

CDM-SSCWG45-A03

Draft Small-scale Methodology

AMS-I.H: Biodiesel production and use for energy generation in stationary applications

Version 02.0

Sectoral scope(s): 01

DRAFT



United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. Following the approval of the methodological tool “Project emissions from cultivation of biomass” at the seventy-fifth meeting of the Executive Board of the clean development mechanism (CDM) (hereinafter referred to as 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).

2. Purpose

2. The draft revision:
 - (a) Introduces the methodological tool “Project emissions from cultivation of biomass”, taking advantage of its procedures and applicability criteria, and removing obsolete procedure;
 - (b) Streamlines biomass cultivation procedures;
 - (c) Streamlines transport related project emissions procedures;
 - (d) Introduces project and leakage emissions equations instead of cross-reference to another methodology;
 - (e) Removes restrictions for application in a PoA.

3. Key issues and proposed solutions

3. None.

4. Impacts

- (a) Increased environmental integrity;
- (b) Simplified and streamlined procedures.

5. Subsequent work and timelines

4. None.

6. Recommendations to the Board

5. The SSC WG recommends that the Board adopt this draft revised methodology, to be made effective at the time of the Board’s approval.

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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)	Biodiesel is produced from oilseeds cultivated on dedicated plantations and from waste oil/fat and used to generate thermal; mechanical or electrical energy in equipment including cogeneration
Type of GHG emissions mitigation action	Renewable energy. Displacement of more-GHG-intensive fossil fuel for combustion in stationary installations

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology comprises activities involving the cultivation of oilseeds and the sourcing of waste oil/fat¹ for production of biodiesel² to generate thermal/mechanical/electrical energy including cogeneration to displace fossil fuel and/or fossil fuel based technologies.

2.2. Applicability

3. The methodology is applicable under the following conditions:

- (a) Pure biodiesel and blends above 10 per cent with fossil fuel shall be used in equipment³ that is specially built or modified;
- (b) Biodiesel must comply with national quality regulations;
- (c) The retailers, final users and the producer of the biodiesel or its blend are bound by a contractual agreement allowing emission reductions to be claimed only by the project proponent;
- (d) The alcohol used for esterification is methanol from fossil fuel origin. **Volumes of The biodiesel produced with using alcohols** other than methanol (for example,

¹ ~~Waste oil/fat is defined as a residue or waste stream of biogenic origin from restaurants, agro and food industry, slaughterhouses or related commercial sectors.~~

² ~~Biodiesel is a diesel fuel consisting of long-chain alkyl (methyl, propyl or ethyl) esters which is produced by esterification of vegetable oils and/or waste oil/fat with alcohols from biogenic and/or fossil origin.~~

³ For internal combustion engines conversion measures include adaptations of fuel supply, combustion and injection mechanisms.

ethanol) ~~are shall~~ not be included in the quantity of biodiesel for which emission reductions are claimed;⁴

~~(e) In accordance with the approved “General guidance on leakage in biomass project activities” for small scale projects, the project participants should demonstrate that the area where the biomass is grown is not a forest (as per DNA forest definition) and has not been deforested, according to the forest definition by the national DNA, during the last 10 years prior to the implementation of the project activity. In the absence of forest definition from the DNA, definitions provided by relevant international organizations (e.g. FAO) shall be used;~~

(e) Co-firing with solid fuels is not allowed;

(f) The export of biodiesel produced under this category is not allowed.

4. The biodiesel produced by the project activity may be used as a blend with pure petrodiesel or with petrodiesel that has already been blended with biofuel.⁵ In the latter case baseline emissions only from the petrodiesel fraction shall be calculated, the biofuel content of the primary blend shall be considered as carbon neutral, however, in the calculation of the project emissions, the fuel used for blending (primary blend) shall be considered as pure petrodiesel i.e. 100 per cent petrodiesel fraction. This conservative approach is used because it may not be feasible to determine the upstream emissions associated with the production of the biodiesel used for the primary blending.

5. If the project activity utilizes oil seeds sourced from dedicated plantations, the applicability conditions prescribed in the methodological tool “Project emissions from cultivation of biomass” shall apply.

~~6. The following conditions have to be met only if the feedstock for production of the biodiesel is vegetable oil produced from oil seeds cultivated in dedicated plantations:~~

~~(a) The project activity does not lead to a shift of pre-project activities outside the project boundary i.e. the land under the proposed project activity can continue to provide at least the same amount of goods and services as in the absence of the project;~~

~~(b) The plantations are established:~~

~~(i) On land which was at the start of the project implementation, classified as degraded or degrading as per the “Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities”; or~~

⁴ Only methanol from fossil fuel origin is included because the methodology does not provide procedures for estimating emissions associated with the use of other alcohols than methanol from fossil fuel origin. Project proponents are invited to propose procedures to estimate the emissions associated with the production of other alcohols that could be used for esterification, such as ethanol or methanol from renewable sources, as a revision to this methodology.

⁵ It is expected that biodiesel is blended with pure petrodiesel, however, where the project proponent has no access to pure petrodiesel (e.g. due to local regulations requiring sale of blended petrodiesel in the region/country) blended fuel may be used.

~~(ii) On a land area that is included in the project boundary of one or several registered A/R CDM project activities.~~

~~(c) Plantations established on the peatlands are not eligible even if qualifying under condition (b) above.~~

6. Project eligibility limits (capacity limits) are in accordance with the guidelines in:

- (a) AMS-I.C for thermal energy and cogeneration applications;
- (b) AMS-I.B for mechanical energy applications;
- (c) AMS-I.D, AMS-I.F or AMS-I.A as the case may be for electricity applications.

2.3. Entry into force

7. The date of entry into force is the date of the publication of the EB 81 meeting report.

3. Normative references

8. Project participants shall apply the “General guidelines ~~to~~ for SSC CDM methodologies”, and “Guidelines on the demonstration of additionality of small-scale project activities” 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> <<https://cdm.unfccc.int/Reference/Guidclarif/index.html>> mutatis mutandis.

9. This methodology also refers to the latest approved versions of the following approved methodologies and tools:

- (a) “AMS-I.A: Electricity generation by the user”;
- (b) “AMS-I.B: Mechanical energy for the user with or without electrical energy”;
- (c) “AMS-I.C: “Thermal energy production with or without electricity”;
- (d) “AMS-I.D: Grid connected renewable electricity generation”;
- (e) “AMS-I.F: Renewable electricity generation for captive use and mini-grid”;
- (f) “AMS-III.G: Landfill methane recovery”;
- (g) “AMS-III.F: Avoidance of methane emissions through composting”;
- (h) “AMS-III.H: Methane recovery in wastewater treatment”;
- ~~(i) “AMS-III.AK: Biodiesel production and use for transport applications”;~~
- (j) “Project emissions from cultivation of biomass ~~Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities~~”;
- (k) “Project and leakage emissions from transportation of freight”;
- (l) “Upstream leakage emissions associated with fossil fuel use”;

(m) "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion";

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

4. Definitions

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

11. Furthermore, for this methodology, the following definitions apply:

(a) **Waste oil/fat** is a residue or waste stream of biogenic origin from restaurants, agro and food industry, slaughterhouses or related commercial sectors;

(b) **Biodiesel** is a diesel fuel consisting of long-chain alkyl (methyl, propyl or ethyl) esters which is produced by esterification of vegetable oils and/or waste oil/fat with alcohols from biogenic and/or fossil origin.

5. Baseline methodology

5.1. Project boundary

12. The project boundary is the geographical area of the cultivation, production and processing of oil-seeds, disposal of waste products, and the areas where biodiesel is processed/blended. The boundary also extends to the users where biodiesel is consumed in the project equipment to produce thermal/electrical/mechanical energy and the end users of the produced energy.

5.2. Baseline emissions

13. The energy baseline and the corresponding baseline emissions for biodiesel based renewable energy sources and/or technologies shall be chosen as follows:

(a) As per the procedures of AMS-I.A if the project activity is for standalone off-the-grid power systems supplying electricity to households/users included in the boundary;

(b) As per the procedures of AMS-I.F if the project activity displaces electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit;

(c) As per the procedures of AMS-I.D if the project activity supplies electricity to a regional or national grid;

(d) As per the procedures of AMS-I.C if the project activity produces thermal energy and/or cogenerates heat and electricity;

(e) As per the procedures of AMS-I.B if project activity is generating mechanical energy.

14. For project activities that involve retrofit of an existing facility and/or capacity addition at an existing facility, the baseline emissions shall be calculated following the applicable principles described in AMS-I.D.

5.3. Project emissions

15. Project emissions ~~include~~ consists of:

- (a) CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”, including the consumption of fossil fuels for processing (e.g. pressing and filtering, transesterification, degumming, neutralization) of plant oil and excluding the consumption of fossil fuels related to the cultivation of oil seeds, if any;
- (b) CO₂ emissions from electricity consumption by the project activity using the latest version of the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”, including the consumption of fossil fuels for processing (e.g. pressing and filtering, transesterification, degumming, neutralization) of plant oil and excluding the consumption of electricity related to the cultivation of oil seeds, if any;
- (c) Project methane emission from solid waste disposal, wastewater are calculated as per provisions in AMS-III.G (landfill); AMS-III.F (composting), and AMS-III.H. (waste water treatment) in the cases where the waste are disposed in anaerobic conditions;
- (d) The project emissions from cultivation of oil seeds are calculated using the latest version of the tool “Project emissions from cultivation of biomass”;
- (e) Project emissions from fossil fuel carbon in the biodiesel due to the use of methanol from fossil origin in the esterification process are estimated as follows:

$$PE_{MeOH,y} = MC_{MeOH,y} \times EF_{C,MeOH} \times \frac{44}{12} \quad \text{Equation (1)}$$

Where:

$PE_{MeOH,y}$	=	Project emissions from fossil carbon in the biodiesel due to esterification with methanol of fossil origin in year y (t CO ₂ e)
$MC_{MeOH,y}$	=	Quantity of methanol consumed in the biodiesel plant, including spills and evaporations in year y (tonnes)
$EF_{C,MeOH}$	=	Carbon emission factor of methanol, based on molecular weight (tC/tMeOH) (= 12/32)
$\frac{44}{12}$	=	Molecular weight ratio to convert tonnes of carbon into tonnes of CO ₂ (t CO ₂ /tC)

~~(f) The project emissions related to the cultivation of oil seeds and processing/production of biodiesel are calculated as per the procedures defined in the latest version of AMS-III.AK;~~

- (f) Project emissions from transportation of oil seeds to the oil production plant ~~have to be accounted following the procedures in AMS-III.AK~~ are estimated using the latest version of the tool “Project and leakage emissions from transportation of

freight”; if the transportation distance is more than 200 km, otherwise they can be neglected.

5.4. Leakage

16. Leakage emissions are calculated as follows:

$$LE_y = LE_{BR} + LE_{MeOH,y} - LE_{upstream,y} \quad \text{Equation (2)}$$

Where:

LE_y = Leakage in year y (t CO₂)

LE_{BR} = Leakage due to biomass residues in year y (t CO₂)

$LE_{MeOH,y}$ = Leakage emissions associated with production of methanol used in biodiesel production in year y (t CO₂)

$LE_{upstream,y}$ = Negative leakage due to reducing indirect emissions associated with the production of petrodiesel (t CO₂)

16. ~~Leakage emissions due to a shift of pre-project activities shall be accounted for as per the approved “General guidance on leakage in biomass project activities” for small-scale project activities.~~

17. ~~In case biodiesel is produced in the baseline situation in the area of land where biodiesel is cultivated in the project situation from waste oil/fat, the guidance on competing uses for biomass in the “General guidance on leakage in biomass project activities” for small-scale projects shall be taken into account. LE_{BR} Leakage emissions shall be estimated accordingly and deducted from the emission reductions.~~

18. Leakage effects due to the upstream emissions for the methanol production may be disregarded, if the leakage due to the avoided production of petrodiesel (including production of crude oil and refining of crude oil) is also disregarded. Otherwise, the leakage emissions due to the production of methanol used in the esterification process shall be calculated as follows:

$$LE_{MeOH,y} = MC_{MeOH,y} \times EF_{MeOH,PC} \quad \text{Equation (3)}$$

Where:

$LE_{MeOH,y}$ = Leakage emissions associated with production of methanol used in biodiesel production in year y (t CO₂)

$MC_{MeOH,y}$ = Quantity of methanol consumed in the biodiesel plant, including spills and evaporation on-site in year y (t MeOH)

$EF_{MeOH,PC}$ = Pre-combustion (i.e. upstream) emissions factor for methanol production (t CO₂/t MeOH)

19. The substitution of biodiesel for petrodiesel reduces indirect (“upstream”) emissions associated with the production of petrodiesel ($LE_{upstream}$) and is treated as negative

leakage⁶ and can be calculated as per the methodological tool “Upstream leakage emissions associated with fossil fuel use”.

5.5. Emission reductions

20. Emission reductions are calculated as follows:

$$ER_y = BE_y - \text{MAX}(PE_y + LE_y, 0) \quad ER_y = BE_y - PE_y - LE_y \quad \text{Equation (4)}$$

Where:

ER_y = Emission reductions in year y (t CO₂e)

BE_y = Baseline emissions in year y (t CO₂e)

PE_y = Project emissions in year y (t CO₂)

LE_y = Leakage emissions in year y (t CO₂)

21. The emissions from the production of plant oil is are compared to the emissions of from the production of the petrodiesel, which is avoided by displacing petrodiesel consumption with plant oil and is considered as negative leakage. The project emissions from the production of plant oil may be compensated by this negative leakage. However, project proponents shall not claim emission reductions from this comparison.

6. Monitoring

22. Monitoring parameters shall be as prescribed by the applicable Type I methodology chosen in section 5.2 per paragraph 7 and 8 and the applicable tools. Project emissions are monitored as per paragraph 9 section 5.3. The applicable requirements specified in the “General guidelines to for SSC CDM methodologies” (e.g. calibration requirements, sampling requirements) are also an integral part of the monitoring guidelines.

~~22. The occurrence of shift of pre-project activities and the competing uses of biomass shall be monitored and verified.~~

~~23. The contracts between the producer of biodiesel and the final users and retailers specifying that only the project proponent can claim CERs.~~

23. If paragraph 3(a) is applicable, then the equipment modification or the installation of the new equipment shall be monitored.

7. Project activity under a programme of activities

~~24. As currently constructed this methodology does not apply to a programme of activities. In order for this methodology to be used under a programme of activities further analyses are required, for instance further analysis concerning issues related to the shift of the~~

⁶ Emission reduction from reducing international bunker fuel consumption is not eligible under CDM as per the EB 25 report, paragraph 58.

pre-project activities in the lands where the oil crops are grown and the competing use of biomass is required. Project Proponents are encouraged to submit procedures to address these issues as revisions to make this methodology applicable to a programme of activities for approval by the Board.

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

<i>Version</i>	<i>Date</i>	<i>Description</i>
02.0	5 September 2014	SSCWG 45, Annex 3 To be considered at EB81. This document was issued for call for public input from 16 to 31 May 2014. This revision removes the applicability conditions related to land eligibility and project emission calculations related to the cultivation of biomass, removes the restriction for application of methodology in PoAs in methodologies and includes reference to the approved tools.
01.0	30 July 2010	EB 55, Annex 29 Initial adoption.

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