

CDM-MP88-A07

Draft Small-scale Methodology

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

Version 13.0

Sectoral scope(s): 01

DRAFT



COVER NOTE

1. Procedural background

1. The Executive Board of the clean development mechanism (CDM) (hereinafter referred to as the Board), at its 111th meeting (EB 111), considered the concept note “Improving clarity and consistency of methodological products” and requested the secretariat and the Methodologies Panel (MP) to:
 - (a) Recommend a new methodological tool containing a repository of data/parameters that are common among different methodologies; and
 - (b) Update the default values in methodologies that are found to be not conservative in accordance with the latest science.
2. The Board at its 113th meeting (EB113) approved the “TOOL33: Default values for common parameters” (hereinafter referred as TOOL33). TOOL33 contains default values for of (a) carbon dioxide (CO₂) emission factors for diesel generator systems used for off-grid power generation purposes and (b) CO₂ emission factor for kerosene usage by households and communities for lighting purposes.
3. Previously, values for above-mentioned parameters were included in a specific methodology for example, values for CO₂ emission factors for diesel generator system were contained in “AMS-I.F.: Renewable electricity generation for captive use and mini-grid” and values for CO₂ emission factor for kerosene usage was included in “AMS-I.L.: Electrification of rural communities using renewable energy”.

2. Purpose

4. The proposed revision introduces reference to TOOL33 for using a default value of CO₂ emission factor for diesel generator systems and introduces minor editorial improvements.

3. Key issues and proposed solutions

5. The proposed revision refers to TOOL33 that contains recently updated default values for CO₂ emission factors for diesel generator systems used for off-grid power generation purposes.

4. Impacts

6. The proposed default values as contained in TOOL33 will enhance the reliability of emission reductions estimates as they are based on recent studies and literature and are conservative when compared to the current values.

5. Subsequent work and timelines

7. The MP, at its 88th meeting, agreed to seek public inputs on the draft revised methodology, and any input will be discussed with the MP and forwarded to the Board for its consideration.

CDM-MP88-A07

Draft Small-scale Methodology: AMS-I.B.: Mechanical energy for the user with or without electrical energy
Version 13.0

Sectoral scope(s): 01

6. Recommendations to the Board

8. The MP recommends that the Board adopt this draft methodology, to be made effective at the time of the Board's approval.

TABLE OF CONTENTS	Page
1. INTRODUCTION	5
2. SCOPE, APPLICABILITY, AND ENTRY INTO FORCE	5
2.1. Scope	5
2.2. Applicability	5
2.3. Entry into force	6
2.4. Applicability of sectoral scopes	6
3. NORMATIVE REFERENCES	6
4. DEFINITIONS	7
5. BASELINE METHODOLOGY	7
5.1. Project boundary	7
5.2. Baseline	8
5.2.1. Baseline scenario	8
5.2.2. Baseline under suppressed demand scenario	8
5.3. Baseline emissions	9
5.4. Project emissions	9
5.5. Leakage	10
5.5.1. Capacity addition with renewable energy units other than solar, wind, wave and tidal plants	10
5.6. Emission reductions	10
6. MONITORING METHODOLOGY	11
6.1. Data and parameters monitored	11

1. Introduction

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

Table 1. Methodology key elements

Typical project(s)	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 energy: Displacement of more GHG intensive fossil-fuel-based generation of mechanical power

2. Scope, applicability, and entry into force

2.1. Scope

2. The methodology comprises renewable energy generation units that supply individual or groups of households or users with mechanical energy.
3. The renewable energy generation units include technologies such as hydropower, wind power, renewable-biomass 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:
- (a) To replacement or retrofitting of existing facilities;
 - (b) To greenfield facilities or project activities involving capacity additions;
 - (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,¹ 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 “TOOL16: Project and leakage emissions from biomass” shall apply.

2.3. Entry into force

6. The date of entry into force is the date of the publication of the EB ### meeting report on xx Month 2022.

2.4. Applicability of sectoral scopes

7. For validation and verification of CDM projects and programme of activities by a designated operational entity (DOE) using this methodology, application of sectoral scope 01 is mandatory.

3. Normative references

8. Project participants shall apply the “General guidelines for SSC CDM methodologies”, TOOL21: Demonstration of additionality of small-scale project activities (attachment A to appendix B) and TOOL22: Project and leakage emissions from biomass (attachment C to appendix B) provided at: <<https://cdm.unfccc.int/Reference/Guidclarif/index.html>> mutatis mutandis.
9. This methodology refers to the latest version of the following methodological tools and guidelines² mutatis mutandis:
- (a) “AMS-I.A.: Electricity generation by the user” (hereinafter referred to as AMS-I.A.);
 - (b) “AMS-I.D.: Grid connected renewable electricity generation” (hereinafter referred to as AMS-I.D.);

¹ —

² Please refer to: <<https://cdm.unfccc.int/Reference/index.html>>.

- (c) “AMS-I.F.: Renewable electricity generation for captive use and mini-grid” (hereinafter referred to as AMS-I.F.);
- (d) “TOOL16: Project and leakage emissions from biomass” (hereinafter referred to as TOOL16);
- (e) “TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (hereinafter referred to as TOOL05);
- (f) “TOOL19: Demonstrating additionality of microscale project activities” (hereinafter referred to as TOOL19);
- (g) “TOOL33: Default values for common parameters” (hereinafter referred to as TOOL33);
- (h) “General guidelines for SSC CDM methodologies”.

4. Definitions

- 10. The definitions contained in the Glossary of CDM terms shall apply.
- 11. 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;³
 - (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

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

³ See Glossary of CDM Terms, available at: <<https://cdm.unfccc.int/Reference/index.html>>.

5.2. Baseline

5.2.1. Baseline scenario

13. 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.
14. 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

15. 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

16. 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)⁴ 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.

⁴ For definition of SUZ refer to guideline on “TOOL19 Demonstrating additionality of microscale project activities” available at <<https://cdm.unfccc.int/Reference/Guidclarif/index.html>>.

5.3. Baseline emissions

17. 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.;
 - (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 CO₂ per kg of diesel fuel;
- (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 from** an off-grid/stand-alone **mode power plant** or **from** an isolated mini-grid, the baseline emissions for the electricity use will be determined according to procedures specified in AMS-I.A. or AMS-I.F. **In cases where off-grid/stand-alone or isolated mini-grid system has generators that used exclusively fuel oil and/or diesel fuel, the baseline carbon dioxide emission factor of diesel generator system of the relevant capacity operating at optimal load as provided by Table 1 of TOOL33 shall be used;**
 - (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.

5.4. Project emissions

18. Project emissions consist of:

- (a) CO₂ emissions from consumption of diesel;
- (b) CO₂ emissions from consumption of electricity not generated from the project activity (if applicable);
- (c) **CO₂ emissions due to biomass consumption. TOOL16.**

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

Where:

- PE_y = Project emissions in year y (t CO₂)
- $FC_{diesel,y}$ = Quantity of diesel consumption in year y (l)

0.8439	=	Default value for diesel density ⁵ (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 TOOL05
$PE_{BC,y}$	=	Project emissions due to biomass consumption in year y (t CO₂). This parameter shall be calculated as per TOOL16 in year y (t CO ₂)

19. In case biomass is sourced from dedicated plantations, the procedures in the ~~tool~~ **TOOL16** shall be used to calculate $PE_{BC,y}$.

5.5. Leakage

20. 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

21. For 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.
22. 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

23. 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)

⁵ International Energy Agency and Organisation for Economic Co-operation and development, 2004 Energy statistic manual.

6. Monitoring methodology

24. 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

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

Document information*

<i>Version</i>	<i>Date</i>	<i>Description</i>
13.0	13 July 2022	<p>MP 88, Annex 7</p> <p>To be considered by the Board at EB 115. A call for public input will be issued for this draft document. Any input will be discussed with the MP and forwarded to the Board for consideration.</p> <p>Revision to:</p> <ul style="list-style-type: none"> • Introduce reference to “TOOL33: Default values for common parameters”; and • Make minor editorial improvements.
12.0	28 November 2014	<p>EB 81, Annex 23</p> <p>Revision to:</p> <ul style="list-style-type: none"> • 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	<p>EB 76, Annex 10</p> <p>Revision to:</p> <ul style="list-style-type: none"> • Include a section on project emissions and relevant monitoring parameters; <p>Improve consistency with other type (i) projects.</p>
10	27 July 2007	<p>EB 33, Annex 18</p> <p>Revision provides guidance for situations where electricity is a co-product of the project activity, providing mechanical energy for the user.</p>
9	22 June 2007	<p>EB 32, Annex 26</p> <p>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.</p>
8	26 February 2006	<p>EB 23, Annex 30</p> <p>Amendments to include provisions for retrofit and renewable energy capacity additions as eligible activities.</p>

* 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.

<i>Version</i>	<i>Date</i>	<i>Description</i>
Decision Class: Regulatory		
Document Type: Standard		
Business Function: Methodology		
Keywords: energy efficiency, renewable energy generation, simplified methodologies, type (i) projects		

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).

<i>Version</i>	<i>Date</i>	<i>Description</i>
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).

CDM-MP88-A07

Draft Small-scale Methodology: AMS-I.B.: Mechanical energy for the user with or without electrical energy

Version 13.0

Sectoral scope(s): 01

<i>Version</i>	<i>Date</i>	<i>Description</i>
Decision Class: Regulatory		
Document Type: Standard		
Business Function: Methodology		

DRAE
DRAFT