CLEAN DEVELOPMENT MECHANISM

CDM-SSCWG44-A03

Draft Small-scale Methodology

AMS-I.L: Electrification of rural communities using renewable energy

Version 02.0

Sectoral scope(s): 01

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United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The small-scale working group (SSC WG) at its 44th meeting considered a request for revision "SSC_702: Revision of AMS-I.L to further clarify monitoring requirements and baseline calculations for mini-grid system", request for proposed new methodology "SSC-NM092: Electrification and energization of off-grid areas using renewable energy" and request for clarification "SSC_701: Clarification on the requirement related to high efficiency lighting and the scope of using options 1 and 2 for monitoring".

2. The proposed revision is in response to the submissions mentioned above.

2. Purpose

3. The proposed revised methodology broadens the applicability of the methodology simplify monitoring requirements and further clarifies the baseline procedure.

3. Key issues and proposed solutions

(a) Further clarifies the baseline procedure and monitoring requirements for renewable based mini-grid system in response to SSC_702 with the approach consistent with the one provided in "AMS-III.BB: Electrification of communities through grid extension or construction of new mini-grids";

(b) Removes the requirement related to high efficiency lighting considering that the equipment specifications are addressed through reference to standards and further clarifies the monitoring requirement in response to SSC_701;

(c) Consolidates elements from SSC-NM092 to broaden the applicability of AMS-I.L covering rehabilitation of renewable energy systems. The projects that aim to rehabilitate through on-going or deferred maintenance are excluded.

4. Impacts

5. The proposed revised methodology, if approved, would facilitate the implementation of rural electrification CDM projects and PoAs, which are quite relevant for the least developed countries (LDCs) and other regions that are underrepresented in the CDM.

6. Recommendations to the Board

4. The SSC WG recommends that the Board approve the attached draft version of the methodology.

7. References

(a) Response to the request for clarification "SSC_702: Revision of AMS-I.L to further clarify monitoring requirements and baseline calculations for mini-grid

system" (available at <http://cdm.unfccc.int/methodologies/SSCmethodologies/clarifications/pending>);

(b) Response to the request for proposed new methodology "SSC-NM-092: Electrification and energization of off-grid areas using renewable energy" (available at <http://cdm.unfccc.int/methodologies/SSCmethodologies/pnm/pending>);

(c) Response to the request for clarification "SSC_701: Clarification on the requirement related to high efficiency lighting and the scope of using options 1 and 2 for monitoring" (available at <http://cdm.unfccc.int/methodologies/SSCmethodologies/clarifications/pending>).

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1. Introduction

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

Table 1. Methodology key elements

Typical project(s)	Communities which did not have electricity prior to project implementation are supplied with electricity from renewable based systems (e.g. solar home systems, renewable mini grid)
Type of GHG emissions mitigation action	Renewable energy. Displacement of fossil fuel use

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology is applicable to electrification of a community achieved through the installation of renewable electricity generation systems[1] ~~(e.g. solar photovoltaic systems)~~ that displace fossil fuel use, such as in fuel-based lighting systems, stand-alone power generators, and fossil fuel based mini-grids. The two categories of applicable project activities are:

(a) Implementation of individual, renewable energy systems such as roof top solar photovoltaic systems;

(b) Installation or extension of an isolated mini-grid which distributes electricity generated only from renewable energy systems.

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2.2. Applicability

3. This methodology is applicable to electrification of a community achieved through the installation of renewable electricity generation systems[2] ~~(e.g. solar photovoltaic systems)~~ that displace fossil fuel use, such as in fuel-based lighting systems, stand-alone power generators, and fossil fuel based mini-grids. The two categories of applicable project activities are:

(a) Implementation of individual, renewable energy systems such as roof top solar photovoltaic systems;

(b) Installation or extension of an isolated mini-grid which distributes electricity generated only from renewable energy systems.

[1] ~~Facilities and consumers supplied electricity through an isolated mini-grid are also included. 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.~~

[2] ~~Facilities and consumers supplied electricity through an isolated mini-grid are also included. 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.~~

4. This methodology is applicable to:

   (a) New construction of (Greenfield) individual, renewable energy system projects or mini-grid activities; and/or

   (b) Rehabilitation (or refurbishment) of individual, renewable energy systems if it can be demonstrated that the baseline system(s) are not part of another CDM activity and are non-operational and require a substantial investment[3] for them to be rehabilitated to or above the original electricity generation capacity. Options for demonstrating compliance with this condition include providing documentation that:

      (i) The existing system has not generated electricity, or that alternative fuels (e.g. kerosene) have been used, for at least six months prior to PDD or CDM-SSC-CPA-DD submittal; and/or

      (ii) Substantial investments are required to rehabilitate the existing systems, e.g. investments greater than half of the cost to install a new system with the same electricity generation capacity.

5. 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 fossil fuel based mini-grid prior to the implementation of the project are now supplied with electricity from the project activity.

6. At least 75 per cent (by number) of the consumers connected to the project renewable electricity generation system(s) shall be households.

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~~3. The applicability of this methodology is limited to end-use facilities that, if they utilize electricity for lighting in the project activity, only utilize high efficient lighting equipment such as Compact Fluorescent Lamps (CFLs), Light Emitting Diode (LED) lamps, and/or fluorescent lamps.~~

7. Project equipment shall comply with applicable international standards[4] or comparable national, regional or local standards/guidelines and the Project Design Document (PDD) shall indicate the standard(s) applied.

8. The methodology is applicable to renewable electricity generation systems intended for permanent installation and is not applicable to portable systems, such as portable electricity generating systems or LED lanterns. The aggregate installed capacity of the renewable energy generating systems shall not exceed 15 MW.

9. For projects involving the installation of hydro power plants with reservoirs the requirements prescribed under AMS-I.D shall be followed.

[3] On-going or deferred maintenance is not eligible (See definition of rehabilitation provided in paragraph 15(c) of this document).

[4] For example IEC 62124 PV stand-alone systems, design verification or another PVGAP recommended standard to verify system design and performance of stand-alone photovoltaic systems including functionality, the battery autonomy and solar fraction.

2.3. Entry into force

10. The date of entry into force is the date of the publication of the EB 79 meeting report on 1 June 2014.

3. Normative references

11. Project participants shall apply the "General guidelines ~~to~~ for SSC CDM methodologies", the "Guidelines on the demonstration of additionality of small-scale project activities" ~~information on additionality (attachment A to Appendix B)~~ and the "General guidance on leakage in biomass project activities" (attachment C to Appendix B) provided at <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> mutatis mutandis.

12. This methodology is originally based on the proposed small-scale methodology "NM-073: Electrification of rural communities using renewable energy" which was jointly proposed by The World Bank, UK Department for International Development (DFID) and Pöyry Management Consulting (Sweden). The methodology is revised based on: (i) "NM-092: Electrification and energization of off-grid areas using renewable energy" proposed by NIRAS A/S in cooperation with KfW and the revision request "SSC_702 Revision of AMS-I.L to further clarify monitoring requirements and baseline calculations for mini-grid system" proposed by Randall Spalding-Fecher.

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

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(a) "AMS-I.D: Grid connected renewable electricity generation".

4. Definitions

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

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

(a) **Renewable mini-grid system** - small-scale power system with a total capacity not exceeding 15 MW (i.e. the sum of installed capacities of all electricity generating units connected to the mini-grid is equal to or less than 15 MW) which is not connected to a national or a regional grid.

(b) **Individual, renewable electricity generation system** - renewable-based electricity generation system that supplies electricity to a single consumer (e.g. a home) and that are not interconnected with other facilities or generation systems, i.e. stand-alone systems;

(c) **Rehabilitation (or refurbishment**) - Investment to restore existing individual, renewable electricity generation systems that are not generating electricity in their current condition. This may involve repairs, renovations or replacement of broken, missing or worn out equipment, but specifically excludes actions only involving on-going or deferred maintenance. The primary objective of rehabilitation or refurbishment is to restore the performance of the system. Rehabilitation may also lead to increase in efficiency performance of individual, renewable electricity generation systems;

(d) **Consumer(s)** - they are end-user(s)/facility(ies) that may include households; public buildings; and/or small, medium and micro enterprises (SMMEs). Electricity uses may include interior lighting, street lighting, refrigeration, or agricultural water pumps.

5. Baseline methodology

5.1. Project boundary

16. The spatial extent of the project boundary includes the project renewable electricity generation systems, any project distribution (grid) systems, and the physical sites of the consumers ~~end-use facilities~~ served by the project activity.

17. Two parameters are required to be known to determine the baseline:

(a) The amount of renewable electricity utilized by the consumers ~~facilities~~ served by the project renewable electricity generation systems;

(b) The number of consumers ~~end-use facilities~~ supplied with renewable electricity by the project activity.

18. The following are the baseline emission factors for each tranche of annual amount of renewable electricity consumed per consumer ~~end-use facility~~ during the crediting period:

(a) For the first 55 kWh of renewable electricity consumed by each consumer ~~facility~~ the baseline emission factor is 6.8 (t CO_2/MWh);

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(b) For the facility consumption more ~~greater~~ than 55 kWh but equal to or less than 250 kWh, the baseline emission factor is 1.3 (tCO_2/MWh) for the tranche between 55 and 250 kWh;

(c) For the facility consumption beyond 250 kWh, the baseline emission factor is 1.0 (t CO_2/MWh) for the tranche beyond 250 kWh.

5.2. Baseline emission calculations for new construction and/or rehabilitation of individual renewable generation systems

19. Baseline emissions for the entire project activity are calculated as:

$$BE_y = BE_{55,y} + BE_{250,y} + BE_{250plus,y}$$ Equation (1)

Where:

BE_y = Baseline emissions in year *y* (t CO_2)

$BE_{55,y}$ = Aggregate baseline emissions for consumers ~~facilities~~ that consumed equal to or less than 55 kWh of renewable electricity from project renewable electricity systems in year *y* (t CO_2)

$BE_{250,y}$ = Aggregate baseline emissions for consumers ~~facilities~~ that consumed more than 55 kWh but equal to or less than 250 kWh of renewable electricity from project renewable electricity systems in year *y* (t CO_2)

$BE_{250\ plus,y}$ = Aggregate baseline emissions for consumers ~~facilities~~ that consumed more ~~greater~~ than 250 kWh of renewable electricity from project renewable electricity systems in year *y* (t CO_2)

20. For consumers ~~facilities~~ that consumed equal to or less than 55 kWh, baseline emissions are calculated as:

$$BE_{55,y} = \sum_{x}^{N} EG_{x,y} \times EF_{CO2,55} \quad \text{Equation (2)}$$

Where:

$EG_{x,y}$ = Electricity delivered by project renewable electricity generation system to consumer ~~facility~~ *x*, where the electricity delivered to that facility is equal to or less than 55 KWh in year *y* (MWh)

$EF_{CO2,55}$ = 6.8 (t CO_2/MWh)

x = Consumer ~~facility~~ supplied with renewable electricity from operating project renewable electricity generation systems consuming equal to or less than 55 kWh in year *y*

N = Number of consumers ~~facilities~~ in the project activity consuming equal to or less than 55 kWh/year

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21. For consumers ~~facilities~~ that consumed more than 55 kWh but equal to or less than 250 kWh, baseline emissions are calculated as:

$$BE_{250,y} = \sum_{z}^{M} \left(\left(EG_{z,y} - 0.055 \right) \times EF_{CO2,250} + C \right) \quad \text{Equation (3)}$$

Where:

$EG_{z,y}$ = Electricity delivered by project renewable electricity generation system to consumer ~~facility~~ *z* in year *y*, where the electricity delivered to the facility is more than 55 kWh but equal to or less than 250 kWh in year *y* (MWh)

$EF_{CO2,250}$ = 1.3 (tCO_2/MWh)

z = Consumer ~~facility~~ supplied with renewable electricity from operating project renewable electricity generation systems consuming more than 55 kWh but equal to or less than 250 kWh in year *y*

C	=	0.374 (t CO_2), a constant calculated as (0.055 MWh x 6.8 t CO_2/MWh)
M	=	Number of facilities in the project activity consuming more than 55 kWh but equal to or less than 250 kWh/year

22. For facilities that consumed more than 250 kWh baseline emissions are calculated as:

$$BE_{250plus,y} = \sum_{w}^{P} \left(\left(EG_{w,y} - 0.250 \right) \times EF_{CO2,250plus} + D \right) \quad \text{Equation (4)}$$

Where:

$EG_{w,y}$	=	Electricity delivered by project renewable electricity generation system to consumer ~~facility~~ w in year *y* such that the electricity delivered to the facility is more than 250 kWh in year *y* (MWh)
$EF_{CO2,250\ plus}$	=	1.0 (t CO_2/MWh)
w	=	Consumer ~~facility~~ supplied with renewable electricity from operating project renewable electricity generation systems consuming more than 250 kWh in year *y*
D	=	0.6275 (tCO_2), a constant calculated as (0.055 MWh x 6.8 t CO_2/MWh + 0.195 MWh x 1.3 t CO_2/MWh)
P	=	Number of consumers ~~facilities~~ in the project activity consuming more than 250 kWh/year

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5.3. Baseline emission calculations for new construction or expansion of renewable mini-grid systems

23. An ex ante census of project electricity consumers are intended to be supplied with electricity from the project renewable mini-grid shall be carried out to document the physical location of each consumer and the anticipated annual electricity consumption of each consumer. As an option, the anticipated annual electricity consumption of individual consumer may be established based on the type of connection or payment arrangement provided (e.g. load limited, fee for service based connection). The consumers should be categorised as either households (Type I consumers) or non-households[5] (Type II consumers). Electricity consumption of each Type I consumer that is expected to consume more than 1,000 kWh per year and each Type II consumer shall be individually metered. Type I consumers whose consumption is required to be individually metered are called Type I-M consumers and Type I consumers whose consumption is not required to be individually metered are called as Type I-NM facilities.

24. Baseline emissions are the sum of emissions associated with:

[5] These include commercial consumers; small, medium and micro enterprises (SMMEs); public institutions; street lighting and small scale industrial consumers as well as agricultural facilities (such as irrigation pump sets).

(a) Consumers that will be connected to the new or expanded mini-grid but were not connected to any existing grids prior to the project activity; these are defined as new consumers (either Type I and Type II consumers);

(b) Consumers that will be connected to the new or expanded mini-grid but were connected to an existing grid prior to the project activity; these are defined as existing consumers (for existing consumers, whether they are Type I and Type II consumers is not relevant).

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

$$BE_y = BE_{T1,y} + BE_{T2,y} + BE_{exist,y} \quad \text{Equation (5)}$$

Where:

BE_y = Baseline emissions in year *y* (t CO_2)

$BE_{T1,y}$ = Baseline emissions for Type I consumers in year *y* (t CO_2)

$BE_{T2,y}$ = Baseline emissions for Type II consumers in year *y* (t CO_2)

$BE_{exist,y}$ = Baseline emissions of existing consumers i.e. baseline emissions from displacement of electricity from an existing mini-grid (t CO_2)
$BE_{exist,y} = 0$, if there are no existing consumers

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26. Baseline emissions of existing consumers are calculated as follows:

$$BE_{exist,y} = ED_{exist,y} \times EF_{mgrid} \quad \text{Equation (6)}$$

Where:

$ED_{exist,y}$ = Total electricity delivered to existing consumers ($N_{exist,y}$) (MWh)

EF_{mgrid} = Baseline emissions factor for the mini-grid (t CO_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”

27. The following two approaches can be used to estimate baseline emissions associated with new Type I and Type II consumers.

(a) Approach I. Detailed calculations based on tranches of electricity;

(b) Approach 2. Simplified calculation based on average electricity consumption per consumer.

5.3.1. Approach 1. Baseline emissions determination of new Type I and Type II consumers based on tranches of electricity consumption.

28. With this approach, baseline emissions of Type II consumers, $BE_{T2,y}$ are calculated as follows:

$$BE_{T2,y} = \sum_{i}^{N_y} EC_{T2,i,y} \times EF_{CO2,T2}$$ Equation (7)

Where:

$BE_{T2,y}$	=	Baseline emissions for Type II consumers in year *y* (t CO_2)
$EC_{T2,i,y}$	=	Metered annual electricity consumption of Type II consumer *i* in year *y* (MWh)
$EF_{CO2,T2}$	=	1.0 (t CO_2/MWh)
N_y	=	Number of Type II consumers in year *y*

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29. Baseline emissions from Type I consumers, $BE_{T1,y}$ 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.

$$BE_{T1,y} = \left(\left\lfloor EC_{T1NM,y} \times NM_y \right\rfloor \times EF_{CO2,T1NM}\right) + \left(\left\lfloor EC_{T1M,y} \times M_y \right\rfloor \times EF_{CO2,T1M}\right)$$ Equation (8)

$$EC_{T1NM,y} = \left(EC_{tot\_T1NM,y}\right) \div NM_y$$ Equation (9)

$$EC_{T1M,y} = \left(\sum_{j}^{M} EC_{T1M,j,y}\right) \div M_y$$ Equation (10)

$$EC_{tot\_T1NM,y} = \left[\left(ED_{tot,y} - ED_{exist,y}\right) * \left(1 - TL_p\right)\right] - \sum_{i}^{N} EC_{T2,i,y} - \sum_{j}^{M} EC_{T1M,j,y}$$ Equation (11)

Where:

$BE_{T1,y}$	=	Baseline emissions for Type I consumers in year *y* (t CO_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*

$EF_{CO2,T1NM}$ = (a) If $EC_{T1NM,y}$ is equal to or less than 0.055 MWh/y, then use a default value of 6.8 (t CO_2/MWh);

(b) If $EC_{T1NM,y}$ is less than or equal to 0.250 MWh/y but more than 0.055 MWh/y, then:

(i) For the portion up to and including 0.055 MWh/y, use a default value of 6.8 (t CO_2/MWh);

(ii) For the portion greater than 0.055 MWh/y, use a default value of 1.3 (t CO_2/MWh);

(c) If $EC_{T1NM,y}$ is greater than 0.250 MWh/y but less than or equal to 0.500 MWh/y, then:

(i) For the portion up to and including 0.055 MWh/y use a default value of 6.8 (t CO_2/MWh);

(ii) For the portion greater than 0.055 MWh/y and less than 0.25 MWh/y use a default value of 1.3 (t CO_2/MWh);

(iii) For the portion greater than 0.25 MWh/y use a default value of 1.0 (t CO_2/MWh);

(d) If $EC_{T1NM,y}$ is greater than 0.500 MWh/y, then use a default value of 1.0 (t CO_2/MWh) for the entire portion i.e. default values of 1.3 (t CO_2/MWh) or 6.8 (t CO_2/MWh) are not eligible for any of the portions

$EF_{CO2,T1M}$ = (a) If $EC_{T1M,y}$ is equal to or less than 0.055 MWh/y, then use a default value of 6.8 (t CO_2/MWh);

(b) If $EC_{T1M,y}$ is less than or equal to 0.250 MWh/y but greater than 0.055 MWh/y, then:

(i) For the portion up to and including 0.055 MWh/y, use a default value of 6.8 (t CO_2/MWh);

(ii) For the portion greater than 0.055 MWh/y, use a default value of 1.3 (t CO_2/MWh);

(c) If $EC_{T1M,y}$ is greater than 0.250 MWh/y but less than or equal to 0.500 MWh/y, then:

(i) For the portion up to and including 0.055 MWh/y use a default value of 6.8 (t CO_2/MWh);

(ii) For the portion greater than 0.055 MWh/y and less than 0.25 MWh/y use a default value of 1.3 (t CO_2/MWh); and

(iii) For the portion greater than 0.25 MWh/y use a default value of 1.0 (t CO_2/MWh);

(d) 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 (t CO_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 (MWh)

$TL_{P,y}$ = Transmission and distribution losses within the project area (%), with 10 per cent as a default value

5.3.2. Approach 2. Baseline emissions determination of new Type I and Type II consumers based on average electricity consumption per consumer

30. With this approach, baseline emissions of Type-I and Type II consumers, are calculated as follows:

$$BE_{T1,y} + BE_{T2,y} = \left(ED_{tot,y} - ED_{exist,y}\right) \times (1 - TL_p) \times EF_{CO2,tot} \quad \text{Equation (12)}$$

Where:

$EF_{CO2,tot}$ 1.0 (t CO_2/MWh)

5.4. Project emissions

31. Project emissions are considered zero (i.e. PE_y =0) except in the cases below where method indicated in the most recent version of "AMS-I.D: Grid connected renewable electricity generation" ~~ACM0002 Consolidated baseline methodology for grid-connected electricity generation from renewable sources"~~ is applied to calculate project emissions.

(a) Emissions related to the operation of geothermal power plants (e.g. non-condensable gases, electricity/fossil fuel consumption);

(b) Emissions from water reservoirs of hydro power plants.

5.5. Leakage

32. If the energy generating equipment is transferred from another activity leakage is to be considered.

5.6. Emission reductions

33. Emission reductions on annual basis (ER_y) are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (13)}$$

Where:

ER_y = Emission reductions in year *y* (t CO_2e/y)

BE_y = Baseline Emissions in year *y* (t CO_2/y)

PE_y = Project emissions in year *y* (t CO_2/y)

LE_y = Leakage emissions in year *y* (t CO_2/y)

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6. Monitoring methodology

6.1. Monitoring in the case of Individual, renewable electricity generation system

34. Net annual amount of renewable electricity supplied to a facility is monitored as ~~using one of the options~~ below:

(a) **Option 1**: measure the net amount of renewable electricity delivered to each ~~all~~ consumer ~~end-use facilities~~ connected to the project renewable electricity generation system(s). Such measurements shall be made continuously and recorded at least on a monthly basis;

(b) **Option 2**: calculate the net amount of renewable electricity delivered to all the consumer ~~facilities~~ connected to the project renewable electricity generation system(s) as the installed capacity of the project renewable electricity generation systems times a default annual average value for availability.[6] Assume a twelve per cent (12 per cent) availability[7] for solar photovoltaic electricity systems. This option can only be applied to project activities involving installation or rehabilitation of individual, renewable energy systems and only for consumers (facilities) associated those systems whose ~~if the~~ installed capacity ~~of each project system~~ is equal to or less than 1.0 kW.

[6] This assumes that all of the renewable energy that is produced will be consumed by the facility.

[7] For example a 15 Wp Solar Home System would deliver 15.77 kWh annually (0.015 x 8760 x 0.12). Availability factors for other renewable energy systems may be proposed following the procedures for request for revision of small-scale CDM methodologies.

35. When option 2 in paragraph ~~17~~ 34 above is applied, the number of operating project renewable electricity generation systems is determined on a sample basis either annually choosing 90/10 confidence/precision or biennially choosing 95/10 confidence/precision for the sample size estimation following the requirements under "Standard on sampling and surveys for CDM project activities and PoAs". This monitored value determines N/M/P (number of consumers ~~facilities~~) in equations (2), (3) and (4). Renewable electricity generation systems can be counted as operating only if they can be shown to be able to produce electricity by means of one of the following:

(a) The manufacturer's warranty; or

(b) Regular maintenance arrangement (e.g. with suppliers/distributors/implementers); or

(c) Showing that the systems are procured following the standards/guidelines (local/national/international) to ensure that the systems are of adequate quality and provide the required performance; or

(d) By direct monitoring of systems, if necessary on sample basis.

In the absence of this demonstration, the system capacity shall be de-rated following manufacturers guidelines or as per relevant international standards/guidelines.

36. Both monitoring options 1 and 2 in paragraph 34 can be used within the same project activity provided that:

(a) A procedure that ensures no double counting of emissions reductions has been implemented;

(b) Option 2 is applied to all systems with a capacity for renewable electricity generation is equal to or less than 1.0 kW.

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6.2. Monitoring in the case new construction or expansion of renewable mini-grid systems

37. The metering of all the relevant parameters shall be per the guidance indicated below. The applicable requirements (e.g. calibration) for monitoring plan specified in the "General guidelines for SSC CDM methodologies" are an integral part of the monitoring guidelines specified below and therefore shall be referred to by the project participant.

Data / Parameter Table 1.

Data / Parameter:	$ED_{tot,y}$
Data unit:	MWh/y
Description:	Electricity delivered to consumers from the grid/mini-grid system
Measurement procedures (if any):	An electricity meter shall be installed as part of the project activity to measure total gross electricity supplied to all connected consumers (new and existing) from the project renewable electricity generation system. For new mini-grid construction, the metering can be at the mini-grid plant itself. For mini-gird extension, this can be at the substation from which the electrification project is supplied.

Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	$EC_{T2,i,y}$
Data unit:	MWh/y
Description:	Electricity metered at Type II consumer *i*
Measurement procedures (if any):	Measurements are undertaken using electricity meters at the consumer electricity service entrance
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording
Any comment:	-

Data / Parameter table 3.

Data / Parameter:	$EC_{T1M,j,y}$
Data unit:	MWh/y
Description:	Electricity metered at Type I-M consumer
Measurement procedures (if any):	Measurements are undertaken using electricity meters at the facility electricity service entrance
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording
Any comment:	-

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Data / Parameter table 4.

Data / Parameter:	$ED_{exist,y}$
Data unit:	MWh/y
Description:	Total electricity delivered in year *y* to the existing consumers
Measurement procedures (if any):	Measurements are undertaken using electricity meters. The measurement should be taken at the nearest pre-existing substation from which the electrification project is supplied
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording
Any comment:	-

Data / Parameter table 5.

Data / Parameter:	Proportion of N_y, NM_y $N_{exist,y}$ and M_y having access to mini-grid
Data unit:	-
Description:	Check for continued access to electricity

Measurement procedures (if any):	Annual/biennial checks that mini-grid connections are still working, done with a census or a statistically significant sample of consumers. Use 90/10 and 95/10 precision for annual and biennial checks, respectively
Monitoring frequency:	Annual/biennial
Any comment:	-

7. Project activity under a programme of activities

38. The methodology is applicable to a programme of activities; no additional leakage estimations are necessary other than that indicated under leakage section above. Both - Option 1 and Option 2 in paragraph 34 for monitoring can be used for monitoring within one component project activity of a programme of activity and within the same rural community provided that the requirements specified for the use of each option are followed during the crediting period in a consistent manner.

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Document information

Version	*Date*	*Description*
02.0	14 May 2014	SSC WG 44, Annex 3 To be considered at EB 79. Revision further clarifies the baseline procedure and monitoring requirements for renewable based mini-grid, removes the requirement related to high efficiency lighting and consolidates elements from SSC-NM092 to broaden the applicability of AMS-I.L covering rehabilitation of renewable energy systems.
01.0	2 March 2012	EB 66, Annex 53 Initial adoption.

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