MECHANISM

CDM-MP92-A05

Draft small-scale Methodology

AMS-II.J.: Demand-side activities for efficient lighting technologies

Version 08.0

Sectoral scope(s): 03

United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The Executive Board of the clean development mechanism (CDM) (hereinafter referred to as the Board), at its 116th meeting, requested the MP to review and, if needed, revise the methodologies listed below to clarify eligible energy efficient lighting technologies. In addition, the Board requested the MP to further assess the eligibility of different compact fluorescent lamps technologies as project technologies (e.g. considering the additionality aspects and environmental impacts of disposal) and propose limitations where deemed necessary.

    (a) "AM0046: Distribution of efficient light bulbs to households";

    (b) "AM0113: Distribution of compact fluorescent lamps (CFL) and light-emitting diode (LED) lamps to households";

    (c) "AMS-II.C.: Demand-side energy efficiency activities for specific technologies";

    (d) "AMS-II.J.: Demand-side activities for efficient lighting technologies";

    (e) "AMS-III.AR.: Substituting fossil fuel-based lighting with LED/CFL lighting systems".

2. Purpose

2. The purpose is to revise the methodologies to address the mandate from the Board.

3. Key issues and proposed solutions

3. The following changes are proposed to the methodologies listed in paragraph 1 above:

    (a) Removing references to the types of technologies eligible for project lamps, i.e. compact fluorescent lamps (CFLs) and light emitting diode (LED), and replacing by efficient systems or efficient lamps;

    (b) Including a requirement that the PDD shall ensure that project lamps will be managed properly at the end of its lifetime in line with national regulations or standards to prevent harm to the environment and to public health.

4. To ensure that only efficient lamps are eligible as project lamps, the proposed revision makes the methodology applicable only to projects using lamps with a minimum luminous efficacy that meets the Minimum Energy Performance Standards (MEPS) of the host Party, if available and not older than 5 years. If the country has no MEPS requirements or

if the MEPS are older than five years, the luminous efficacy of project lamps shall be no less than 70 Lumen/Watt.[1]

5. In addition to the changes above, the proposed revision also updates the additionality section by allowing project participants to demonstrate additionality through positive list (market share and market penetration), through the application of the "TOOL21: Demonstration of additionality of small-scale project activities" or through the application of the "TOOL19: Demonstration of additionality of microscale project activities".

4. Impacts

6. The revision of this methodology, if approved, will ensure that only high efficient project lamps that do not have the potential to harm the environment or public health are eligible as project lamps.

5. Subsequent work and timelines

7. The MP, at its 92nd meeting, agreed to seek public inputs on the draft revised methodology. Inputs received, if any, will be discussed with the MP and forwarded to the Board for its consideration together with this document. No further work is envisaged.

6. Recommendations to the Board

8. The MP recommends that the Board adopt this draft methodology, to be made effective at the time of the Board's approval.

[1] CLASP and PricewaterhouseCoopers Private Limited (PwC). 2020. Indonesia Lighting Market Study and Policy Analysis – Final Report. Available at https://www.clasp.ngo/wp-content/uploads/2021/01/Indonesia-Lighting-Market-Study-and-Policy-Analysis.pdf, accessed on 30 August 2023. Figure 52 illustrates the performance (in lumen/W) of different types of lamps per outputs (lumen) for different types of lamps (LED, CFL, Halogen, Incandescent) gathered from different countries (Australia, China, Indonesia, Korea and Singapore) and compare these performances with Minimum Energy Performance Standards (MEPS) from South Africa, European Union and China. A threshold of 70 lumen/W is proposed since it covers lamps with a high performance. As a consequence, most CFL lamps and all incandescent and halogen lamps are not eligible under this methodology.

TABLE OF CONTENTS **Page**

1. Introduction

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

Table 1. Methodology key elements

Typical projects	~~Activities for a~~Adoption of energy efficient light bulbs ~~(e.g. self-ballasted compact fluorescent lamps (CFLs) and light emitting diode (LED) lamps) to replace less efficient light bulbs (e.g. incandescent lamps (ICLs))~~ ~~in~~ for residential applications
Type of GHG emissions mitigation action	Energy efficiency: Displacement of more-GHG-intensive lighting by technology switch

2. Scope, applicability, and entry into force

2.1. Scope

2. This category comprises activities that lead to efficient use of electricity through the adoption of energy efficient light bulbs (project lamps) to replace less energy efficient light bulbs (baseline lamps) in residential applications. ~~Eligible self-ballasted CFLs have integrated ballasts as a non-removable part.~~ The project lamps adopted to replace existing equipment shall be new equipment and not transferred from another activity.

2.2. Applicability

3. The minimum luminous efficacy of project lamps shall meet the Minimum Energy Performance Standards (MEPS) of the host Party, if available and not older than 5 years, or else the luminous efficacy of project lamps shall be no less than 70 Lumen/Watt.[2]

4. The total light output of a project lamp should be equal to or more than that of the baseline lamp being replaced; light output of the baseline and the project lamp shall be determined in accordance with relevant national or international standard/s. ~~The minimum light output values provided in Table 2 may be used as an alternative option to such standards. If lamp wattage is not provided in Table 2, linearly interpreted value shall be used to determine the minimum light output requirements for example 493 Lumen for a 45 W lamp.~~

[2] CLASP and PricewaterhouseCoopers Private Limited (PwC). 2020. Indonesia Lighting Market Study and Policy Analysis – Final Report. Available at https://www.clasp.ngo/wp-content/uploads/2021/01/Indonesia-Lighting-Market-Study-and-Policy-Analysis.pdf, accessed on 30 August 2023. Figure 52 illustrates the performance (in lumen/W) of different types of lamps per outputs (lumen) for different types of lamps (LED, CFL, Halogen, Incandescent) gathered from different countries (Australia, China, Indonesia, Korea and Singapore) and compare these performances with Minimum Energy Performance Standards (MEPS) from South Africa, European Union and China. A threshold of 70 lumen/W is proposed since it covers lamps with a high performance. As a consequence, most CFL lamps and all incandescent and halogen lamps are not eligible under this methodology.

~~**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 aggregate electricity savings by a single project activity may not exceed the equivalent of 60 GWh per year.

6. The rated average life[3] of each project lamp type shall be known ex ante and reported in the CDM-PDD or CDM-PoA-DD/CPA-DD. Manufacturer specifications shall be used to determine the rated average life. The CDM-PDD or CDM-PoA-DD/CPA-DD shall cite the standard used by the manufacturer.

7. The project lamps utilized under the project activity shall, in addition to the standard lamp specifications,[4] be marked for clear unique identification for the project.[5] The method to meet this requirement includes, but is not limited to, the following:

   (a) Permanent marking of CDM project number and name on each of the project lamps along with other specifications;

   (b) Marking using special codes, for example each project is permanently marked *'for CDM project, not for sale/resale'* followed by project specific marking/labelling;

   (c) Other forms of identification using communication technologies (e.g. GPS, mobile phone networks) or lease/rental payment.

[3] See Section 4 for definitions of Rated Average Life.

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

[5] The requirements on unique marking of project lamps are to ensure that if ex post monitoring survey conducted to confirm that the lamps are still installed and operating is based on sample survey, sample selection is on a random basis to ensure results are unbiased estimates of the parameters and each lamp would have equal chance to qualify as a sample. Besides, the requirements are also to enable identification of the lamps that are distributed only through the specific CDM project activity under consideration~~, particularly if multiple CFL projects are underway~~. Furthermore, in the case of programme of activities (PoAs), the requirements are important to avoid double counting within the PoA (the same device belonging to two different CPAs of the same PoA); and to avoid double counting in situations external to the PoA (the same device belonging to two different PoAs). Thus, unique identification of each lamp would avoid double counting as well as allow implementation of unbiased and reliable sample schemes.

8. The CDM-PDD or CDM-PoA-DD/CPA-DD shall:

   (a) Explain the proposed method of distribution of project lamps and how collection (e.g. exchanged for project lamps) and destruction[6] of baseline lamps will be conducted and documented~~. The CDM-PDD or CDM-PoA-DD/CPA-DD shall also~~;

   (b) Explain how the proposed procedures eliminate double counting of emission reductions, for example due to project lamp manufacturers, wholesale providers or others possibly claiming credit for emission reductions from the project lamps; and

   (c) Describe how to ensure that project lamps are handled properly at the end of their lifetime in line with national regulations or standards to prevent harm to the environment and to public health.

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

   (a) Directly installing the project lamps;

   (b) Charging at least a minimal price[7] for efficient lighting equipment;

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

10. Whether the project lamps are directly installed or not directly installed, the CDM-PDD or CDM-PoA-DD/CPA-DD shall define actions to be taken to encourage the project lamps being installed in locations within the residences where the utilization hours are relatively high, for example common areas. For project lamps not directly installed, these actions can include educating the project lamp recipients of the best uses for project lamps.

11. The households receiving project lamps are connected to a national or regional electricity grid.

2.3. Entry into force

12. The date of entry into force is the date of the publication of the EB XX meeting report on the DD Month YYYY.

2.4. Applicability of sectoral scopes

13. For validation and verification of CDM projects and programme of activities by a designated operational entity (DoE) using this methodology sectoral scope 03 is mandatory.

[6] 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.

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

3. Normative references

14. Project participants shall apply the "General guidelines for SSC CDM methodologies", information on additionality as contained in the methodological tool "Demonstration of additionality of small-scale project activities" (*Previously known as Attachment A of Appendix B to simplified modalities and procedures of small scale CDM project activities* provided at <http://cdm.unfccc.int/Reference/tools/index.html> mutatis mutandis.

15. This methodology also refers to the latest approved versions of the following approved tools and methodologies:

    (a) "TOOL07: Tool to calculate the emission factor for an electricity system" (hereinafter referred as TOOL07);

    (b) "TOOL19: Demonstration of additionality of microscale project activities" (hereinafter referred as TOOL19);

    (c) "TOOL21: Demonstration of additionality of small-scale project activities" (hereinafter referred as TOOL21);

    (d) "AMS-I.D.: Grid connected renewable electricity generation (hereinafter referred as AMS-I.D.)".

4. Definitions

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

17. For the purpose of this methodology, the following definitions apply;

    (a) **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;

    (b) **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;

    (c) **Minimum Energy Performance Standard (MEPS):** a set of specifications at a national level containing several performance requirements for an energy-using device, that effectively limits the maximum amount of energy that may be consumed by a product in performing a specified task. For lighting, it specifies the minimum performance requirement for different lighting appliances;

    (d) **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

18. The spatial extent of the project boundary encompasses the physical, geographical location of each project lamp installed in the project area and the spatial extent of the electricity system(s) that the households are connected to as defined in ~~the~~ TOOL07.

5.2. The baseline scenario and demonstration of additionality

~~19. If the project lamps sold or distributed by the project coordinator to households are self-ballasted LED lamps, the project activity is deemed automatically additional. The provision is valid for three years from the date of entry into force of version 6.0 of AMS-II.J on 28 November 2014; the Board may reassess the validity of the provision and extend or update it if needed. Any update does not affect the project activities that request registration as a CDM project activity or a programme of activities by 27 November 2017.~~

~~20. If the project lamp sold or distributed to a household by the project coordinator is self-ballasted CFLs,~~

~~21. For countries which have no or only limited lighting efficiency regulations when the CDM-PDD or CDM-PoA-DD is published for global stakeholder consultation, according to the Efficient Lighting Policy Status Map developed by UNEP's en.lighten initiative,the project activity is deemed additional;~~

~~22. For other countries, additionality should be demonstrated through barrier analysis using the latest version of the methodological tool "Demonstration of additionality of small-scale project activities" that is available on the UNFCCC web site. If "Investment barrier" is chosen to demonstrate additionality, the investment analysis should be applied from the perspective of the project coordinator undertaking the project activity. For "Technological barrier", it shall be assessed from the perspective of the users of the project lamps. The proposed project activity is considered as facing "Technological barrier", if the market penetration of CFLs for households in the geographical area of the project activity is less than 20 per cent.~~

23. The ~~assumed~~ baseline scenario is that lighting by the project lamps would have been provided by the lamps collected and replaced by the project activity.

24. Additionality is demonstrated using one of the options below:

5.2.1. Option 1 (positive list)

25. Demonstrate ex ante that the market penetration of each of the project lamp technologies is equal to or less than **2.5 per cent** of the technologies providing similar services to end-users using the data **based on annual sales of units**, or **1.5 per cent** using the data **based on the stock of units**, in the applicable geographic area in order to be considered as automatically additional. The applicable geographical area should be the entire host country. If the project participants opt to limit the applicable geographical area to a specific geographical area (such as province, region, etc.) within the host country, then they shall provide justification on the essential distinction between the identified specific geographical area and rest of the host country.

26. The market penetration shall be determined using one of the following options:

    (a) Official statistics or reports, relevant industry association reports or peer-reviewed literature;

    (b) Results of a sampling survey conducted by project participants or a third party as per the latest version of "Standard: sampling and surveys for CDM project activities and programme of activities" covering technologies/measures providing similar services as the project technology/measure.

27. If the market penetration is determined using the data based on annual sales of units, the most recent three years' data available at the time of submission of the CDM-PDD or CDM-CPA-DD for validation/inclusion shall be used. This period is considered necessary to capture variations of the sales data from year to year. Exceptionally, historical sales data covering less than three years, but a minimum of one year may be used with due justifications (e.g. demonstrated unavailability of data despite the efforts made).

28. To determine the market penetration using the data based on the stock of units, the most recent data available at the time of submission of the CDM-PDD or CDM-CPA-DD for validation/inclusion, shall be used, and the data vintage used shall not include data older than two years prior to: (a) the start date of the CDM project activity; or (b) the start of validation/inclusion, whichever is earlier.

5.2.2. Option 2

29. Additionality should be demonstrated through barrier analysis using the latest version of the methodological tool TOOL21. If "Investment barrier" is chosen to demonstrate additionality, the investment analysis should be applied from the perspective of the project coordinator undertaking the project activity. For "Technological barrier", it shall be assessed from the perspective of the users of the project lamps.

5.2.3. Option 3

30. Demonstrate additionality applying TOOL19.

5.3. Emission reductions

31. Ex ante calculations are done as per the following steps:

    (a) Estimate the nameplate/rated power (Watts) of the baseline incandescent lamps to be replaced;

    (b) Determine operating hours of project (and baseline) lamps using one of the following two options:

        (i) **Option 1:** a default value of 3.5 hours per 24 hours period for 'daily operating hours', that is factor O_i in equation (2), is chosen ex ante and is used ex post throughout the crediting period. In this case surveying to determine O_i is not required;

        (ii) **Option 2:** instead of using a default value of 3.5 hours for O_i, a measured value can be used for the ex ante estimate using the sampling requirements indicated in the definition of O_i for equation (2);

(c) Calculate the annual gross electricity savings by comparing the nameplate/rated power rating of the project lamp with that of the baseline incandescent lamp and multiplying by: (i) annual hours of operation; and (ii) the estimated number of Project Lamps that are part of the project. If more than one type (wattage) of project lamp is to be used, repeat calculation for each type;

(d) Calculate the annual net electricity saving (*NES*), for each year of the assumed crediting period, by correcting the gross electricity savings for leakage, a net-to-gross adjustment (*NTG*) factor, transmission & distribution losses, and Lamp Failure Rate.[8]

32. The electricity saved by the project activity in year *y* is calculated as indicated in equations (1) and (2):

$$NES_y = \sum_{i=1}^{n} Q_{PJ,i} \times \left(1 - LFR_{i,y}\right) \times ES_i \times \frac{1}{\left(1 - TD_y\right)} \times NTG \quad \text{Equation (1)}$$

$$ES_i = \left(P_{i,BL} - P_{i,PJ}\right) \times O_i \times 365/1000 \quad \text{Equation (2)}$$

Where:

NES_y	=	Net electricity saved in year *y* (kWh)
$Q_{PJ,i}$	=	Number (quantity) of pieces of equipment (project lamps) of type *i* distributed or installed under the project activity (units). In total for all *i*, this value shall be equal to or less than the documented number of all baseline incandescent lamps destroyed. Once all of the project lamps are distributed or installed, $Q_{PJ,i}$ is a constant value independent from *y*
i	=	Counter for equipment type. Lamps with the same manufacturer and similar (within 10 per cent) technical specifications and rated average life are considered to be of the same type. The project participants may include additional criteria (e.g. manufacturing year) for defining lamp types
n	=	Number of types of equipment *i*
ES_i	=	Estimated annual electricity savings for equipment of type *i*, for the relevant technology (kWh)
$LFR_{i,y}$	=	Lamp Failure Rate for equipment type *i* in year *y* (fraction)

[8] Calculate annual savings with consideration of lamp failure rate as indicated in equation (3) using either Average Life or Rated Average Life of Project Lamps.

TD_y	=	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. This value shall not include non-technical losses such as commercial losses (e.g. theft/pilferage). 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
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
$P_{i,BL}$	=	Rated power of the baseline lighting devices of the group of *i* lighting devices (Watts)
$P_{i,PJ}$	=	Rated power of the project lighting devices of the group of *i* lighting devices (Watts)
O_i	=	Average daily operating hours of the lighting devices replaced by the group of *i* lighting devices. For ex post values use either:[9] (a) 3.5 hours per 24 hour period; or (b) The average measured value determined from measurements of a representative sample conducted once, prior to or concurrent with the first ex post monitoring survey (see paragraph 38 and 39 below). Note that surveying to assess retention rates is still required even if a default value for O_i is chosen. In no case may a value greater than five hours per 24 hour period shall be used under this methodology

33. To use a value for 'daily operating hours' other than 3.5 hrs/day, a continuous measurement of usage hours of baseline or project lamps for a minimum of 90 days at representative sample households is required. Also see requirements in paragraph 41~~31~~. 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".

[9] 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_i in equation (2). 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 CDM-PDD or CDM-PoA-DD/CPA-DD, 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.

34. The Lamp Failure Rate ($LFR_{i,y}$) is the per cent of lamps that have failed during a year. The rated average life is used to calculate the Lamp Failure Rate as follows:

$$LFR_{i,y} = y \times X_i \times \frac{100 - R_i}{100 \times L_i} = \frac{0.5 \times y \times X_i}{L_i} \quad \text{Equation (3)}$$

Where:

$LFR_{i,y}$	=	Lamp Failure Rate for equipment type *i* in year *y* (fraction)
y	=	Counter for year
X_i	=	Number of operating hours per year for equipment type *i* (hours)
L_i	=	Rated Average Life for equipment type *i* (hours)
R_i	=	% of lamps of type *i* operating at the end of the rated average life (use a value of 50)

35. Emissions reduction is net electricity savings (*NES*) times an Emission Factor (*EF*) calculated in accordance with the two options (i.e. a combined margin emission factor and a weighted average emission factor) provided in AMS-I.D. (paragraph 23 in case of AMS-I.D. version 18.0)~~provisions under "AMS-I.D.: Grid connected renewable electricity generation"~~.

$$ER_y = NES_y \times EF_{CO2,ELEC,y} \quad \text{Equation (4)}$$

Where:

ER_y	=	Emission reductions in year *y* (t CO_2e)
$EF_{CO2,ELEC,y}$	=	Emission factor in year *y* calculated based on paragraph 35 above~~in accordance with the provisions in paragraph 23 of AMS-I.D.~~ (t CO_2/MWh)

36. The electricity savings from the efficient lighting equipment installed by the project activity shall be considered from the date of completion of installation of the equipment.

37. Ex post monitoring and adjustment of corresponding Net Electricity Savings (NES_y) can be conducted, using one of the following options:

38. **Option 1: Use of annually monitored data on lamp failures:** Annual checks of a sample of project lamps should be conducted, and the ex-post monitored data for lamp failure ($LFR_{i,y}$) and quantity of project lamps ($Q_{PJ,i}$) should be used.

39. **Option 2: Use of data monitored every three years:**

(a) First ex post monitoring survey, carried out within the first year after installation of all efficient lighting equipment will provide a value for the number of project lamps placed in service and operating under the project activity. The results of this survey are used to determine the quantity of project lamps ($Q_{PJ,i}$) in the emission reduction calculation to determine the ex post Lamp Failure Rate ($LFR_{i,y}$) for use in ex post emission reduction calculations;

(b) Subsequent ex post monitoring surveys are carried out once every three years[10] to determine the ex post Lamp Failure Rate ($LFR_{i,y}$) for use in ex post emission reduction calculations until such time as CERs are being requested;

(c) The above ex post monitoring sampling surveys to determine Lamp Failure Rate ($LFR_{i,y}$) shall be conducted for each batch of project lamps. Alternatively, the result of a sampling survey of the first batch may be used as a proxy to subsequent batches (e.g. the Lamp Failure Rate in year 4 for the project lamps installed in year 1 could be used for the Lamp Failure Rate in year 5 for the project lamps installed in year 2);

(d) The surveys will consist of identifying project lamps, marked per paragraph 76, that are installed and operating. Only project lamps with an original marking can be counted as installed. While project lamps replaced as part of a regular maintenance or warranty program can be counted as operating, cannot be replaced as part of this monitoring survey process and counted as operating for the purposes of determining $Q_{PJ,i}$.

40. Changes to Lamp Failure Rate ($LFR_{i,y}$) and treatment of differences between Rated Average Life and Average Life for adjustment of Net Electricity Savings (NES_y): the Net Electricity Savings shall be modified for changes to the Lamp Failure Rate as may be indicated by ex post monitoring survey results. The modifications shall be made using the following methods:

(a) Calculated $LFR_{i,y}$ values in equation (3) shall be used for the periods when ex post monitoring surveys are not conducted;

(b) However, when ex post monitoring surveys are conducted (i.e. year 1, 4, 7,.), actual failure rates determined through the survey shall be used instead of the calculated $LFR_{i,y}$ values in equation (3);

(c) For subsequent years beginning from the first calculation year after completion of the ex-post monitoring survey, *a* new value for L_i shall be determined using equation (3) and newly calculated values of $LFR_{i,y}$ shall be used. The adjustment of L_i and $LFR_{i,y}$ should be repeated every time when ex post monitoring surveys are conducted. [11]

[10] 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.

[11] For example, when the Rated Average Life L_i value is 6,000, ex-ante $LFR_{i,y}$ value for year 1 is calculated as 10.6 per cent using equation (3). In case, ex post monitored $LFR_{i,y}$ value for year 1 is 11 per cent, then a new value for L_i will be determined using equation (3) using the ex post $LFR_{i,y}$ of 11 per cent. The newly calculated L_i value will be 5,807. With this new L_i value, new ex ante values for $LFR_{i,y}$ for year 2 onwards will be calculated, i.e. 22 per cent in year 2, 33 per cent in year 3 and so on. If the second survey is to be done in year 4, the same exercise is repeated.

6. Monitoring methodology

41. Monitoring includes: (i) recording of lamp distribution data; and (ii) ex post monitoring surveys as defined in paragraph 3827 and 3928:

(a) During project activity implementation, the following data are to be recorded:

(i) Number of pieces of new equipment distributed under the project activity, identified by the type of equipment and the date of supply;

(ii) The number and power of the replaced devices;

(iii) Data to unambiguously identify the recipient of the new equipment distributed under the project activity;

(b) The emission reductions are calculated ex ante and adjusted ex post following the monitoring surveys, as described under paragraphs above.

6.1. Generic instructions for conducting the surveys and sampling

42. The following survey principles shall be followed for activities related to determining number of project lamps 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 90 per cent confidence interval 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.

6.2. Parameters for monitoring during the crediting period

Data / Parameter table 1.

Data / Parameter:	$EF_{CO2,ELEC,y}$
Data unit:	t CO_2e/kWh
Description:	CO_2 emission factor of the grid electricity in year *y*
Measurement procedures (if any):	Follow the procedure described under paragraph 35 above ~~AMS-I.D~~.
Monitoring frequency:	~~Annual~~As per AMS-I.D.
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	TD_y
Data unit:	Fraction
Description:	Average annual technical grid losses (transmission and distribution) during year *y* for the grid serving the locations where the devices are installed
Measurement procedures (if any):	This value shall not include non-technical losses such as commercial losses (e.g. theft/pilferage). 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
Monitoring frequency:	Annual
Any comment:	-

Data / Parameter table 3.

Data / Parameter:	$LFR_{i,y}$
Data unit:	Fraction
Description:	Lamp Failure Rate for equipment type *i* in year *y* (fraction)
Measurement procedures (if any):	Follow the procedures in paragraph 38~~27~~, 39~~28~~ and 40~~29~~
Monitoring frequency:	Follow the procedures in paragraph 38~~27~~, 39~~28~~ and 40~~29~~
Any comment:	-

6.3. Project activity under a programme of activities

43. Scrapping of replaced equipment to avoid leakage is addressed under paragraph 8~~7~~ and 9~~8~~, therefore no specific requirements are indicated.

44. The option in paragraph 39(c)~~28(c)~~ which allows the use of the results of the sampling surveys of the first batch as a proxy to subsequent batches should only be applied to the same CPA to which the first batch belongs.

- - - - -

Document information

Version	*Date*	*Description*
08.0	17 October 2023	MP 92, Annex 5 To be considered by the Board at EB 120. A call for public input will be issued for this draft document. Any input will be discussed with the MP and forwarded to the Board for consideration. The revisions include inter alia: • Removing reference to CFL and LED lamps to make the methodology technologically neutral; • Inclusion of requirement in the PDD to check the management of project lamps at the end of its lifetime; • Options to demonstrate of additionality based on positive list, based on the application of the TOOL21 or based on the application of the TOOL19.
07.0	13 May 2016	EB 89, Annex 6 Revision to enable the use of field monitored data on lamp failure.
06.0	28 November 2014	EB 81, Annex 30 The revision: • Further clarity in unique marking requirement for the project/PoA; • Simplification of testing requirements for project lamps; • Simplification of emission reductions calculation (in particular, extrapolation of monitoring results of the first batch of installed lamps to the whole project); • Criteria for automatic additionality consistent with "AM0113: Distribution of compact fluorescent lamps (CFL) and light-emitting diode (LED) lamps to households"; • Expansion of applicability to include switching from incandescent lamps (ICLs) to LEDs as well as switching from CFLs to LEDs.
05.0	31 May 2013	EB 73, Annex 10 The revision removes limitations that restrict the methodology to a fixed crediting period.
04	28 May 2010	EB 54, Annex 6 The revisions include inter alia: • Definitions of Average life and Rated average life of lamp; • Deletion of Annex 1 for ex post monitoring survey; • Provisions to use lamp's rated average life for ex ante emission reduction estimation; • Additional clarifications on how to take into account ex post survey data on Lamp Failure rate and ex post determined lamp's average life.

Version	*Date*	*Description*
03	28 May 2009	EB 47, Annex 21 The revisions include inter alia: • Broader range of eligible incandescent and CFL Wattages; • Deletion of cross effect calculations and baseline penetration assessment for PoAs; • Provisions to use results of ex post surveys to correct CFL attrition rates; • Fixed average daily utilisation hours of CFL (3.5 hrs/day).
02	28 November 2008	EB 44, Annex 22 The revisions clarify the project design requirements, consideration of electricity T&D losses in the baseline, frequency of ex post surveys, and estimation of cross-effects of lighting and heating.
01	02 August 2008	EB 41, Annex 16 Initial adoption.

Decision Class: Regulatory
Document Type: Standard
Business Function: Methodology
Keywords: energy efficiency, household appliances, simplified methodologies, type (ii) projects