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I.A Electricity generation by the user (cont)

TYPE I - RENEWABLE ENERGY PROJECTS

Project participants shall apply the general guidance to the small-scale CDM methodologies, information on additionality (attachment A to appendix B) and 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*.

I.A. Electricity generation by the user

Technology/measure

1. This category comprises renewable electricity generation units that supply individual households/users or groups of households/users included in the project boundary. The applicability is limited to individual households and users that do not have a grid[1] connection except when;

(a) A group of households or users are supplied electricity through a standalone mini-grid[2] powered by renewable energy generation unit(s) where the capacity of the generating units does not exceed 15 MW (i.e., the sum of installed capacities of all renewable energy generators connected to the mini-grid is less than 15 MW) e.g., a community based stand-alone off-the-grid renewable electricity systems; or

(b) The emissions reduction per renewable energy based lighting system is less than 5 tonnes of CO_2e a year and where it can be shown that fossil fuel would have been used in the absence of the project activity by;

(i) A representative sample survey (90% confidence interval, ±10% error margin) of target households; or

(ii) Official statistics from the host country government agencies.

~~These~~ The renewable energy generation units include technologies such as solar, hydro, wind, biomass gasification and other technologies that produce electricity all of which is used on-site/locally by the user, e.g., solar home systems, wind battery chargers . The renewable generating units may be new installations (Greenfield) or replace existing onsite fossil-fuel-fired generation. ~~The capacity of these renewable energy generators shall not exceed 15 MW.~~ To qualify as a small-scale project, the total output of the unit(s) shall not exceed the limit of 15 MW.

2. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:

- The project activity is implemented in an existing reservoir with no change in the volume of reservoir;
- The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2;

[1] National/regional grid
[2] Not connected to a national/regional grid

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I.A Electricity generation by the user (cont)

- The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2.

3. Combined heat and power (cogeneration) systems are not eligible under this category.

4. If the unit added has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.

5. Project activities that involves retrofit or replacement ~~modify~~ of an existing facility for renewable energy generation are included in this category. To qualify as a small-scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.

6. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct[3] from the existing units.

Boundary

7. The physical, geographical site of the renewable energy generating unit and the equipment that uses the electricity produced delineates the project boundary.

Baseline

8. The energy baseline is the fuel consumption of the technology in use or that would have been used in the absence of the project activity to generate the equivalent quantity of energy[4], estimated using one of the following three options:

(a) Option 1:

$$E_{BL,y} = \sum_i \left(n_i * EC_{i,y}\right) / (1 - l) \quad \textbf{(1)}$$

Where:

$E_{BL,y}$	Annual energy baseline; kWh
$\sum_i$	The sum over the group of *i* renewable energy technologies (e.g., renewable energy technologies for households, rural health centres, rural schools, grain milling, water pumping, irrigation, etc.) implemented as part of the project activity
n_i	Number of consumers supplied by installations of the renewable energy technology belonging to the group of *i* renewable energy technologies during the year

[3] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the replacement of the nacelle assembly or blades of a wind battery charger would not be considered "physically distinct".

[4] Renewable energy lighting applications shall consider the equivalent level of lighting service instead of energy (See annex 1 of EB 08).

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I.A Electricity generation by the user (cont)

$EC_{i,y}$ Estimate of average annual individual energy consumption observed in closest grid electricity systems among rural grid connected consumers belonging to the same group of *i* renewable energy technologies. If energy consumption is metered, $EC_{i,y}$ is the average energy consumed[5] by consumers belonging to the group of *i* renewable energy technologies; kWh

L Average technical distribution losses that would have been observed in diesel powered mini-grids installed by public programmes or distribution companies in isolated areas, expressed as a fraction[6];

(b) Option 2:

$$E_{BL,y} = \sum_i EG_{i,y} / (1 - l) \quad \textbf{(2)}$$

Where:

$E_{BL,y}$ Annual energy baseline; kWh

$\sum_i$ The sum over the group of *i* renewable energy technologies (e.g., renewable energy technologies for solar home systems, solar pumps) implemented as part of the project activity

$EG_{i,y}$ The estimated annual output of the renewable energy technologies of the group of *i* renewable energy technologies installed; kWh

L Average technical distribution losses that would have been observed in diesel powered mini-grids installed by public programmes or distribution companies in isolated areas, expressed as a fraction[6];

(c) Option 3: the baseline can be a trend-adjusted projection of historic fuel consumption in situations where an existing technology is replaced. For the specific case of lighting devices a daily usage of 3.5 hours shall be assumed, unless it is demonstrated that the actual usage hours adjusted for seasonal variation of lighting is different based on representatives sample survey (90% confidence interval ±10% error) done for minimum of 90 days.

9. For Option 1 and Option 2 above the emissions baseline is the energy baseline calculated in accordance with paragraphs ~~7–~~8a and ~~7~~ 8 b above times a default emission factor:

[5] Potential oversizing of the power capacity installed or energy generated by the CDM project activity shall not be reflected in the baseline and emissions reduction calculation. For this reason, the energy value taken into account shall be the energy consumed. It cannot be the electricity output, except if the project participant justifies that it represent a reasonable estimate of the energy that would have been generated by a diesel generator larger than 35 kW and operating with a load factor of at least 50% to provide similar electricity services.

[6] A reasonable default value for distribution losses on low voltage rural distribution grid could be 20%. Project proponents shall demonstrate in the PDD that in the absence of the project activity electricity supply would have entailed distribution losses e.g. users are in distributed locations, else a value of L=0 shall be used.

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I.A Electricity generation by the user (cont)

$$BE_{CO2,y} = E_{BL,y} * EF_{CO2} \quad \textbf{(3)}$$

Where:

$BE_{CO2,y}$	Emissions in the baseline in year *y*; tCO_2
$E_{BL,y}$	Annual energy baseline in year *y*; kWh
EF_{CO2}	CO_2 emission factor; tCO_2/kWh

For $EF_{CO2,}$ default value of 0.8 kg CO_2-e/kWh, which is derived from diesel generation units, may be used. A small-scale project proponent may, with adequate justification use a higher emissions factor from table I.F.1 under category AMS I.F.

10. In the case of Option 3, the emissions baseline is the historic fuel consumption calculated in accordance with paragraph ~~7~~ 8c above times the CO_2 emission factor for the fuel displaced. IPCC default values for emission factors may be used.

$$BE_{CO2,y} = \sum_j FC_{j,y} * NCV_j * EF_{CO2,j} \quad \textbf{(4)}$$

Where:

$BE_{CO2,y}$	Emissions in the baseline in year *y*; tCO_2
$FC_{j,y}$	Amount of fuel consumption of fuel type *j*; mass or volume unit in year *y*
NCV_j	Net calorific value of fuel type *j*; gigajoule per mass or volume unit
$EF_{CO_2,j}$	CO_2 emission factor of fuel type *j*; tCO_2/GJ
j	Fuel type used for combustion

11. The baseline emissions of project activities that involve retrofit/replacement of an existing facility or capacity addition at an existing facility, shall be calculated following the procedures prescribed in AMS-I.D with the exception that the applicable emission factor (EF_{CO2}) is calculated as described in this methodology.

~~12. In the case of project activities adding renewable energy capacity, if the availability of renewable resources is limited, the impact of a decrease in electricity production from the units installed before the project implementation must be considered.~~

~~For the specific case of hydropower plants, this effect could be considered calculating the production of electricity that must be used for the emission reduction calculation with the following procedure:~~

~~(1) Every year during the crediting period, the energy that would have been produced under the same hydrological conditions by the units installed before the project is estimated;~~

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I.A Electricity generation by the user (cont)

(2) The electricity generation i.e. $EG_{PJ,hydro,add,y}$ to be considered to calculate emission reductions is calculated with the following formula:

$$EG_{PJ,hydro,add,y} = EG_{hydro,y} - EG_{hydro,old,y} \quad (5)$$

Where:

$EG_{PJ,hydro,add,y}$	Net increase in electricity generation by hydropower plants in year *y* that should be considered as the energy baseline (E_{BL}) in year *y*; kWh
$EG_{hydro,y}$	Total actual electricity produced in year *y* in the plant (all units); kWh
$EG_{hydro,old,y}$	Estimated electricity that would have been produced by the units installed before the project under the hydrological conditions of year *y*; kWh

13. In the case of project activities that involves the addition of renewable energy generation units at an existing renewable power generation facility, where the existing and new units share the use of common and limited renewable resources (e.g. streamflow, reservoir capacity, biomass residues), the potential for the project activity to reduce the amount of renewable resource available to, and thus electricity generation by, existing units must be considered in the determination of baseline emissions, project emissions, and/or leakage, as relevant.

For project activities that involve the addition of new generation units (e.g. turbines) at an existing facility, electricity generation (MWh/y) should be calculated as follows:

$$EG_{electrical,add,y} = EG_{electrical,PJ,y} - EG_{electrical,old,y} \quad (6)$$

Where:

$EG_{electrical,add,y}$	Net increase in electricity generation by renewable energy plant in year *y* that should be considered as energy baseline (E_{BL}); kWh
$EG_{electrical,PJ,y}$	Total actual electricity produced in year *y* by all units, existing and new project units; kWh
$EG_{electrical,old,y}$	Estimated electricity that would have been produced by existing units (installed before the project activity) in year *y* in the absence of the project activity; kWh

The value $EG_{electrical,old,y}$ is given by

$$EG_{electrical,old,y} = MAX\left(EG_{electrcial,actual,y}, EG_{electrical,estimated,y}\right) \quad (7)$$

Where:

$EG_{electrical,actual,y}$	Actual, measured electrical energy production of the existing units in year *y*; kWh
$EG_{electrical,estimated,y}$	Estimated electrical energy that would have been produced by the existing units under the observed availability of the renewable resource (e.g. hydrological conditions) for year *y*; kWh

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I.A Electricity generation by the user (cont)

If the existing units shut down are derated or otherwise become limited in production, the project activity should not get credit for generating electricity from the same renewable resources that would have otherwise been used by the existing units (or their replacements). Therefore, the equation for $EG_{electrical,old,y}$ still holds, and the value for $EG_{electrical,estimated,y}$ should continue to be estimated assuming the capacity and operating parameters are the same as those at the time of the start of the project activity.

If the existing units are subject to modifications or retrofits that increase production, then $EG_{electrical,old,y}$ can be estimated using the procedures described for $EG_{BL,electrical,retrofit}$ below.

14. For project activities that seek to retrofit or modify an existing facility for renewable energy generation the baseline scenario is the following:

In the absence of the CDM project activity, the existing facility would continue to provide electricity ($EG_{BL,electrical,retrofit,y}$) at historical average levels ($EG_{historical,electrcial,y}$) until the time at which the generation facility would be likely to be replaced or retrofitted in the absence of the CDM project activity ($DATE_{BaselineRetrofit}$). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and baseline electricity production is assumed to equal project electricity production and no emission reductions are assumed to occur.

$$EG_{BL,electrical,retrofit,y} = MAX\left(EG_{historical,electrical}, EG_{estimated,electrical,y}\right) \text{ until } DATE_{BaselineRretrofit} \quad (8)$$

Where:

$EG_{BL,electrical,retrofit,y}$	Electrical energy production by an existing facility in the absence of the project activity; kWh
$EG_{historical,electrical}$	Average of historical annual electricity levels delivered by the existing facility, spanning all data from the most recent available year (or month, week or other time period) to the time at which the facility was constructed, retrofit, or modified in a manner that significantly affected output (i.e. by 5% or more); kWh
$EG_{estimated,electrical,y}$	Estimated electrical energy that would have been produced by the existing units under the observed availability of renewable resource (e.g. hydrological conditions) in year *y*; kWh
$DATE_{BaselineRetrofit}$	Date at which the existing generation facility is likely to be replaced or retrofitted in the absence of the CDM project activity

The energy baseline E_{BL} is then, the electricity supplied by the project activity ($EG_{PJ,electrical,retrofit,y}$) minus the baseline electricity supplied in the case of modified or retrofit facilities ($EG_{BL,electrical,retrofit,y}$), as follows:

$$E_{BL,y} = \left(EG_{PJ,retrofit,y} - EG_{BL,retrofit,y}\right) \quad (9)$$

Where:

$E_{BL,y}$	Annual energy baseline in year *y*; kWh

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I.A Electricity generation by the user (cont)

~~$EG_{PJ,electrical,retrofit,y}$ Electricity supplied by the project activity in year *y* (after retrofit); kWh~~

~~$EG_{BL,retrofit,y}$ Electricity supplied by an existing facility in the absence of the project activity in year *y* (before retrofit); kWh~~

~~$EG_{historical,electrical}$ is the average of historical electricity levels delivered by the existing facility, spanning all data from the most recent available year (or month, week or other time period) to the time at which the facility was constructed, retrofit, or modified in a manner that significantly affected output (i.e. by 5% or more), expressed in kilowatt-hour per year. A minimum of 5 years (60 months) (excluding abnormal years) of historical generation data is required in the case of hydro facilities. For other facilities, a minimum of 3 years of data is required. In the case that 5 years of historical data (or three years in the case of non-hydro project activities) are not available e.g. due to recent retrofits or exceptional circumstances as described in footnote [7] – a new methodology or methodology revision must be proposed.~~

~~All project electricity generation above baseline levels ($EG_{BL,electrical,retrofit,y}$) would have otherwise been generated by the operation of power plants and by the addition of new generation sources.~~

~~In order to estimate the point in time when the existing equipment would need to be replaced in the absence of the project activity ($DATE_{BaselineRetrofit}$), project participants may take the following approaches into account:~~

~~(a) The typical average technical lifetime of the equipment type may be determined and documented, taking into account common practices in the sector and country, e.g. on the basis of industry surveys, statistics, technical literature, etc.~~

~~(b) The common practices of the responsible company regarding replacement schedules may be evaluated and documented, e.g. on the basis of historical replacement records for similar equipment.~~

~~The point in time when the existing equipment would need to be replaced in the absence of the project activity should be chosen in a conservative manner: that is, if a range is identified, the earliest date should be chosen~~.

Project emissions

12. For most renewable energy project activities, $PE_y = 0$. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of ACM0002.

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

- Emissions from water reservoirs of hydro power plants

[7] Data for periods affected by unusual circumstances such as natural disasters, conflicts, and transmission constraints shall be excluded.

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I.A Electricity generation by the user (cont)

Leakage

13. If the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.

Monitoring

14. Monitoring shall consist of:

(a) An annual check of all systems or a sample thereof to ensure that they are still operating (other evidence of continuing operation, such as on-going rental/lease payments could be a substitute).

OR

(b) Metering the electricity generated by all systems in a sample thereof.

15. For projects where only biomass or biomass and fossil fuel are used the amount of biomass and fossil fuel input shall be monitored.

16. For projects consuming biomass, a specific fuel consumption[8] of each type of fuel (biomass or fossil) to be used should be specified *ex ante*. The consumption of each type of fuel shall be monitored.

17. If fossil fuel is used, the electricity generation metered should be adjusted by deducting the electricity generation from fossil fuels using the specific fuel consumption and the quantity of fossil fuel consumed.

18. If more than one type of biomass fuel is consumed, each shall be monitored separately.

19. The amount of electricity generated using biomass fuels calculated as per paragraph 17 shall be compared with the amount of electricity generated calculated using specific fuel consumption and amount of each type of biomass fuel used. The lower of the two values should be used to calculate emission reductions.

Project activity under a programme of activities

The following conditions apply for use of this methodology in a project activity under a programme of activities:

21. In the specific case of biomass project activities the applicability of the methodology is limited to either project activities that use biomass residues only or biomass from dedicated plantations complying with the applicability conditions of AM0042.

22. In the specific case of biomass project activities the determination of leakage shall be done following the general guidance for leakage in small-scale biomass project activities (attachment C of appendix B[9] of simplified modalities and procedures for small-scale clean development

[8] Specific fuel consumption is the fuel consumption per unit of electricity generated (e.g., tonnes of bagasse per megawatt-hour).

[9] Available on <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>.

mechanism project activities) or following the procedures included in the leakage section of AM0042. In case the project activity involves the replacement of equipment and the leakage from the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.

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I.A Electricity generation by the user (cont)

History of the document*

Version	Date	Nature of revision
13	EB 42, Annex 16 26 September 2008	Include project activities for renewable energy based lighting (e.g., solar-lamps) to displace fossil fuel usage in lighting in rural households that are not grid connected or connected to a weak grid prone to blackouts/brownouts.
12	EB 33, Annex 19 22 June 2007	Clarify the applicability of the methodology and maintain consistency with the revision AMS-I.B, which provides guidance for situations where electricity is a co-product of the project activity, providing mechanical energy for the user.
11	EB 32, Annex 25 22 June 2007	Clarify the monitoring of biomass in project activities that apply this methodology which is consistent with monitoring of biomass in the approved methodology AMS I.D.
10	EB 31, Annex 19 04 May 2007	Clarify that all cogeneration project activities should apply AMS I.C.
09	EB 28, Annex 24 15 December 2006	Maintain consistency across categories particularly in relation to AMS I.D; Revised guidance on capacity addition activities and a default emission coefficient of 0.8 kg CO2 /kWh for diesel generation, as opposed to 0.9 kg CO2 /kWh.
08	EB 23, Annex 29 24 February 2006	Include provisions for retrofit and renewable energy capacity additions as eligible activities; Provide clarification for baseline calculations under category I.D; Provide clarification on the applicability of Category I.A as against Category I.D.

* This document, together with the 'General Guidance' and all other approved SSC methodologies, was part of a single document entitled: Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities until version 07.

History of the document: Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities

Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities contained both the General Guidance and Approved Methodologies until version 07. After version 07 the document was divided into separate documents: 'General Guidance' and separate approved small-scale methodologies (AMS).

Version	Date	Nature of revision
07	EB 22, Para. 59 25 November 2005	References to "non-renewable biomass" in Appendix B deleted.
06	EB 21, Annex 22 20 September 2005	Guidance on consideration of non-renewable biomass in Type I methodologies, thermal equivalence of Type II GWhe limits included.
05	EB 18, Annex 6 25 February 2005	Guidance on 'capacity addition' and 'cofiring' in Type I methodologies and monitoring of methane in AMS III.D included.
04	EB 16, Annex 2 22 October 2004	AMS II.F was adopted, leakage due to equipment transfer was included in all Type I and Type II methodologies.
03	EB 14, Annex 2 30 June 2004	New methodology AMS III.E was adopted.
02	EB 12, Annex 2 28 November 2003	Definition of build margin included in AMS I.D, minor revisions to AMS I.A, AMS III.D, AMS II.E.
01	EB 7, Annex 6 21 January 2003	Initial adoption. The Board at its seventh meeting noted the adoption by the Conference of the Parties (COP), by its decision 21/CP.8, of simplified modalities and procedures for small-scale CDM project activities (SSC M&P).