Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

TYPE III – OTHER PROJECT ACTIVITIES

Project participants shall apply the general guidelines to SSC CDM methodologies, information on additionality (attachment A to appendix B) provided at <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> *mutatis mutandis*.

III.xx. Substituting fuel based lighting with LED lighting systems

Technology/measure

1. This category comprises activities that replace fossil fuel based lamps (e.g. wick-based kerosene lanterns) with Light Emitting Diode (LED) lamps in residential and non-residential applications.

2. This methodology is applicable only to project lamps that are charged using one or more of the following options:

(a) Charged by Photovoltaic systems;

(b) Charged by a standalone mini-grid[1] powered only by renewable energy generation unit(s) e.g. a community based stand-alone off-the-grid renewable electricity systems;

(c) Charged by a grid that is connected to regional/national grid.

3. Measures are limited to those that result in emissions reductions of less than or equal to 60 kt CO_2 equivalent annually by a single project activity.

4. At a minimum project lamps must be certified by their manufacturer to have a life of at least 5,000 hours during which time the lamp's initial light output will decline by no more than 30%. In addition, for grid charging systems, the battery charging efficiency must be at least 50%.

5. Project lamps utilized under the project activity shall be marked for clear unique identification as lamps associated with the project activity.

6. The project design document shall explain the proposed method of distribution of project lamps. The project design document shall also explain how the proposed procedures:

(a) Ensure that the replaced baseline lamps use only fossil fuels through documentation of common practice of lamp fuel types utilized in the region of project lamp distribution and use; and

(b) Eliminate double counting of Emission Reductions, for example due to LED manufacturers, renewable energy generators, wholesale providers or others possibly claiming credit for Emission Reductions for the project lamps.

7. The project activity shall restrict the number of project lamps per end-users, distributed through the project activity, to three.

[1] Not connected to a national/regional grid.

Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories

III.xx. Substituting fuel based lighting with LED lighting systems (cont)

Boundary

8. The project boundary is the physical, geographical site where each project lamp is utilized. In addition:

(a) If the project lamps are charged by a mini-grid then the project boundary includes the physical, geographical site of the mini-grid;

(b) If the project lamps are charged by a regional/national grid then the project boundary includes the physical, geographical site of the regional/national grid.

LED Lamp Effective Useful Life

9. Option 1: Project lamps are assumed to operate for two years after project lamp distribution to end-users and at the end of these two years project situation is assumed to correspond with the baseline situation i.e. project lamp is equivalent to baseline lighting source. Therefore, emission reductions can only be claimed for two years.

10. Option 2: However, project lamps are assumed to operate for seven years after project lamp distribution to end-users, and thus emission reductions can be claimed for seven years, if the following project lamp conditions are met:

(a) At a minimum, project lamps must be certified by their manufacturer to have a life of at least 25,000 hours during which time the lamp's initial light output has declined by no more than 30% and such claims must be confirmed by a third-party testing organization;

(b) The lamps are sold to end-users at a value of at least 25% of fair market value as determined by the retail price of the same or equivalent lamp in the project country;

(c) The lamps use a replaceable, chargeable battery;

(d) The project includes at least two-year warranty for replacement of any failed project lamps.

Baseline Emissions

11. An annual baseline emissions default value per lamp distributed to end-users shall be utilized, using the following assumptions:

(a) Fuel use rate (liters/hour): 0.025 liters/hour;

(b) Utilization (hours/day): 3.5 hours per day;

(c) Utilization (days/year): 365 days per year;

(d) Fuel emissions factor: 2.4 kgCO2/liter;

(e) Future baseline emissions multiplier: 1.0;

(f) Dynamic baseline multiplier (change in baseline fuel, fuel use rate, and/or utilization during crediting period): 1.0;

(g) Leakage factor: 1.0;

(h) Number of fuel-based lamps replaced per Project lamp: 1.0;

(i) Net-to-Gross factor: 1.0.

12. Using the values indicated in paragraph 11 the annual baseline greenhouse gas emission rate (BE_y) per lamp distributed to end-users is equal to 0.08 tCO_2e per lamp.[2]

Project Emissions

13. There are no project emissions if the project lamp charging mechanism utilized is as defined in paragraph 2(a) or 2(b). $PE_y = 0$.

14. There are project emissions if the project lamp charging mechanism utilized is as defined in paragraph 2(c). Project emissions per lamp are calculated as:

$$PE_y = (1/N)\sum_i N_i \times W_i \times EF_{CO2,ELEC,y} \times (1/Eff_i) \times (D \times H) \times (1 + TD_y) \times 10^{-6} \quad \textbf{(1)}$$

Where:

PE_y	Project Emissions in year y (tCO_2e) per number of project lamps distributed to end users
N	Total number of project lamps distributed to end users
N_i	Number of project lamps distributed to end users, of type i
W_i	Wattage of project lamps distributed to end users, of type i (watts)
Eff_i	Battery charging efficiency of lamps distributed to end users, as documented by lamp manufacturer, of type i
D	Days per year of operation of project lamps, assume = 365
H	Hours per day of operation of project lamps, assume = 3.5
$EF_{CO2,ELEC,y}$	Emission Factor in year y calculated in accordance with the provisions in AMS-I.D (tCO_2/MWh)

[2] Includes some rounding of values in paragraph 11.

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% shall be used for average annual technical grid losses, if no recent data are available or the data cannot be regarded accurate and reliable

Emissions reduction

15. Annual emission reductions are calculated as:

$$ER_y = \sum_j N_j \times \left(BE - PE_j\right) \times \left(OF_{j,y}\right) \quad \textbf{(2)}$$

Where:

ER_y Emission reductions in year *y* (tCO_2e)

N_j Number of project lamps distributed to end users, of type *j* where *j* indicates if it is a lamp charged per paragraph 2(a), 2(b) or 2(c)

BE Annual baseline greenhouse gas emission rate per lamp distributed to end-users, assumed equal to 0.08 (tCO_2e) per lamp

PE_j Project Emissions in year *y* (tCO_2e) per number of project lamps distributed to end users, for each lamp type *j*

$\left(OF_{j,y}\right)$ Percentage of project lamps distributed to end users that are operating and in service in year *y*, for each lamp type *j*. Assumed equal to 100% for years 1, 2 and 3. Equal to value determined per paragraph 18 for years 4, 5, 6 and 7

The emission reductions shall be considered from the date of completion of distribution of the project lamps to end users.

Monitoring

16. Monitoring includes: (i) Recording of lamp distribution data; and (ii) Ex post monitoring surveys to determine percentage of project lamps distributed to end users that are operating and in service in year y.

17. During project activity implementation, the following data are to be recorded:

(a) Number of project lamps distributed to end users under the project activity, identified by the type of project lamps (lamp wattage, battery type, charging method, etc.) and the date of supply;

(b) The number and type (including fuel type and estimated fuel consumption rate) of baseline lamps identified as those replaced by the project lamps; and

(c) For project lamps that will claim emission reductions for up to seven years, per paragraph 10, data to unambiguously identify the recipient of the project lamps distributed.

18. For project lamps that will claim emission reductions for up to seven years ex post monitoring surveys to determine percentage of project lamps[3] distributed to end users that are operating and in service will be conducted during the third year of the crediting period. Only project lamps with an original marking can be counted as operating and in service. While project lamps replaced as part of a regular maintenance or warranty program can be counted as operating, project lamps cannot be replaced as part of the survey process and counted as operating.

19. The following survey principles shall be followed for activities related to determining number of project lamps in service and operating under the project:

(a) The sampling size is determined by minimum 90% confidence interval and the 10% maximum error margin; the size of the sample shall be no less than 100;

(b) Sampling must be statistically robust and relevant i.e. 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.

Project activity under a Programme of Activities

20. If monitoring is required as per paragraph 18 to determine percentage of project lamps distributed to end users that are operating and in service, such monitoring will take place in the third year of each CPA and the results utilized for years 4, 5, 6 and 7 of that CPA.

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[3] If project lamps are distributed with different charging methods, per paragraph 2(a), 2(b) and/or 2(c), then the percentage operating in year 3 should be determined per each category of charging method, see equation 2.

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III.xx. Substituting fuel based lighting with LED lighting systems (cont)

History of the document

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