CLEAN DEVELOPMENT MECHANISM

CDM-SSCWG46-A05

Draft Small-scale Methodology

AMS-I.B.: Mechanical energy for the user with or without electrical energy

Version 12.0

Sectoral scope(s): 01

United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The Conference of Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) in decision 5/CMP.8 (paragraph 35) encourages the Executive Board (hereinafter referred to as the Board) of the clean development mechanism (CDM) to continue its work on the simplification and streamlining of methodologies, with the aim of reducing transaction costs for all project activities and programmes of activities, especially those in regions underrepresented in the clean development mechanism.

2. Following the approval of the methodological tool "Project emissions from cultivation of biomass" at the seventy-fifth meeting of the Board, the Small-Scale Working Group (SSC WG) requested a mandate from the Board to integrate this tool into SSC methodologies. Consequently, the Board mandated this task at its seventy-sixth meeting (EB 76, para 53).

3. The Board, at its seventy-seventh meeting, considered the proposal from the SSC WG to initiate the revision of Type-I methodologies to further clarify and align the baseline scenario for Greenfield/capacity expansion projects in respective methodologies with the current procedure provided in the "General guidelines for SSC CDM methodologies" for determining baseline scenarios. The Board agreed with the proposals from the SSC WG to work on the issue and make recommendations to the Board at a future meeting that enhance consistency, either by revising the methodologies and/or the "General guidelines for SSC CDM methodologies" (EB 77, para 62).

4. The Board at its sixty-seventh meeting approved a list of existing methodologies contained in the "Concept note on the treatment of suppressed demand in approved small-scale methodologies" (annex 15 of the annotations to the agenda of EB 67) for which a revision may be considered in order to integrate the concept of suppressed demand, in accordance with the "Guidelines on the consideration of suppressed demand in the CDM methodologies".

5. The SSC WG at its 40th meeting launched a call for public input pertaining to revision of "AMS-I.B.: Mechanical energy for the user with or without electrical energy" to introduce standardized approaches for determining baseline, taking into account suppressed demand scenario on the application of renewable energy to produce mechanical power (e.g. irrigation pump, agro-processing mills). No inputs were received.

6. The SSC WG, at its 45th meeting, agreed on the draft revised methodology and launched a call for public inputs. No inputs were received. At its 46th meeting, the SSC WG agreed to recommend this draft revised methodology to the Board for approval.

2. Purpose

7. The draft revision:

   (a) Introduces the methodological tool "Project emissions from cultivation of biomass", streamlining biomass cultivation procedures across small and large scale methodologies;

   (b) Removes restrictions for application in a PoA;

   (c) Further clarifies procedure for determining baseline scenarios for Greenfield/capacity expansion project activities;

   (d) Introduce baseline under suppressed demand scenario.

3. Key issues and proposed solutions

8. CDM PDDs show that there exist obvious barriers (e.g. economical, institutional, and technical) to leap frog to renewable based motive power technologies, particularly in rural areas where there is no access to electricity. That is, in the absence of the project either the growing demand of services would not be met or would be met by diesel based systems (e.g. agro-processing mills, water pumps etc.).

9. Stakeholders communicated through clarification requests that there are challenges to determine baseline because of the costly surveys and/or low or no baseline emissions when suppressed demand is not considered for example: (i) when project activity involving replacement (mostly carried out by unorganized sectors) of highly inefficient existing traditional water mills with improved and efficient water mills with increased output and service level; and (ii) projects involving water-pumps for irrigation in rural areas where marginal farmers cannot afford to fully irrigate their lands through motive power and depends upon rain water causing proportion of irrigated land low.

10. The proposed revision (among others mentioned in paragraph 6 above), aims to provide simplified procedure to determine baseline under suppressed demand scenario.

4. Impacts

   (a) Increased environmental integrity;

   (b) Simplified and streamlined procedures.

5. Subsequent work and timelines

11. The methodology is recommended by the SSC WG for consideration by the Board at its eighty-first meeting. No further work is envisaged.

6. Recommendations to the Board

12. As per the recommendation of the SSC WG 46 to approve the recommended revision of "AMS-I.B.: Mechanical energy for the user with or without electrical energy".

TABLE OF CONTENTS **Page**

1. Introduction

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

Table 1. Methodology key elements

Typical project(s)	~~Introduction of~~ installation of renewable energy technologies such as hydropower, wind power and other technologies that provide mechanical energy that otherwise would have been supplied with fossil-fuel-based energy. Mechanical energy is used on-site by individual household(s) or user(s). Typical applications are wind-powered pumps, water mills and wind mills. The project may also produce electricity in addition to mechanical energy. While the pre-project can use any fossil fuel, the baseline scenario is assumed to be the use of diesel fuel consumed in an engine generator
Type of GHG emissions mitigation action	Renewable ~~efficiency~~ energy: Displacement of more GHG intensive fossil-fuel-based generation of mechanical power

2. Scope, applicability, and entry into force

2.1. Scope

2. ~~This category~~ The methodology comprises renewable energy generation units that supply individual or groups of households or users ~~or groups of households~~ ~~or users~~ with mechanical energy ~~who otherwise would have been supplied with fossil fuel based energy~~.

3. The renewable energy generation ~~se~~ units include technologies such as hydropower, wind power, renewable-biomass[1] based energy generation and other technologies that provide mechanical energy (with or without electrical energy), all of which is used on-site by the individual household(s) or user(s), such as wind-powered pumps, solar water pumps, water mills, agro processing mills and wind mills.

2.2. Applicability

4. The methodology is applicable ~~for~~: ~~under the following conditions:~~

   (a) To r~~R~~eplacement or retrofitting of existing facilities ~~only if the existing equipment used to generate the mechanical energy is a fossil fuel generator(s) or pump(s) without renewable component or co-firing of renewable biomass~~;

   (b) To greenfield facilities or project activities involving capacity additions; ~~are eligible, only if the baseline scenario identified according to the related and relevant requirements in the "General guidelines for SSC CDM methodologies" is to generate the mechanical energy with a fossil fuel generator or pump without renewable component or co-firing of renewable biomass;~~

~~1. Refer to EB 23, annex 18 or the definition of renewable biomass.~~

(c) Where generation capacity is specified, it shall be less than 15 MW. If the generation capacity is not specified, the estimated diesel-based electricity generating capacity that would be required to provide the same service or mechanical energy shall be less than 15 MW. In the case of irrigation where diesel-fuelled pumps are used directly, the cumulative rating of diesel-fuelled pumps shall not exceed 15 MW. The size of a diesel-based generator or a diesel pump that would be required shall be justified;

(d) For irrigation applications involving replacement of the pump in addition to renewable energy use, the operating characteristics (head v/s discharge and efficiency) of the new pump should be similar to or better than the system being replaced or would have been replaced. In irrigation applications where the water distribution system is replaced or modified, the new system should have distribution efficiency similar to or better than the replaced system;

(e) If the project equipment includes renewable units and diesel fired units (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable units. For co-fired systems,[2] the total installed mechanical energy generation capacity of the project equipment, when using both fossil and renewable fuel, shall not exceed 15 MW;

(f) 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 from the existing units;

(g) In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.

5. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool “Project emissions from cultivation of biomass” shall apply.

2.3. Entry into force

6. The date of entry into force is the date of the publication of the EB 81 meeting report on 28 November 2014.

3. Normative references

7. Project participants shall apply the “General guidelines for SSC 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: <https://cdm.unfccc.int/Reference/Guidclarif/index.html> mutatis mutandis.

8. This methodology refers to the latest version of the following methodological tools and guidelines[3] mutatis mutandis:

[2] ~~A co-fired system uses both fossil and renewable fuels. For example, both biomass residues and fossil fuels are simultaneously combusted in a single agro-processing unit, or fossil fuel may be used during a period of time when the biomass is not available and due justifications are provided.~~

[3] Please refer to: <https://cdm.unfccc.int/Reference/index.html>.

(a) "AMS-I.A.: Electricity generation by the user";

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

(c) "AMS-I.F.: Renewable electricity generation for captive use and mini-grid";

(d) "Project emissions from cultivation of biomass"~~"AM0042: Grid-connected electricity generation using biomass from newly developed dedicated plantations"~~;

(e) "Tool to calculate baseline, project and/or leakage emissions from electricity consumption";

(f) "General guidelines for SSC CDM methodologies".

4. Definitions

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

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

(a) **Co-fired system** – a system which uses both fossil and renewable fuels in a single boiler for simultaneous combustion and fossil fuel may be used during a period of time when the biomass is not available;

(b) **Existing facilities** – existing facilities are those that have been in operation prior to the start date of the project activity;[4]

(c) **Greenfield facilities** – Greenfield facilities are new project facilities constructed and operated at a site where no project facility was operated prior to the implementation of the project activity;

(d) **Isolated mini-grid** – isolated mini-grid is not connected to a regional or a national grid and the sum of installed capacities of all generators connected to it is equal to or less than 15 MW.

5. Baseline methodology

5.1. Project boundary

11. The physical, geographical site of the renewable energy technology and the equipment that uses the mechanical energy produced delineates the project boundary.

5.2. Baseline

5.2.1. Baseline scenario

12. In the absence of the project activity the project proponent shall demonstrate that the equipment used to generate the mechanical energy is a fossil fuel based generator(s) or pump(s) without renewable component or co-firing of renewable biomass.

[4] See Glossary of CDM Terms, available at: <https://cdm.unfccc.int/Reference/index.html>.

13. In case of Greenfield facilities or project activities involving capacity additions the relevant requirements related to determination of baseline scenario provided in the "General guidelines for SSC CDM methodologies" for Type-II and Type-III Greenfield/capacity expansion project activities should be applied. However in case of suppressed demand scenario, requirements under section 5.2.2 below should be applied.

5.2.2. Baseline under suppressed demand scenario

14. Under a suppressed demand scenario determined using the procedure below diesel based generator(s) or pump(s) is deemed to be the baseline.

5.2.2.1. Procedure for the determination of the suppressed demand scenario

15. A suppressed demand scenario (i.e. minimum service level provided by the project technology is not met prior to project implementation) is deemed to exist, if one of the following conditions is demonstrated through documented evidence such as, published literature, official reports or national statistics:

(a) The project activity is implemented in rural areas and the rate of rural electrification in the host country is less than 20 per cent. The most recent available data on the electrification rates shall be used to demonstrate compliance with the 20 per cent threshold. In no case shall data older than three years from the date of commencement of validation of the project activity be used;

(b) The project activity is located in the Least Developed Countries (LDCs), Small Island Developing States (SIDs) or in special underdeveloped zone (SUZ)[5] of a host country;

(c) The project activity is implemented where there is increased demand for services (i.e. food/agro processing) and continued use of pre-project scenario would not able to meet the demand or the increased demand is partially met with the use of fossil fuel based equipment.

5.3. Baseline emissions

16. The baseline emissions are calculated as follows:

(a) For the fossil fuel consumption to produce mechanical power in the baseline scenario using either of the two approaches below:

(i) The power requirements times hours of operation per year times the emission factor for diesel generator systems, determined according to procedures specified in "AMS-I.A.: Electricity generation by the user";

(ii) The fossil fuel consumption per hour, conservatively converted to diesel fuel hourly consumption rate, times hours of operation per year times the default value for the emission coefficient for diesel fuel ~~(~~i.e. 0.0032 t ~~3.2 kg~~ CO_2 per kg of diesel fuel~~)~~;

[5] For definition of SUZ refer to guideline on "Demonstrating additionality of microscale project activities" available at <https://cdm.unfccc.int/Reference/Guidclarif/index.html>.

(b) For the fossil fuel consumption to produce electricity in the baseline scenario, if the application involves generation of electricity in addition to mechanical energy, using either of the two approaches below:

(i) Where electricity production is on an off-grid/stand-alone mode or an isolated[6] mini-grid, the baseline emissions for the electricity use will be determined according to procedures specified in "AMS-I.A.: Electricity generation by the user" or "AMS-I.F.: Renewable electricity generation for captive use and mini-grid";

(ii) Where electricity production is on a grid connected mode, the baseline emissions for the electricity use will be determined according to procedures specified in "AMS-I.D.: Grid connected renewable electricity generation".

5.4. Project ~~activity~~ emissions

17. Project emissions consist of:

(a) CO_2 emissions from consumption of diesel;

(b) CO_2 emissions from consumption of electricity not generated from the project activity (if applicable);

(c) Project emissions from cultivation of biomass.

$$PE_y = FC_{diesel,y} \times 0.8439 \times 0.0032 + PE_{El,y} + PE_{BC,y} \quad \text{Equation (1)}$$

Where:

PE_y	=	Project emissions in year *y* (t CO_2)
$FC_{diesel,y}$	=	Quantity of diesel consumption in year *y* (l)
0.8439	=	Default value for diesel density[7] (kg/l)
0.0032	=	Default value for the CO_2 emission factor of diesel (t CO_2/kg diesel)
$PE_{El,y}$	=	Project emissions due to electricity consumption in year *y* (t CO_2). This parameter shall be calculated as per the latest version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
$PE_{BC,y}$	=	Project emissions from cultivation of biomass in year *y* (t CO_2)

18. In case biomass is sourced from dedicated plantations, the procedures in the tool "Project emissions from cultivation of biomass" shall be used to calculate $PE_{BC,y}$.

[6] ~~Not connected to the regional or national grids and not exporting and/or importing power from the national/regional grids.~~

[7] International Energy Agency and Organisation for Economic Co-operation and development, 2004 Energy statistic manual.

5.5. Leakage

~~16. If the energy generating equipment is transferred from another activity, leakage is to be considered.~~

19. General guidance on leakage in biomass project activities shall be followed to quantify leakages pertaining to the use of biomass residues.

5.5.1. Capacity addition with renewable energy units other than solar, wind, wave and tidal plants

20. F~~f~~or project activities that involve 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. 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.

21. 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).

5.6. Emission reductions

22. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (2)}$$

Where:

ER_y = Emission reductions in year *y* (t CO_2)

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

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

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

6. Monitoring methodology

23. Relevant parameters shall be monitored as indicated in the table below. The applicable requirements specified in the "General guidelines for SSC CDM methodologies" (e.g. calibration, sampling) are also an integral part of the monitoring guidelines specified below and therefore shall be referred to by the project participants.

6.1. Data and parameters monitored

Data / Parameter table 1.

Data / Parameter:	**-**
Data unit:	-
Description:	Continuous operation of the equipment/system
Source of data:	-
Measurement procedures (if any):	Recording annually the number of project systems operating (evidence of continuing operation, such as on-going rental/lease payments could be a substitute), if necessary using survey methods. Estimating the average annual hours of operation of an average system, if necessary using survey methods. Annual hours of operation can be estimated from total output (e.g. tonnes of grain dried) and output per hour if an accurate value of output per hour is available
Monitoring frequency:	Annual check of all appliances or a representative sample thereof to ensure that they are still operating or are replaced by an equivalent in service appliance
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	**-**
Data unit:	MWh
Description:	Quantity of electricity produced
Source of data:	-
Measurement procedures (if any):	Measurements are undertaken using energy meters
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures:	-
Any comment:	This parameter is applicable if the project generates mechanical and electrical energy

Data / Parameter table 3.

Data / Parameter:	**-**
Data unit:	Mass or volume
Description:	Net quantity of biomass consumed in year *y*
Source of data:	On-site measurements

Measurement procedures (if any):	Use mass or volume based measurements. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity of renewable biomass consumed shall be measured continuously or in batches. If more than one type of biomass fuel is consumed, each shall be monitored separately
Monitoring frequency:	Continuously and estimate using annual mass/energy balance
QA/QC procedures:	Cross-check the measurements with an annual energy balance that is based on purchased quantities (e.g. with sales receipts) and stock changes. In cases where emission reductions are calculated based on energy output, check the consistency of measurements ex post with annual data on energy generation, fossil fuels and biomass used and the efficiency of energy generation as determined ex ante
Any comment:	This parameter is applicable if renewable biomass are consumed in the project equipment

Data / Parameter table 4.

Data / Parameter:	**NCV**
Data unit:	GJ/mass or volume unit on dry-basis
Description:	Net calorific value of biomass residues
Source of data:	On-site measurements
Measurement procedures (if any):	Measurement in laboratories according to relevant national/international standards. Measure quarterly, taking at least three samples for each measurement. The average value can be used for the rest of the crediting period. Measure the NCV based on dry biomass
Monitoring frequency:	Determine once in the first year of the crediting period
QA/QC procedures:	Check the consistency of the measurements by comparing the measurement results with relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements
Any comment:	This parameter is applicable if biomass residues are consumed in the project equipment

Data / Parameter table 5.

Data / Parameter:	**-**
Data unit:	%
Description:	Moisture content of the biomass residues (wet basis)
Source of data:	On-site measurements

Measurement procedures (if any):	Ex ante estimates should be provided in the PDD and used during the crediting period, if the project continues to use same type of biomass during the rest of the crediting period. Alternatively, moisture content value provided by supplier of biomass should be used if it can be shown that it is reliable (e.g. the price paid for the biomass procured depends on its moisture content). In case of dry biomass, monitoring of this parameter is not necessary
Monitoring frequency:	The moisture content of biomass of homogeneous quality shall be determined ex ante. The weighted average should be calculated and used in the calculations
QA/QC procedures:	-
Any comment:	This parameter is applicable if biomass residues are consumed in the project equipment

Data / Parameter table 6.

Data / Parameter:	**$FC_{diesel,y}$**
Data unit:	Litre/yr
Description:	Quantity of diesel consumption in year *y*
Source of data:	Onsite measurements
Measurement procedures (if any):	Use volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift). Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance. In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions
Monitoring frequency:	Continuously
QA/QC procedures:	The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records
Any comment:	This parameter is applicable if diesel is consumed in the project equipment

7. Project activity under a programme of activities

~~21. The following conditions apply for use of this methodology in a project activity under a programme of activities:~~

~~(a) In the specific case of biomass project activities, the multiple types of biomass, (i.e. biomass residues and biomass from dedicated plantations) can be used for a~~

~~PoA, provided all the other requirements in the methodology such as: (a) leakage emissions in case of biomass residues following the general guidance for leakage in small-scale biomass project activities (attachment C of appendix B) and (b) consistency with "AM0042: Grid-connected electricity generation using biomass from newly developed dedicated plantations" in case of dedicated plantation are satisfied.~~

24. 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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Document information*

Version	*Date*	*Description*
12.0	7 November 2014	SSC WG 46, Annex 5 To be considered by the Board at EB 81. The draft revised methodology was available for public input from 9 to 24 September 2014. No inputs were received. Revision to: • Introduce the methodological tool "Project emissions from cultivation of biomass", streamlining biomass cultivation procedures across small and large scale methodologies; • Remove restrictions for application in a PoA; • Include procedure for determining baseline scenarios for Greenfield/capacity expansion project activities; • Include baseline scenario under suppressed demand scenario.
11.0	8 November 2013	EB 76, Annex 10 Revision to: • Include a section on project emissions and relevant monitoring parameters; Improve consistency with other type (i) projects.
10	27 July 2007	EB 33, Annex 18 Revision provides guidance for situations where electricity is a co-product of the project activity, providing mechanical energy for the user.
9	22 June 2007	EB 32, Annex 26 To clarify monitoring of biomass in project activities that apply this methodology which is consistent with monitoring of biomass in the approved methodology AMS I.D
8	26 February 2006	EB 23, Annex 30 Amendments to include provisions for retrofit and renewable energy capacity additions as eligible activities.

Decision Class: Regulatory
Document Type: Standard
Business Function: Methodology
Keywords: energy efficiency, renewable energy generation, simplified methodologies, type (i) projects

* 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*	*Description*
07	25 November 2005	EB 22, Para. 59 References to "non-renewable biomass" in Appendix B deleted.
06	20 September 2005	EB 21, Annex 22 Guidance on consideration of non-renewable biomass in Type *i* methodologies, thermal equivalence of Type II GWhe limits included.
05	25 February 2005	EB 18, Annex 6 Guidance on 'capacity addition' and 'cofiring' in Type *i* methodologies and monitoring of methane in AMS-III.D included.
04	22 October 2004	EB 16, Annex 2 AMS-II.F was adopted, leakage due to equipment transfer was included in all Type *i* and Type II methodologies.
03	30 June 2004	EB 14, Annex 2 New methodology AMS-III.E was adopted.
02	28 November 2003	EB 12, Annex 2 Definition of build margin included in AMS-I.D, minor revisions to AMS-I.A, AMS-III.D, AMS-II.E.
01	21 January 2003	EB 7, Annex 6 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).

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