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 for SSC CDM methodologies, information on additionality (attachment A to appendix B) provided at <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> *mutatis mutandis*.

III.BB. Electrification of communities through grid extension or construction of new mini-grids

Technology/measure

1. This methodology is applicable to project activities involving electrification of a community of consumers[1] through either:

(a) Extension of a grid (national, regional or mini-grid[2]); or

(b) Construction of new mini-grid.

Such project activities will displace fossil fuel use, such as in fuel-based lighting systems and stand-alone power generators.

2. Electricity consumers may include households, commercial facilities such as shops, public services/buildings and small, medium and micro enterprises (SMMEs); Applications may include lighting (interior, public street lighting), electrical appliances such as refrigerators, agricultural water pumps.

3. At least 75% (by number) of the project consumers shall be households.

4. This methodology is applicable in situations where consumers that were not connected to a national/regional grid prior to project implementation are supplied with electricity from the project activity. It is also applicable to situations where a fraction of consumers that are supplied with electricity from a mini-grid prior to the implementation of the project are now supplied with electricity from the project activity (i.e. moving from carbon intensive mini-grid to less carbon intensive regional/national or mini grid).

5. This methodology is applicable for project activities associated with national grids, regional grids or mini-grids that utilize either fossil fuels or fossil fuels and renewable energy in the electricity generation system.

6. Project activities for electrification of a community through the installation of stand-alone renewable electricity generation systems or through the extension/construction of a renewable based mini-grid systems shall explore AMS-I.L "Electrification of rural communities using renewable energy".

[1] Consumers have a single electrical connection to a grid.

[2] For the purpose of this methodology, a mini-grid is defined as a small-scale power system with a total capacity not exceeding 15 MW (i.e. the sum of installed capacities of all generators connected to the mini-grid is equal to or less than 15 MW) which is not connected to a national or a regional grid.

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III.BB. Electrification of communities through grid extension or construction of new mini-grids (cont)

7. Electricity for lighting under this methodology shall be used only with high efficient lighting equipment such as Compact Fluorescent Lamps (CFLs), Light Emitting Diode (LED) lamps and Fluorescent Lamps.

8. This methodology is not applicable to portable systems, such as portable electricity generating systems.

9. This methodology is applicable where the amount of project electricity delivered to consumers can be determined through the use of meters that continuously measure electricity delivered by the project activity to consumers. Specifically:

(a) A master-meter shall be implemented as part of the project activity to measure the gross electricity sent out to all connected consumers (both existing and new consumers)[3] from the main distribution system;

(b) A sub-master-meter shall be implemented as part of the project to measure the gross electricity sent out to all consumers who were supplied electricity with an existing mini-grid prior to project implementation. Such sub-master-meter will measure total electricity supply to these existing consumers (e.g. metering at substation);

(c) Consumption of specific consumers as identified under paragraph 10 below shall be individually metered.

10. An ex ante census of project energy consumers that will be supplied with electricity from the project will be carried out to document the physical location of each consumer and the anticipated connected load and usage hours of each consumer; Optionally the anticipated load for individual households may be established based on the type of connection or payment arrangement provided (e.g. load limited, fee for service based connection). The new consumers will be designated as either households (Type I consumers) or non-households[4] (Type II consumers). This methodology requires metering of electricity consumption of each Type II consumer as well as each Type I consumer expected to consume more than 1000 kWh per year. Type I consumers whose consumption is individually required to be metered are designated as Type I-M and Type I consumers whose consumption is not required to be individually metered are designated as Type I-NM.

11. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.

[3] New consumers are those who did not have supply of electricity prior to project implementation. Existing consumers are those who were supplied electricity from the mini-grid system prior to project implementation.

[4] Commercial consumers, SMMEs, public institutions, street lighting and small scale industrial consumers are included. Agricultural facilities such as irrigation pump sets also fall under this category

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III.BB. Electrification of communities through grid extension or construction of new mini-grids (cont)

Project boundary

12. For project activities involving national or regional grids, the spatial extent of the project boundary includes all power plants within the host country physically connected through transmission and distribution lines to the national or regional grid[5] which is being extended through the project activity. For project activities involving mini-grids, the spatial extent of the project boundary includes all power plants connected through transmission and/or distribution lines to the to the mini-grid which is being built or extended through the project activity. The spatial extent of the project boundary also includes the physical sites of the end-use consumers served by the project activity.

Baseline emissions

13. Baseline emissions are the sum of emissions associated with new consumers (Type I and Type II consumers) and existing consumers calculated as follows:

$$BE_y = BE_{T1,y} + BE_{T2,y} + BE_{exist,y} \quad \textbf{(1)}$$

Where:

BE_y	Baseline emissions in year y (tCO_2)
$BE_{T1,y}$	Baseline emissions for Type I consumers in year y (tCO_2)
$BE_{T2,y}$	Baseline emissions for Type II consumers in year y (tCO_2)
$BE_{exist,y}$	Baseline emissions of existing consumers i.e. baseline emissions from displacement of electricity from an existing mini-grid (tCO_2) $BE_{exist,y} = 0$, if there are no existing consumers (see footnote 3 for the definition of existing consumers)

14. Baseline emissions of existing consumers are calculated as:

$$BE_{exist,y} = ED_{exist,y} * EF_{mgrid} \quad \textbf{(2)}$$

[5] Refer to the most recent version of the "Tool to calculate the emission factor for an electricity system" for the definition of electricity system.

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III.BB. Electrification of communities through grid extension or construction of new mini-grids (cont)

Where:

$ED_{exist,y}$	Total electricity delivered to existing consumers ($N_{exist,y}$) as measured with the use of sub-master-meter mentioned in paragraph 9(b) (MWh)
EF_{mgrid}	Baseline emissions factor for the mini-grid (tCO_2) For a mini-grid system where all generators use exclusively fuel oil and/or diesel fuel, emission factor can be determined per the procedure provided in AMS-I.F "Renewable electricity generation for captive use and mini-grid". For all other mini-grids it shall be calculated as the weighted average emissions for the current generation mix following the procedure provided in AMS-I.D "Grid connected renewable electricity generation"

15. Baseline emissions of Type II consumers, $BE_{T2,y}$ are calculated as:

$$BE_{T2,y} = \sum_{i}^{N_y} EC_{T2,i,y} * EF_{CO2,T2} \quad \textbf{(3)}$$

Where:

$BE_{T2,y}$	Baseline emissions for Type II consumers in year y (tCO_2)
$EC_{T2,i,y}$	Metered annual electricity consumption of Type II consumer i in year y (MWh)
$EF_{CO2,T2}$	1.0 (tCO_2/MWh)
N_y	Number of Type II consumers in year y

16. Baseline emissions of Type I consumers, $BE_{TI,y}$ are calculated as a function of total electricity consumed by all the Type I consumers and a baseline emission factor chosen based on the average annual electricity consumption of all Type I consumers.

$$BE_{T1,y} = \left(\left[EC_{T1NM,y} * NM_y\right] * EF_{CO2,T1NM}\right) + \left(\left[EC_{T1M,y} * M_y\right] * EF_{CO2,T1M}\right) \quad \textbf{(4)}$$

$$EC_{T1NM,y} = \left(EC_{tot\_T1NM,y}\right) \div NM_y \quad \textbf{(5)}$$

$$EC_{T1M,y} = \left(\sum_{j}^{M} EC_{T1M,j,y}\right) \div M_y \quad \textbf{(6)}$$

$$EC_{tot\_T1NM,y} = \left[\left(ED_{tot,y} - ED_{exist,y}\right) * \left(1 - TL_p\right)\right] - \sum_{i}^{N} EC_{T2,i,y} - \sum_{j}^{M} EC_{T1M,j,y} \quad \textbf{(7)}$$

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III.BB. Electrification of communities through grid extension or construction of new mini-grids (cont)

Where:

$BE_{T1,y}$	Baseline emissions for Type I consumers in year y (tCO_2)
$EC_{T1NM,y}$	Average annual electricity consumption of all Type I-NM consumers in year y (MWh)
$EC_{T1M,y}$	Average annual electricity consumption of all Type I-M consumers in year y (MWh)
$EC_{T1M,j,y}$	Annual electricity consumption of Type I-M consumer j in year y (MWh)
NM_y	Number of Type I-NM consumers in year y
M_y	Number of Type I-M consumers in year y
$EF_{CO2,T1NM}$	• If $EC_{T1NM,y}$ is equal to or less than 0.055 MWh/y, then use a default value of 6.8 (tCO_2/MWh); • If $EC_{T1NM,y}$ is less than or equal to 0.250 MWh/y but greater than 0.055 MWh/y, then: o For the portion up to and including 0.055 MWh/y, use a default value of 6.8 (tCO_2/MWh); o For the portion greater than 0.055 MWh/y, use a default value of 1.3 (tCO_2/MWh); • If $EC_{T1NM,y}$ is greater than 0.250 MWh/y but less than or equal to 0.500 MWh/y, then: o For the portion up to and including 0.055 MWh/y use a default value of 6.8 (tCO_2/MWh); o For the portion greater than 0.055 MWh/y and less than 0.25 MWh/y use a default value of 1.3 (tCO_2/MWh); o For the portion greater than 0.25 MWh/y use a default value of 1.0 (tCO_2/MWh); • If $EC_{T1NM,y}$ is greater than 0.500 MWh/y, then use a default value of 1.0 (tCO_2/MWh) for the entire portion i.e. default values of 1.3 (tCO_2/MWh) or 6.8 (tCO_2/MWh) are not eligible for any of the portions
$EF_{CO2,T1M}$	• If $EC_{T1M,y}$ is equal to or less than 0.055 MWh/y, then use a default value of 6.8 (tCO_2/MWh); • If $EC_{T1M,y}$ is less than or equal to 0.250 MWh/y but greater than 0.055 MWh/y, then: o For the portion up to and including 0.055 MWh/y, use a

default value of 6.8 (tCO_2/MWh);

- For the portion greater than 0.055 MWh/y, use a default value of 1.3 (tCO_2/MWh);

- If $EC_{T1M,y}$ is greater than 0.250 MWh/y but less than or equal to 0.500 MWh/y, then:
  - For the portion up to and including 0.055 MWh/y use a default value of 6.8 (tCO_2/MWh);
  - For the portion greater than 0.055 MWh/y and less than 0.25 MWh/y use a default value of 1.3 (tCO_2/MWh); and
  - For the portion greater than 0.25 MWh/y use a default value of 1.0 (tCO_2/MWh);
- If $EC_{T1M,y}$ is greater than 0.500 MWh/y then use a default value of 1.0 (tCO_2/MWh) for the entire portion i.e. default values of 1.3 (tCO_2/MWh) or 6.8 (tCO_2/MWh) are not eligible for any of the portions

$EC_{tot\_T1NM,y}$	Total electricity delivered to the community of all Type I-NM consumers, net of transmission and distribution losses (MWh)
$ED_{tot,y}$	Total electricity delivered to the community of all Type I, Type II and existing consumers as measured with the use of master meter as mentioned in paragraph 9(a) (MWh)
TL_p	Transmission and distribution losses within the project area (%), with 10% as a default value
$ED_{exist,y}$	Total electricity delivered to existing consumers ($N_{exist,y}$) as measured with the use of sub-master-meter mentioned in paragraph 9(b) (MWh)

Leakage

17. Leakage on account of construction of new transmission/distribution lines (e.g. carbon stock loss due to deforestation) shall be calculated using the method indicated in baseline and monitoring methodology AM0045 "Grid connection of isolated electricity systems". If the estimated leakage is within 5% of the estimated emission reductions of the project, then this leakage source may be neglected, otherwise the leakage shall be deducted from the emissions reductions.

18. If any energy generating equipment (e.g. for a mini-grid) is transferred from another activity, leakage is to be considered.

Project activity emissions

19. Project emissions are emissions associated with the generation of electricity supplied to the project activity end use facilities.

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III.BB. Electrification of communities through grid extension or construction of new mini-grids (cont)

$$PE_y = \left(ED_{tot,y} * EF_{\text{grid, CO2 ,y}}\right) \div \left(1 - TL_{grid}\right) \quad \textbf{(8)}$$

Where:

PE_y	Project emissions from electricity generation in year *y* (tCO_2)
$ED_{tot,y}$	Total electricity delivered to the community of all Type I, Type II and existing consumers as measured with the use of master meter as mentioned in paragraph 9(a) (MWh)
$EF_{\text{grid, CO2 ,y}}$	Emissions factor for the project electricity system in year *y* (tCO_2/MWh) • If the project activity involves connection to an existing national or regional grid the emissions factor is determined by ranking all the power units in the national or regional grid in the decreasing order of GHG intensity. The emissions factor is the weighted average emissions factor of the top 10% most GHG intensive plants in the grid.[6] The emissions factors of the plants shall be calculated based on default plant efficiency provided in the "Tool to calculate the emission factor for an electricity system"; • If the project activity involves connection to an existing mini-grid or construction of new mini-grid the emissions factor is determined as either: (a) for a mini-grid system where all generators use exclusively fuel oil and/or diesel fuel per the procedure for such mini-grids provided in AMS-I.F; or (b) for all other mini-grids per the weighted average emissions for the current generation mix following the procedure provided in AMS-I.D
TL_{grid}	Transmission and distribution losses in the project electricity system supplying the project activity (%), with 10% as the default value

Emission reduction

20. Emission reductions (ER_y) are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(9)}$$

Monitoring

21. The table below shows the complete list of parameters monitored.

The applicable requirements specified in the "General Guidelines for SSC CDM methodologies" and the "Standard on sampling and surveys for CDM project activities and PoAs" are also an

[6] If the grid associated with the project imports electricity from other countries the emission factor shall be the higher among the following two: (i) the weighted average emissions factor of the top 10% most GHG intensive plants in the grid of the host country; and (ii) the weighted average emissions factor of the top 10% most GHG intensive plants in the grid of the exporting country.

integral part of the monitoring guidelines specified below and therefore shall be referred to by the project participant.

Table 1: List of parameters monitored

Parameter	Description	Unit	Monitoring/recording frequency	Measurement methods and procedures
$ED_{tot,y}$	Electricity delivered to consumers from the grid/mini-grid system	MWh/y	Continuous monitoring, hourly measurement and at least monthly recording	Measurements are undertaken using Master meters. The measurement should be taken at the nearest pre-existing substation from which the electrification project is supplied
$EC_{T2,i,y}$	Electricity metered at Type II consumer *i*	MWh/y	Continuous monitoring, hourly measurement and at least monthly recording	Measurements are undertaken using electricity meters at each of the Type II facilities
$EC_{T1M,j,y}$	Electricity metered at Type I-M consumer *j*, expected to consume more than 1000 kWh/y identified under paragraph 10	MWh/y	Continuous monitoring, hourly measurement and at least monthly recording	Measurements are undertaken using electricity meters at each of the facilities
$ED_{exist,y}$	Total electricity delivered in year *y* to the existing consumers	MWh/y	Continuous monitoring, hourly measurement and at least monthly recording	Measurements are undertaken using sub-master-meters. The measurement should be taken at the nearest pre-existing substation from which the electrification project is supplied
Proportion of N_y, NM_y, $N_{exist,y}$ and M_y using high efficiency lighting	Check for continued use of high efficiency lighting		Annual/biennial	Annual/biennial check that energy efficient lighting in the project area is still working, done for a statistically significant sample of consumers. Use 90/10 and 95/10 precisions for annual and biennial checks, respectively

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Parameter	Description	Unit	Monitoring/recording frequency	Measurement methods and procedures
Proportion of N_y, NM_y $N_{exist,y}$ and M_y having access to grid	Check for continued access to electricity		Annual/biennial	Annual/biennial check that grid connections are still working, done for a statistically significant sample of consumers. Use 90/10 and 95/10 precision for annual and biennial checks, respectively

Project activity under a programme of activities

22. The methodology is applicable to a programme of activities, no additional leakage estimations are necessary other than that indicated under leakage section above.

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History of the document

Version	Date	Nature of revision
01.0	EB 67, Annex # 11 May 2012	To be considered at EB 67.
Decision Class: Regulatory **Document Type**: Standard **Business Function**: Methodology		