CLEAN DEVELOPMENT MECHANISM

ACM0017

Large-scale Consolidated Methodology

Production of biofuel

Version 03.1

Sectoral scope(s): 01, 05, 07 and 15

United Nations
Framework Convention on
Climate Change

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)	Construction and operation of a biofuel production plant for production of (blended) biofuel that is used as fuel in existing stationary installations (e.g. diesel generators) and/or in vehicles.
Type of GHG emissions mitigation action	Renewable energy: Displacement of more-GHG-intensive fossil fuel for combustion in vehicles and/or stationary installations

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology comprises project activities involving production of biofuel that is used as fuel in existing stationary installations (e.g. diesel generators) and/or in vehicles.

2.2. Applicability

3. The methodology is applicable to project activities that reduce emissions through the production, of blended biofuels to be used in existing stationary installations and/or in vehicles.

4. The biofuel is produced from one or a combination of the following feedstock:

   (a) Waste oil/fat;

   (b) Seeds or crops that are cultivated in dedicated plantations;

   (c) Biomass residues (e.g. agricultural residues, wood residues, organic wastes).

5. In order to avoid double counting of emission reductions, the methodology ensures that the CERs can only be issued to the producer of the biofuel. The project proponent shall demonstrate that double counting of emission reductions will not occur e.g. via a contractual agreement with the end-user(s), feedstock producer or other stakeholder involved in the supply chain.

6. The following conditions apply to the methodology:

   (a) Feedstock inputs:

      (i) For all biofuels: if the biofuel in the project plant is only **partly** produced from the sources specified in paragraph 4 above, any volumes of biofuel that are also produced in the project plant but from other feedstock sources, are not included in the quantity of biofuel for which emission reductions are claimed;

      (ii) For biodiesel: the alcohol used for esterification is methanol from **fossil origin**. Volumes of biodiesel produced with alcohols other than methanol (for

example, ethanol) are not included in the quantity of biodiesel for which emission reductions are claimed.[1]

(b) Dedicated plantations:

(i) If the biofuel is produced from seeds or crops that are cultivated in dedicated plantations, the project activity shall comply with the provisions of the Methodological tool: "Project and leakage emissions from biomass";

(c) Biofuel plant and products:

(i) The fossilfuels, the biofuels and the blended biofuels comply with national regulations (if existent) or with suitable international standards;

(ii) The project activity involves construction and operation of a biofuel production plant;

(iii) Any by-product (e.g. glycerol) is not disposed of or left to decay. It should be either incinerated or used as raw material for industrial consumption or sold;

(iv) If biomass or biofuel is used at the project plant(s) (processing, production or blending plant) as fuel (e.g. for heat or electricity generation), then at least 95% of the biomass or biofuels used in these plants should be either biomass residues from the dedicated plantations established under the project activity or biofuel generated in the project plant. The amount of biofuel used should not be included in the quantity of biofuel for which emission reductions are claimed;

(d) Consumption of biofuel:

(i) The (blended) biofuel is used by consumers within the host country in existing stationary installations (e.g. captive generators) and/or in vehicles;

(ii) In case of vehicles, the target consumer group (e.g. captive fleet of vehicles, gas stations, bulk consumers) and distribution system of the biofuel shall be identified and described in the CDM-PDD;

(iii) If the (blended) biofuels are consumed in stationary facilities, the consumer and the producer of the (blended) biofuel are bound by a contract that allows the producer to monitor the consumption of (blended) biofuel and that states that the consumer shall not claim CERs resulting from its consumption;

(iv) If the (blended) biofuels are sold to an identified consumer group within the host party, the buyer and the producer of the (blended) biofuel are bound by a contract that allows the producer to monitor the sale of (blended) biofuel and that states that the consumer shall not claim CERs resulting from its consumption;

[1] Only methanol from fossil origin is included because the methodology does not provide procedures for estimating emissions associated with the use of other alcohols than methanol from fossil 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.

(v) If the biofuel is blended but neither used in stationary facilities nor sold to an identified consumer group, the blender and the producer of the biofuel are bound by a contract that allows the producer to monitor the blending of biofuel to ensure that blending proportions and amounts are monitored and meet all regulatory requirements, and that states that no CERs resulting from its consumption will be claimed;

(vi) In any case where the host party exports beyond the national boundary (blended) biofuels of the same type(s) as the biofuel(s) produced in the project plant, the consumption of the produced (blended) biofuel shall be monitored in order to ensure that no double counting occurs. The consumer and the producer of the (blended) biofuel shall be bound by a contract that allows the producer to monitor the consumption of (blended) biofuel and that states that the consumer shall not claim CERs resulting from its consumption;

(vii) In case of stationary installations, biofuels with any blending fraction between 0 and 100% can be used. In case of vehicles, the blending proportion must be appropriate to ensure that the technical performance characteristics of the blended biofuels do not differ significantly from those of fossil fuels;

(viii) For biodiesel, the condition in 6.d.vii above is assumed to be met if the blending proportion is up to 20% by volume (B20).[2] If the project participants use a blending proportion of more than 20%, they shall demonstrate in the CDM-PDD that the technical performance characteristics of the blended biodiesel do not differ significantly from those of petrodiesel and comply with all local regulations;

(ix) Only biofuel consumed in excess of mandatory regulations is eligible for the purpose of the project activity.[3]

7. In addition, the applicability conditions included in the tools referred to above apply.

2.3. Entry into force

8. The date of entry into force is the date of the publication of the EB 94 meeting report on 4 May 2017.

2.4. Applicability of sectoral scopes

9. For validation and verification of CDM projects and programme of activities by a designated operational entity (DOE) using this methodology application of the following sectoral scopes are mandatory:

(a) If biofuel is produced from waste oil/fat or biomass residues as a feedstock for:

(i) Stationary applications, then sectoral scope 5 and 1 apply;

(ii) Transportation, then sectoral scopes 5 and 7 apply.

[2] 2009 Biodiesel Handling and Use Guidelines, U.S. Department of Energy.

[3] Regulations that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) need not be taken into account.

(b) If biofuel is produced from anything other than waste oil/fat or biomass residues as a feedstock for:

(i) Stationary applications, then sectoral scopes 5, 1 and 15 apply;

(ii) Transportation, then sectoral scopes 5, 7 and 15 apply.

3. Normative references

10. This consolidated baseline and monitoring methodology is based on the following approved baseline and monitoring methodologies and proposed new methodologies:

(a) AM0047 "Production of biodiesel based on waste oils and/or waste fats from biogenic origin for use as fuel";

(b) NM0180 "BIOLUX Benji Biodiesel Beijing Project", proposed by BIOLUX Benji Energy and Recycling Co. Ltd, whose baseline and monitoring methodology and project design document were prepared by Clemens Plöchl Carbon Consulting;

(c) NM0228 "AGRENCO Biodiesel Project in Alta Araguaia", proposed by Agrenco do Brasil S/A, whose baseline and monitoring methodology and project design document were prepared by Factor Consulting + Management AG and Geoklock Consultoria e Engenharia Ambiental Ltd;

(d) NM0233 "Palm Methyl Ester – Biodiesel Fuel (PME-BDF) production and use for transportation in Thailand" whose baseline and monitoring methodology and project design document were prepared by Japan Transport Cooperation Association, Japan Weather Association and ALMEC Corporation.

11. The methodology also refers to the latest version of the following tools:[4]

(a) "Tool for the demonstration and assessment of additionality";

(b) "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion";

(c) "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation";

(d) "Project and leakage emissions from biomass";

(e) "Project and leakage emissions from transportation of freight";

(f) "Project emissions from flaring";

(g) "Upstream leakage emissions associated with fossil fuel use"

(h) "Apportioning emissions from production processes between main product and co and by-product";

12. For more information regarding the proposed new methodologies and the tools as well as their consideration by the Executive Board please refer to <http://cdm.unfccc.int/goto/MPappmeth>.

[4] Please refer to: <http://cdm.unfccc.int/goto/MPappmeth>.

3.1. Selected approach from paragraph 48 of the CDM modalities and procedures

13. "Existing actual or historical emissions, as applicable".

4. Definitions

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

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

(a) **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;

(b) **Bioethanol** - is an alcohol produced through the fermentation of sugars or starches, followed by a distillation process and, if required, a dehydration processes;

(c) **Biofuel production plant** - is the plant where feedstock (e.g. oil, waste oil/fat sugar, starch) is processed to biofuel;

(d) **Biogenic** - means that the oils and/or fats originate from either vegetable or animal biomass, but not from mineral (fossil) sources;

(e) **Biomass** - non-fossilized and biodegradable organic material originating from plants, animals and micro-organisms including:

(i) Biomass residue;

(ii) The non-fossilized and biodegradable organic fractions of industrial and municipal wastes; and

(iii) The gases and liquids recovered from the decomposition of non-fossilized and biodegradable organic material;

(f) **Biomass residues** -non-fossilized and biodegradable organic material originating from plants, animals and micro-organisms which is a by-product, residue or waste stream from agriculture, forestry and related industries;

(g) **Blended biofuel** - blend of fossil fuel and biofuels;

(h) **Dedicated plantations -** are plantations that are newly established as part of the project activity for the purpose of supplying feedstock to the project plant. In case the dedicated plantation is an A/R CDM project, then the procedures of the approved A/R methodology apply;

(i) **Esterification** - denotes the formation of an ester compound from carbonic acid and alcohol. Transesterification denotes the exchange of one alcohol in an ester against another (for example glycerol against methanol). In this methodology, "esterification" is used to denote both esterification and transesterification for simplicity;

(j) **Mill** - is a plant where seeds or crops are processed into starch/sugar;

(k) **Oil production plant** - is a plant where oil seeds from plants are processed to vegetable oil;

(l) **Oil seeds** - are seeds of plants from which oil can be derived;

(m) **Petrodiesel** - is 100% fossil fuel diesel**;**

(n) **Vegetable oil** - is oil of biogenic origin that is produced from oil seeds from plants;

(o) **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.

5. Baseline methodology

5.1. Project boundary

16. The spatial extent of the project boundary encompasses:

(a) Where applicable, transportation of:

(i) Raw materials (e.g. seeds and/or biomass residues) to the projectplant(s);

(ii) Feedstock (e.g. vegetable oil and/or waste oil/fats) to the biofuel production plant; and

(iii) The biofuels to the site where it is blended with fossil fuels;

(b) The biofuel production plant at the project site, comprising the processing unit(s) (e.g. esterification, fermentation, hydrolysis) plus other installations on the site (e.g. storage, refining, blending, etc.);

(c) The feedstock processing plant(s) (e.g. oil production plant, mill) on-site or off-site;

(d) If blended biofuel is produced: the facility where the biofuel is blended with fossil fuel (regardless of the ownership of the blending facility);

(e) Where applicable, vehicles or gas stations and existing stationary combustion installations where the (blended) biofuel is consumed;

(f) If the feedstock is sourced from plants produced in dedicated plantations: the geographic boundaries of the dedicated plantations.

Note: Production of fossil fuels leads to emissions, which would occur in the absence of project activity. These emissions are considered in the leakage section, as the production of the fossil fuels is not included in the project boundary. Similarly, emissions associated with the production of methanol used for esterification, or chemicals used for pre-treatment and/or hydrolysis of lignocellulosic biomass are excluded from the project boundary, but are accounted for as leakage.

Table 2. Emission sources included in or excluded from the project boundary

Source		Gas	Included	Justification/Explanation
Baseline	Vehicles and stationary combustion installations consuming fossil fuels	CO_2	Yes	Main source of baseline emissions
		CH_4	No	Excluded for simplification. CH4 and N2O emissions are assumed to be very small. No systematic difference to project activity
		N_2O	No	
Project activity	On-site energy consumption at biofuel production plant and the feedstock production plant(s)	CO_2	Yes	May be a significant emissions source
		CH_4	No	Excluded for simplification. CH_4 emissions are assumed to be very small
		N_2O	No	Excluded for simplification. N_2O emissions are assumed to be very small
	Combustion of fossil fuel derived methanol in the biodiesel ester	CO_2	Yes	May be a significant emissions source
		CH_4	No	Excluded for simplification. CH_4 emissions are assumed to be very small
		N_2O	No	Excluded for simplification. N_2O emissions are assumed to be very small
	Transportation of feedstock	CO_2	Yes	May be a significant emissions source
		CH_4	No	Excluded for simplification. CH_4 emissions are assumed to be very small
		N_2O	No	Excluded for simplification. N_2O emissions are assumed to be very small
	Transportation of biofuel to blending facility	CO_2	Yes	May be a significant emissions source
		CH_4	No	Excluded for simplification. CH_4 emissions are assumed to be very small
		N_2O	No	Excluded for simplification. N_2O emissions are assumed to be very small
	Anaerobic wastewater treatment in feedstock production.	CO_2	No	Excluded for simplification. CO_2 emissions are assumed to be very small
		CH_4	Yes	May be a significant emissions source
		N_2O	No	Excluded for simplification. N_2O emissions are assumed to be very small
		CO_2	Yes	May be a significant emissions source

Source		Gas	Included	Justification/Explanation
	Cultivation of biomass in a dedicated plantation[5]	CH_4	Yes	May be a significant emissions source
		N_2O	Yes	May be a significant emissions source

5.2. Procedure for the selection of the baseline scenario

17. The baseline scenario shall be separately identified among all realistic and credible alternative(s) for the following elements:

    (a) **Production of fuels (P)**: what would have happened at the production level in the absence of the CDM project activity?

    (b) **Consumption (C):** which fuel would have been consumed in the absence of the CDM project activity?

    (c) **Material (M)**: what would have happened to the material used as input for production of biofuel in the absence of the CDM project activity?

18. If the biofuel is produced from seeds or crops from plants cultivated in dedicated plantations, the following element should be taken into account:

    (a) **Land used for plantations (L):** what would be the land use in the absence of the CDM project activity?

19. For the **fuel production (P)**, project participants shall identify the most likely baseline scenario among all realistic and credible alternative(s), applying steps of the latest approved version of the "Tool for the demonstration and assessment of additionality". Step 3 should be used to assess which of these alternatives is to be excluded from further consideration (i.e. alternatives where barriers are prohibitive or which are clearly economically unattractive) and Step 2 should be applied for all remaining alternatives. In case project proponent is a company already producing fuels other than biofuels then only Step 2 should be applied for all options identified (barrier analysis is not allowed). Include a sensitivity analysis applying Sub-step 2d of the latest version of the "Tool for the demonstration and assessment of additionality". If the sensitivity analysis is conclusive (for a realistic range of assumptions), then the most cost effective scenario is the baseline scenario. In case the sensitivity analysis is not fully conclusive, select the baseline scenario alternative with least emissions among the alternatives that are the most economically attractive according to the investment analysis and the sensitivity analysis.

20. At the production level the realistic and credible alternative(s) may include, inter alia:

    (a) P1: Continuation of current practices with no investment in biofuel production capacity;

    (b) P2: The project activity implemented without the CDM; and

[5] This emission source does not need to be included in the project boundary, if the complete land area of the dedicated plantation is included in the project boundary of one or several registered CDM A/R project activities.

(c) P3: Investment in any other alternative fuel replacing partially or totally the baseline fuel.

21. For the **consumption of fuel (C)**, the baseline should be determined as follows:

5.2.1. Step 1: Identify all realistic and credible alternatives for the fuel used by end consumers

22. Project participants should at least consider the following alternatives with respect to the intended consumer of blended biofuel:

(a) C1: Continuation of fossil fuel consumption or blended biofuel consumption (in case of mandatory regulations);[6]

(b) C2: Consumption of biofuel from other producers;

(c) C3: Consumption of other single alternative fuel such as CNG or LPG, etc.;

(d) C4: Consumption of a mix of above alternative fuels;

(e) C5: Consumption of biofuel from the proposed project plant.

5.2.2. Step 2: Eliminate alternatives that are not complying with applicable laws and regulations

23. Eliminate alternatives that are not in compliance with all applicable legal and regulatory requirements. Apply Sub-step 1b of the latest version of the "Tool for the demonstration and assessment of additionality".

5.2.3. Step 3: Eliminate alternatives that face prohibitive barriers

24. Scenarios that face prohibitive barriers (e.g. technical barrier) should be eliminated by applying Step 3 of the latest version of the "Tool for the demonstration and assessment of additionality".

5.2.4. Step 4: Compare economic attractiveness of remaining alternatives

25. Compare the economic attractiveness for all the remaining alternatives by applying Step 2 of the latest version of the "Tool for the demonstration and assessment of additionality". Provide all the assumptions in the CDM-PDD.

26. Include a sensitivity analysis applying Sub-step 2d of the latest version of the "Tool for the demonstration and assessment of additionality". If the sensitivity analysis is conclusive (for a realistic range of assumptions), then the most cost effective scenario is the baseline scenario. In case the sensitivity analysis is not fully conclusive, select the baseline scenario alternative with least emissions among the alternatives that are the most economically attractive according to the investment analysis and the sensitivity analysis.

27. For the **material (M)** level, the previous Steps 1 through 4 shall be taken.

[6] Regulations that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) need not be taken into account.

28. Project participants should at least consider the following alternatives:

    (a) M1: Use of material for production of biofuel (by the project proponent or by others);

    (b) M2: Use for material production of substances other than fuel;

    (c) M3: Incineration of material for the purpose of energy recovery;

    (d) M4: Incineration of material without energy recovery;

    (e) M5: Disposal of material in an anaerobic or aerobic manner.

29. For the **land use where the dedicated plantations are established (L)**, the baseline scenario should be determined as follows:

5.2.5. Step 1: Identify all realistic and credible alternatives for the land use

30. Project participants should at least consider the following alternatives with respect to the baseline scenario for the use of the land where the dedicated plantations are established:

    (a) L1: Continuation of current land use, i.e. continued absence of agricultural and forestry activities on degraded or degrading lands;

    (b) L2: Conversion to dedicated seed or crop plantations without CDM;

    (c) L3: Conversion to another plantation (annual or perennial).

5.2.6. Steps 2 – 4: Eliminate scenarios which are not in legal compliance or face prohibitive barriers or are not economically attractive, as described above for the fuel consumption scenarios

31. The project participants should demonstrate that the most plausible scenario is continuation of current land use (L1), by assessing the attractiveness of the plausible alternative land uses in terms of benefits to the project participants, consulting with stakeholders for existing and future land use, and identifying barriers for alternative land uses. This can be done by demonstrating that similar lands in the vicinity are not planned to be used for alternative land uses other than L1. Show that apparent financial and/or other barriers, which prevent alternative land uses can be identified.

32. If the biofuel is produced from waste oil/fat or biomass residues this methodology is applicable for the baseline scenario which combines P1, C1, and any one of the M scenarios. For material scenarios M1, M2 and M3, possible leakage from the displacement of existing uses of waste oil/fat or biomass residues needs to be assessed, as stated in the leakage section.

33. If the biofuel is produced from feedstock cultivated in dedicated plantations, this methodology is applicable for the baseline scenario which combines P1, C1 and L1.

5.3. Additionality

34. The additionality of the project activity shall be demonstrated and assessed using the latest version of the “Tool for the demonstration and assessment of additionality” agreed by the CDM Executive Board, and available on the UNFCCC CDM website.

35. Where Step 2 of the "Tool for the demonstration and assessment of additionality" (Investment Analysis) is used, the investment analysis shall include a sensitivity analysis of the biofuel sales price, the feedstock costs and fuel costs.

36. Guidance for the Barriers Analysis when the dedicated plantation (or part of) is covered under an A/R CDM project activity:

    (a) If the A/R CDM activity and the activity covering the production, sale and consumption of blended biofuel are two independent project activities (which may imply also that project proponents are different) then:

        (i) A barrier related to the implementation of the plantation cannot be used for the project activity covering the production, sale and consumption of blended biofuel;

    (b) If the A/R CDM project activity and the project activity covering the production, sale and consumption of blended biofuel are part of an integrated development project (which means that the same project proponents are to be involved in the two CDM activities) then:

        (i) A barrier related to the implementation of the plantation can also be used by the production, sale and consumption of blended biofuel activity.

37. Investment in the establishment of dedicated plantations must be considered, whether or not the establishment of such plantations is part of an A/R CDM project activity, if there is no market for the feedstock. By definition, tCERs from A/R CDM activities, whose plantations are part of the biofuel project, implemented under this methodology and CERs accruing from CDM project activities under this methodology must not be included in the investment analysis performed in order to identify the baseline scenario.

5.4. Baseline emissions

38. Baseline emissions from displaced fossil fuel are determined as follows:

$$BE_y = BF_y \times NCV_{BF,y} \times EF_{CO2,FF} \qquad \text{Equation (1)}$$

With

$$BF_y = \left[min\left\{ \left(P_{BF,y} - P_{BF,on-site,y}\right); \left(\sum_i f_{PJ,i,y} \times C_{BF,i,y} \right) \right\} - P_{BF,other,y} \right] \qquad \text{Equation (2)}$$

$$\times \left(\frac{\sum_i C_{BF,i,y} \times \left(\frac{f_{PJ,i,y} - f_{reg,y}}{f_{PJ,i,y}} \right)}{\sum_i C_{BF,i,y}} \right)$$

Where:

BE_y = Baseline emissions during the year *y* (tCO_2)

BF_y	=	Quantity of biofuel eligible for crediting in year *y* (t)
$NCV_{BF,y}$	=	Net calorific value of biofuel produced in year *y* (GJ/t)
$EF_{CO2,FF}$	=	Carbon dioxide emissions factor for displaced fossil fuel (tCO_2/GJ)
$P_{BF,y}$	=	Quantity of biofuel produced in the project plant in year *y* (t)
$P_{BF,on-site,y}$	=	Quantity of biofuel consumed at the project plant(s) (biofuel production and/or feedstock processing) in year *y* (t)
$PD_{BF,other,y}$	=	Quantity of biofuel that is either produced with alcohols other than methanol from fossil origin or produced using feedstock or waste oil(s)/fat(s) other than those eligible under this methodology according to the applicability conditions in year *y* (t)
$C_{BF,i,y}$	=	Quantity of biofuel type *i* consumed/sold/blended in year *y* (t)
$f_{PJ,i,y}$	=	Fraction of biofuel in the blended biofuel type *i* in year *y* (ratio)
$f_{reg,y}$	=	Fraction of biofuel in the blended biofuel which is required by mandatory regulations of the host country in year *y* (ratio)
i	=	Blended biofuel type (e.g. B5, B10, B20, B50 etc.)

39. Project participants shall determine $C_{BF,i,y}$ as follows:

    (a) For (blended) biofuels that are consumed in stationary installations, $C_{BF,i,y}$ shall be based on the monitored amount of biofuels consumed;

    (b) For (blended) biofuels that are sold to an identified consumer group, $C_{BF,i,y}$, shall be based on the monitored amount of (blended) biofuel sold;

5.5. For biofuels that are blended but neither used in stationary facilities nor sold to an identified consumer group, $C_{BF,i,y}$ shall be based on the amount of biofuel blended at the blending facility(ies).Project Emissions

40. Project emissions include four components:

    (a) If the biofuel is produced from feedstock that is cultivated in dedicated plantations: project emissions from cultivation of seeds or crops

    (b) Project emissions from transportation, where applicable. This includes:

        (i) Any transportation of raw feedstock (e.g. seeds, biomass residues) from the field(s) to the oil production plant(s)/mill(s);

        (ii) Any transportation of feedstock (e.g. vegetable oil, waste oil/fats) to the biofuel production plant, and;

        (iii) Any transportation of the biofuel to the site where it is blended with fossil fuel ;

    (c) Project emissions at the biofuel production facility and, if applicable, the feedstock processing plant(s) (e.g. the oil production plant(s) and/or mill(s));

(d) CO_2 from combustion of fossil carbon contained in methanol that is chemically bound in the biodiesel during the esterification process, and released upon combustion.

41. These emission sources are only partly allocated to the production of biofuel, through the allocation factor $AF_{1,y}$ in equation 3). Where applicable, project emissions associated with the cultivation of land are allocated between the different products produced from the plants expressed through the allocation factor $AF_{2,y}$ in equation 3). The Allocation factors are estimated as per the methodological tool "Apportioning emissions from production processes between main product and co and by-product".

42. Accordingly, project emissions are calculated as follows:

$$PE_y = AF_{1,y} \times \left(PE_{BPF,y} + PE_{MeOH,y} + PE_{TR,y} + AF_{2,y} \times PE_{BC,y}\right) \quad \text{Equation (3)}$$

Where:

PE_y	=	Project emissions in year *y* (tCO_2)
$PE_{BPF,y}$	=	Project emissions at the biofuel production plant and, if applicable, the oil production plant(s)/mill(s) in year *y* (tCO_2)
$PE_{MeOH,y}$	=	Project emissions from fossil carbon in the biodiesel due to esterification with methanol of fossil origin in year *y* (tCO_2)
$PE_{TR,y}$	=	Project emissions from transportation in year *y* (tCO_2)
$PE_{BC,y}$	=	Project emissions associated with the cultivation of land in dedicated plantations in year *y* (tCO_2)
$AF_{1,y}$	=	Allocation factor for the production of biofuel in year *y* (fraction)
$AF_{2,y}$	=	Allocation factor for the land cultivation in year *y* (fraction)

5.5.1. Project emissions at the biofuel production plant and feedstock processing plant(s) ($PE_{BPF,y}$)

43. These emissions include fuel and electricity consumption that occurs at the site of the biofuel production plant and, if applicable, emissions associated with the anaerobic treatment of wastewater in the feedstock processing plant(s) (e.g. oil production plant(s)/mill(s)).

44. These emissions are estimated as follows:

$$PE_{BPF,y} = \sum_j PE_{FC,j,y} + PE_{EC,y} + PE_{W,y} \quad \text{Equation (4)}$$

Where:

$PE_{BPF,y}$	=	Project emissions at the biofuel production facility and, if applicable, the feedstock processing plant(s) in year *y* (tCO_2)
$PE_{FC,j,y}$	=	Project emissions from combustion of fuel type *j* in the biofuel production plant and the feedstock processing plant(s) in year *y* (tCO_2)

$PE_{EC,y}$ = Project emissions from electricity consumption in the biofuel production plant and the feedstock processing plant(s) in year *y* (tCO_2)

$PE_{W,y}$ = Project emissions from anaerobic treatment of waste water in year *y* (tCO_2)

5.5.1.1. Emissions from fossil fuel consumption ($PE_{FC,j,y}$)

45. This emission source should include CO_2 emissions from all fossil fuel consumption that occurs at the site of the biofuel production plant and, if applicable, the feedstock processing plant(s) (e.g. oil production plant(s) and/or mill(s)) that is attributable to the project activity. This shall include, inter alia, fossil fuel combustion for heat and/or electricity generation.

46. The project emissions from fossil fuel combustion ($PE_{FC,j,y}$) shall be calculated following the latest version of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". For this purpose, the processes *j* in the tool correspond to all fossil fuel combustion sources at these plants.

5.5.1.2. Emissions from electricity consumption ($PE_{EC,y}$)

47. Emissions from electricity consumption includes electricity delivered from the grid to the biofuel production plant and, if applicable, the feedstock processing plant (s) (e.g. oil production plant(s)/mill(s)). Electricity generated on-site should not be included here.[7]

48. The project emissions from electricity consumption ($PE_{EC,y}$) will be calculated following the latest version of " "Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation". In this particular case, the tool can also be applied if captive renewable power generation technologies are installed to provide electricity; however, only the electricity purchased from the grid should be included in $EC_{PJ,j,y}$ and Scenario A of the tool should be applied respectively.

5.5.1.3. Project emissions from waste water treatment ($PE_{w,y}$)

49. Emissions associated with the anaerobic treatment of wastewater in the feedstock processing plant (s) (e.g. oil production plant(s)/mill(s)) should be estimated where applicable.

50. If the methane from anaerobic treatment of wastewater is vented to the atmosphere, then $PE_{w,y}$ is estimated as follows:

$$PE_{w,y} = Q_{COD,y} \times P_{COD,y} \times B_0 \times MCF_p \times GWP_{CH4} \quad \text{Equation (5)}$$

Where:

$PE_{w,y}$ = Project emissions from anaerobic treatment of waste water in year *y* (tCO_2e)

[7] On-site electricity generation with fossil fuels should be included in $PE_{FC,j,y}$. On-site electricity generation with biomass residues or biodiesel is accounted as zero emissions, as the use of biomass residues is not assumed to result in any emissions and emissions associated with the production of biodiesel are included in the emission sources accounted under this methodology.

$Q_{COD,y}$	=	Amount of wastewater treated anaerobically or released untreated from the feedstock processing plant(s) in year *y* (m^3)
$P_{COD,y}$	=	Chemical Oxygen Demand (COD) of wastewater in year *y* ($tCOD/m^3$)
B_0	=	Maximum methane producing capacity ($t\ CH_4/t\ COD$)
MCF_p	=	Methane conversion factor (fraction)
GWP_{CH4y}	=	Global warming potential of CH_4 (tCO_2e/tCH_4)

51. If the methane from anaerobic treatment of waste water is flared, then the methodological tool " "Project emissions from flaring" should be used to estimate project emissions from waste water treatment. In this case, $PE_{w,y}$ will be calculated ex ante as per equation 5, and then monitored during the crediting period.

5.5.2. Project emissions from fossil carbon in the biodiesel due to the use of methanol from fossil origin in the esterification process ($PE_{MeOH,y}$)

52. Under the current applicability of the methodology, methanol of fossil origin is used for the esterification of vegetable oil or waste oil/fats. In the esterification process, the carbon from the methanol remains in the esters. Thus, a fraction of the carbon in the biodiesel is of fossil origin and need to be accounted as project emissions. These emissions are estimated as follows:

$$PE_{MeOH,y} = MC_{MeOH,y} \times EF_{C,MeOH} \times \frac{44}{12} \qquad \text{Equation (6)}$$

Where:

$PE_{MeOH,y}$	=	Project emissions from fossil carbon in the biodiesel due to esterification with methanol of fossil origin in year *y* (tCO_2)
$MC_{MeOH,y}$	=	Quantity of methanol consumed in the biodiesel plant, including spills and evaporations on-site in year *y* (tMeOH)
$EF_{C,MeOH}$	=	Carbon emissions factor of methanol, based on molecular weight (tC/tMeOH)
$44/12$	=	Molecular weight ratio to convert t of carbon into t of CO_2 (tCO_2/tC)

5.5.3. Project emissions from transportation ($PE_{Tr,y}$)

53. Emissions resulting from transportation are estimated by following the provisions in the methodological tool "Project and leakage emissions from transportation of freight"

54. Project emissions from transportation only have to be accounted if distances of more than 50 km are covered.

55. Project emissions from transportation include the following sources, where applicable:

(a) Any transportation of raw feedstock (e.g. seeds, biomass residues) from the field(s) to the processing plant(s) (e.g. oil production plant(s)/mill(s))

(b) Any transportation of feedstock (e.g. vegetable oil, waste oil/fats) to the biofuel production plant, and;

(c) Any transportation of the biofuel to the site where it is blended with fossil fuel.

5.5.4. Project emissions associated with the cultivation of lands to produce seeds/crops in dedicated plantations ($PE_{BC,y}$)

56. Project emissions associated with the cultivation of lands in a dedicated plantation are estimated by following the provisions in the methodological tool: "Project and leakage emissions from biomass".

57. Project participants should clearly document and justify in the CDM-PDD which emission sources are applicable to the project activity.

58. Alternatively, project participants may choose a simplified approach to calculate this emission source using conservative **default values** for the emissions associated with the cultivation of lands. This approach can only be used for **palm, cassava, jatropha, soy, corn, sugarcane or pongamia**.

5.5.4.1. Use of a default emission factor

$$PE_{BC,y} = PE_{SOC,y} + \sum_{s} A_{s,y} \times EF_{s,y} \quad \text{Equation (7)}$$

Where:

$PE_{BC,y}$ = Project emissions associated with the cultivation of land to produce biomass feedstock in year *y* (tCO_2)

$PE_{SOC,y}$ = Emissions resulting from loss of soil organic carbon, in year *y* (t CO2e) to be estimated as per the methodological tool: "Project and leakage emissions from biomass".

$A_{s,y}$ = Area in which feedtstock type *s* is cultivated for use in the project plant in year *y* (ha)

$EF_{s,y}$ = Default emission factor for the GHG emissions associated with the cultivation of land to produce feedstock type *s* (tCO_2e/ha). See Table 3 below for available values.

Table 3. Conservative default emission factors for the GHG emissions associated with the cultivation of land to produce biomass feedstock

Feedstock type s	Fresh palm fruit bunches	Cassava roots	Jatropha nuts	Soybeans	Corn Seed	Sugarcane	Pongamia
$EF_{s,y}$ (t CO_2e/ha)	2.5	1.9	2.6	0.8	2.1	2.3	1.5

59. An excel sheet that can be used to calculate the emission factors for the GHG emissions associated with the cultivation of land to produce crops is provided at the following weblink at UNFCCC CDM website: <http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>.

5.6. Leakage

60. This methodology estimates the following sources of leakage:

(a) Emissions associated with the production of the methanol used for esterification or the chemicals used for pre-treatment and/or hydrolysis of lignocellulosic biomass;

(b) If the biofuel is produced from waste oil/fat or biomass residues, diversion of existing applications of waste oil/fat or biomass residues that may result in increased demand for fossil fuels elsewhere;

(c) Positive leakage associated with the avoided production and transportation of fossil fuel.

61. The leakage emissions are calculated as follows:

$$LE_y = LE_{MeOH,y} + LE_{BR,y} - LE_{FF,y}$$ Equation (8)

Where:

LE_y	=	Leakage emissions in year *y* (tCO_2)
$LE_{MeOH,y}$	=	Leakage emissions associated with production of methanol used in biodiesel production in year *y* (tCO_2)
$LE_{BR,y}$	=	Leakage emissions from displacement of existing uses of waste oil/fat or biomass residues in year *y* (tCO_2)
$LE_{FF,y}$	=	Leakage related to the avoided production of fossil fuel in year *y* (tCO_2)

62. Please note that the overall leakage emissions shall not be less than zero. In cases where, in year *y*, LE_y is less than zero, consider it as zero.

5.6.1. Leakage from methanol/chemicals production

63. Emissions from production of methanol that is used in the esterification process to produce the biodiesel are estimated as follows:

$$LE_{MeOH,y} = MC_{MeOH,y} \times EF_{MeOH,PC}$$ Equation (9)

Where:

$LE_{MeOH,y}$	=	Leakage emissions associated with production of methanol used in biodiesel production in year *y* (tCO_2)
$MC_{MeOH,y}$	=	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 (tCO_2/t MeOH)

64. Emissions from production of chemicals that are used for pre-treatment and/or hydrolysis of lignocellulosic biomass to produce cellulosic ethanol are estimated in accordance with the methodological tool: “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”.

5.6.2. Leakage from the diversion of existing applications of waste oil/fat and/or biomass residues.

65. Leakage emissions from the diversion of existing applications of waste oil/fat and/or biomass residues are estimated in accordance with the methodological tool: "Project and leakage emissions from biomass".

66. These emissions will only be estimated if the biofuel is produced from waste oil/fat and/or biomass residues. For material scenarios M1, M2 and M3, project participants shall demonstrate that the use of these materials by the project activity does not result in increased fossil fuel consumption elsewhere. For this purpose, project participants shall monitor the total supply of waste oil/fat or biomass residues used in the project plant.

$$WOF_{L,y} = \begin{cases} \dfrac{\left(1.25 \times WOF_{D,y}\right) - WOF_{S,y}}{1.25} & if \left(1.25 \times WOF_{D,y}\right) > WOF_{S,y} \\ 0 & if \left(1.25 \times WOF_{D,y}\right) \leq WOF_{S,y} \end{cases}$$

67. In the case that overall emission reductions from the project activity are negative in a given year because of the leakage emissions, CERs are not issued to project participants for the year concerned and in subsequent years, until emission reductions from subsequent years have compensated the quantity of negative emission reductions from the given year.

5.6.3. Leakage related to the avoided production of fossil fuel

68. The substitution of biofuel for fossil fuel reduces upstream emissions associated with the production of fossil fuel.

69. For the purpose of this methodology, the following upstream emissions stages *i* are considered:

    (a) Production of crude oil. These include emissions from venting, flaring and energy uses;

    (b) Oil refinery. These include emissions from energy uses, production of chemicals and catalysts, disposal of production wastes (including flaring) and direct emissions;

    (c) Long distance transport.[8]

70. Emissions related to infrastructure are not be taken into account either for the production of crude oil (e.g. drilling and maintenance of the oil wells) or for the oil refinery (e.g. construction of the refinery), to keep consistency with the estimation of project emissions from biofuel production where these emission sources are also ignored.

[8] Emissions from international long distance transport (transport of crude oil to the refinery) will not be taken into account since the EB has clarified that CDM project activities cannot claim emission reductions from reducing international bunker fuel consumption. EB 25 report paragraph 58 states that "The Board agreed to confirm that the project activities/parts of project activities resulting in emission reductions from reduced consumption of bunker fuels (e.g. fuel saving on account of shortening of the shipping route on international waters) are not eligible under the CDM." If long distance transport occurs within the host country where the project activity takes place, these emissions will be accounted for as per equation 17

71. Emissions from the distribution to filling stations are not taken into account, as it is assumed that these emissions balance with the emissions of transport of the biofuel to the blending facility.

$$LE_{FF,y} = BF_y \times \sum_x \sum_i \sum_j NCV_{BF,y} \times EF_{i,j,x,y} \quad \text{Equation (10)}$$

Where:

$LE_{FF,y}$	=	Leakage related to the avoided production of fossil fuel in year *y* (tCO_2)
BF_y	=	Quantity of biofuel eligible for crediting in year *y* (t)
$NCV_{BF,y}$	=	Net calorific value of biofuel produced in year *y* (GJ/t)
$EF_{i,j,x,y}$	=	Emission factor for upstream emissions stage i associated with consumption of fossil fuel type *x* from fossil fuel origin j applicable to year y (t CO2e/TJ)

5.7. Emission reductions

72. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (11)}$$

Where:

ER_y	=	Emission reductions in year *y* (tCO_2)
BE_y	=	Baseline emissions in year *y* (tCO_2)
PE_y	=	Project emissions in year *y* (tCO_2)
LE_y	=	Leakage emissions in year *y* (tCO_2)

5.8. Changes required for methodology implementation in 2nd and 3rd crediting periods

73. Refer to the "Tool to assess the validity of the original/current baseline and to update the baseline at the renewal of a crediting period" (Annex 1 of the "Procedures for renewal of the crediting period of a registered CDM project activity").[9]

5.9. Data and parameters not monitored

Data / Parameter table 1.

Data / Parameter:	***NCV_{FF}***
Data unit:	GJ/t
Description:	Net calorific value of fossil fuel displaced
Source of data:	2006 IPCC Guidelines for GHG Inventories

[9] <https://cdm.unfccc.int/Reference/Procedures/reg_proc04.pdf>.

Measurement procedures (if any):	-
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	$EF_{CO2,FF}$
Data unit:	tCO_2/GJ
Description:	Carbon dioxide emissions factor for fossil fuel displaced
Source of data:	Default value may be derived from 2006 IPCC Guidelines, or from national statistics, if available
Measurement procedures (if any):	-
Any comment:	Local or national data should be preferred. Default values from the IPCC may be used alternatively

Data / Parameter table 3.

Data / Parameter:	MCF_p
Data unit:	%
Description:	Methane conversion factor
Source of data:	The source of data should be the following, in order of preference: project specific data, country specific data or IPCC default values. As per guidance from the Board, IPCC default values should be used only when country or project specific data are not available or difficult to obtain
Measurement procedures (if any):	-
Any comment:	Preferably local specific value should be used. In absence of local values, MCF_p default values can be obtained from table 6.3, chapter 6, volume 4 from IPCC 2006 guidelines

Data / Parameter table 4.

Data / Parameter:	B_0
Data unit:	$t\ CH_4/t\ COD$
Description:	Maximum methane producing capacity
Source of data:	IPCC 2006 guidelines specifies the value for B_0 as 0.25 kg CH_4/kg COD. Taking into account the uncertainty of this estimate, project participants should use a value of 0.265 kg CH_4/kg COD as a conservative assumption for B_o
Measurement procedures (if any):	-
Any comment:	-

Data / Parameter table 5.

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential of CH_4
Source of data:	IPCC
Measurement procedures (if any):	21 for the first commitment period. Shall be updated according to any future COP/MOP decisions
Any comment:	-

Data / Parameter table 6.

Data / Parameter:	$EF_{C,MeOH}$
Data unit:	tC/tMeOH
Description:	Carbon emissions factor of methanol, based on molecular weight
Source of data:	-
Measurement procedures (if any):	Use the value of 0.375 (calculated as 12/32)
Any comment:	-

Data / Parameter table 7.

Data / Parameter:	EF_{MeOH_PC}
Data unit:	tCO_2/t MeOH
Description:	Pre-combustion (i.e. upstream) emissions factor for methanol production
Source of data:	Apple 1998: <http://edj.net/sinor/SFR4-99art7.html> and 2006 IPCC Guidelines
Measurement procedures (if any):	1.95 tCO_2/t produced methanol
Any comment:	Based on 30 GJ/t energy requirement and average of IPCC emissions factors for natural gas and diesel oil

Data / Parameter table 8.

Data / Parameter:	NCV_L
Data unit:	GJ/t
Description:	Net calorific value of the fossil fuel likely to substitute waste oil / fat or biomass residues.
Source of data:	2006 IPCC Guidelines for GHG Inventories
Measurement procedures (if any):	-
Any comment:	Identification of the fossil fuel shall be made taking into account common practice

Data / Parameter table 9.

Data / Parameter:	$EF_{i,j,x,y}$
Data unit:	tCO_2e/TJ
Description:	Emission factor for upstream emissions stage i associated with consumption of fossil fuel type x from fossil fuel origin j applicable to year y
Source of data:	-
Value to be applied:	$EF_{i,j,x,y}$ shall be determined in accordance with the Methodological tool: "Upstream leakage emissions associated with fossil fuel use"
Any comment:	-

Data / Parameter table 10.

Data / Parameter:	$EF_{CO2,i}$
Data unit:	tCO_2/TJ
Description:	CO_2 emissions factor for fossil fuel type *i*
Source of data:	The following data sources may be used if the relevant conditions apply:

Data source	**Conditions for using the data source**
(a) Values provided by the fuel supplier in invoices	This is the preferred source
(b) Measurements by the project participants	If (a) is not available
(c) Regional or national default values	If (a) is not available. These sources can only be used for liquid fuels and should be based on well-documented, reliable sources (such as national energy balances)
(d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories	If (a) is not available

Measurement procedures (if any):	For (a) and (b): Measurements should be undertaken in line with national or international fuel standards
Any comment:	-

6. Monitoring methodology

6.1. Monitoring procedures

74. Describe and specify in the draft CDM-PDD all monitoring procedures, including the type of measurement instrumentation used, the responsibilities for monitoring and QA/QC procedures that will be applied. Where the methodology provides different options (e.g. use of default values or on-site measurements), specify which option will be used. All meters and instruments should be calibrated regularly as per industry practices.

75. Biofuel production must apply national industry standards on QA/QC or, if there are no national QA/QC standards yet, apply industry standards from mature biofuel production markets such as in Brazil, Europe or US.

6.2. Specific CDM related monitoring procedures

76. The quality manual necessary under the above mentioned QA/QC standards shall include a section describing the elements of the CDM related monitoring procedures and how to assure and control their quality. A quality management representative from the project participant shall ensure that the monitoring procedures are established and that they meet the requirements as specified in this methodology.

77. Monitoring the plant inputs and outputs required for calculating leakage, baseline and project emissions shall be based on a complete documented mass balance, adjusted for stock changes, covering:

    (a) Amounts of waste oil/fat or biomass residues purchased and processed, if applicable;

    (b) Amounts of feedstock from dedicated plantations purchased and processed; if applicable;

    (c) Amounts of catalysts purchased, processed and recovered;

    (d) Amounts of methanol purchased and processed;

    (e) Amounts of glycerol or other by-products produced and incinerated and/or sold for utilization;

    (f) Amounts of blended biofuel consumed, sold or blended.

78. This mass balance shall be based on a combination of purchase/sales records and records of measurements, in accordance with the measuring instruments available at the plant and stationary consumers or fuelling stations of the captive fleet owner in case of use in transport sector. The mass balance serves as a QA/QC instrument to crosscheck results of monitoring parameters as defined in the following section.

79. The following procedure shall be used to verify the actual amount of biofuel from waste oil/fat or biomass residues that is consumed by the end user for displacement of fossil fuel

and its correspondence with the produced amount of biofuel from waste oil/fat or biomass residues:

(a) If the biofuel is produced from waste oil/fat or biomass residues the produced amount of biofuel from these sources is recorded by a periodically calibrated metering system;

(b) If the biofuel is produced from feedstock cultivated in dedicated plantations, the produced amount of biofuel from feedstock from dedicated plantations is recorded by a periodically calibrated metering system;

(c) The amount of biofuel produced from waste oil/fat, biomass residues, or from feedstock from dedicated plantations transported to the storage of the blender is recorded by a calibrated metering system at the point of filling the (road) tankers and at the point of delivery at the blender site;

(d) During the process of creating the biofuel blend at the blending station, the blending operation shall be monitored to assure adequate mixing of the products in the specified proportions. This includes measuring and recording the volumes and blend levels as verified through bills of lading, meter printouts or other auditable records of both the biofuel and fossil fuel, which comprise the blended biofuel;

(e) Contractually the biofuel producer has to monitor consumption by the consumer as follows:

(i) The receiving amount of blended biofuel in the gas station or final distributor has to be recorded by a calibrated metering system and the storage fill level is recorded by a calibrated filling level indicator;

(ii) For stationary installations, the amount of the blended biofuel filled into the installation where combustion takes place must be recorded by a calibrated metering system;

(iii) If blending is done by a third party contractual arrangement shall be made, that the receiving amount of biofuel at the blending facility has to be recorded by a calibrated metering system and the storage fill level is recorded by a calibrated filling level indicator.

80. If the biofuel is produced from feedstock cultivated in dedicated plantations, the following specific guidance should be taken into account:

(a) If feedstock is pre-processed off-site, the energy consumption of the corresponding facilities shall be included in the monitoring; ;

(b) Monitoring compliance with the applicability conditions.

6.3. Data Archiving

81. All data need to be archived electronically until two years after end of the crediting period.

6.4. Data and parameters monitored

Data / Parameter table 11.

Data / Parameter:	$f_{PJ,i,y}$
Data unit:	ratio
Description:	Fraction of biofuel in the blended biofuel from the project activity, with blending ratio *i*, in year *y*
Source of data:	Records from blending operations
Measurement procedures (if any):	Recording volumes or flows with calibrated meters
Monitoring frequency:	Every produced blend must be monitored
QA/QC procedures:	During the process of creating the blended biofuel at the blending station, the blending operation shall be monitored to assure adequate mixing of the products in the correct proportions. This includes measuring and recording the volumes and blend levels as verified through bills of lading, meter printouts or other auditable records of both the biofuel and fossil fuel, which comprise the blend
Any comment:	

Data / Parameter table 12.

Data / Parameter:	$f_{reg,y}$
Data unit:	ratio
Description:	Fraction of biofuel in the blended biofuel which is required by mandatory regulations of the host country in year *y*
Source of data:	Regulations in the Host Country
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 13.

Data / Parameter:	Various parameters; Compliance of biofuel with national regulations
Data unit:	Various data units
Description:	Compliance of produced biofuel with national regulation, biofuel properties
Source of data:	Various measurements based on national or international standards
Measurement procedures (if any):	Various methods of measurement and uncertainty analysis
Monitoring frequency:	According to national regulation, at least annually
QA/QC procedures:	According to national or international standards
Any comment:	-

Data / Parameter table 14.

Data / Parameter:	$MP_{Glyc,y}$
Data unit:	t
Description:	Amount of by-product (e.g. glycerol) produced during plant operation
Source of data:	Project participants
Measurement procedures (if any):	Volumetric flow meter including a volume integrator or load cell to measure the weight of produced by-product
Monitoring frequency:	All quantity of produced by-product must be monitored
QA/QC procedures:	Volumetric flow meter and integrator calibrated periodically Load cell calibrated periodically. Measured amounts to be crosschecked against mass balance of the biofuel production unit
Any comment:	This monitored parameter is used to meet the applicability condition "The by-product (e.g. glycerol) is not disposed of or left to decay. It should be either incinerated or used as raw material for industrial consumption or sold". $MP_{Glyc,y}$ should be equal to $MU_{Glyc,y}$

Data / Parameter table 15.

Data / Parameter:	$MU_{Glyc,y}$
Data unit:	t
Description:	Amount of by-product (e.g. glycerol) incinerated or sold or used
Source of data:	Project participants, based on sales data and internal records in case of use inside the plant or incinerated
Measurement procedures (if any):	-
Monitoring frequency:	All produced by-product must be tracked via sales data or internal records or its mode of disposal checked by DOE (incl. visual inspection of facilities and record of incineration or disposal if any)
QA/QC procedures:	DOE to check the produced by-product was marketed
Any comment:	This monitored parameter is used to meet the applicability condition "The by-product (e.g. glycerol) is not disposed of or left to decay. It should be either incinerated or used as raw material for industrial consumption or sold"

Data / Parameter table 16.

Data / Parameter:	$P_{BF,y}$
Data unit:	t
Description:	Quantity of biofuel produced in the project plant in year *y*
Source of data:	On-site measurements by the project participants
Measurement procedures (if any):	Use calibrated measurement equipment that is maintained regularly and checked for proper functioning
Monitoring frequency:	All produced biofuel must be metered
QA/QC procedures:	Cross check production and consumption data with sales records
Any comment:	-

Data / Parameter table 17.

Data / Parameter:	$P_{BF,on\text{-}site,y}$
Data unit:	t
Description:	Quantity of biofuel consumed at the project biofuel production plant and/or the oil production plant(s) in year *y*
Source of data:	On-site measurements by the project participants
Measurement procedures (if any):	Use calibrated measurement equipment that is maintained regularly and checked for proper functioning
Monitoring frequency:	All consumed biofuel must be metered
QA/QC procedures:	Cross check production and consumption data with sales records
Any comment:	-

Data / Parameter table 18.

Data / Parameter:	$PD_{BF,other,y}$
Data unit:	t
Description:	Quantity of biofuel that is either produced with alcohols other than methanol from fossil origin or produced using feedstock other than those eligible under this methodology according to the applicability conditions in year *y*
Source of data:	On-site measurements by the project participants
Measurement procedures (if any):	Use calibrated measurement equipment that is maintained regularly and checked for proper functioning
Monitoring frequency:	All consumed biofuel must be metered
QA/QC procedures:	Cross check production and consumption data with sales records
Any comment:	-

Data / Parameter table 19.

Data / Parameter:	$C_{BF,i,y}$
Data unit:	t
Description:	Quantity of biofuel with blending ratio *i*, consumed/sold to identified consumer/blended in year *y*
Source of data:	Metering system at fuelling stations
Measurement procedures (if any):	Use calibrated measurement equipment that is maintained regularly and checked for proper functioning
Monitoring frequency:	Continuous recording of filling consumers´ stationary combustion installations or vehicles
QA/QC procedures:	Cross check production and consumption data with sales records
Any comment:	Project participants shall determine $C_{BF,i,y}$ as follows: - For (blended) biofuels that are consumed in stationary installations, $C_{BF,i,y}$ shall be based on the monitored amount of biofuels consumed; - For (blended) biofuels that are sold to an identified consumer group $C_{BF,i,y}$, shall be based on the monitored amount of (blended) biofuel sold; - For biofuels that are blended but neither used in stationary facilities nor sold to an identified consumer group, $C_{BF,i,y}$, shall be based on the amount of biofuel blended at the blending facility(ies).

Data / Parameter table 20.

Data / Parameter:	$NCV_{BF,y}$
Data unit:	GJ/t
Description:	Net calorific value of biofuel produced in year *y*
Source of data:	Laboratory analysis
Measurement procedures (if any):	Measured according to relevant national or international standards regulating determination of NCV by calibrated equipment
Monitoring frequency:	Annually
QA/QC procedures:	Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measurements
Any comment:	Analysis has to be carried out by accredited laboratory. A sample is representative if uncertainty of the NCV does not exceed ±5% at 95% confidence level

Data / Parameter table 21.

Data / Parameter:	$MC_{MeOH,y}$
Data unit:	tMeOH
Description:	Quantity of methanol consumed in the biofuel plant, including spills and evaporations on-site in year *y*
Source of data:	Mass meters
Measurement procedures (if any):	Use calibrated measurement equipment that is maintained regularly and checked for proper functioning. The methanol consumption should be net of any water content. Methanol spilled and evaporated on the project site should be considered as consumption for estimating the emissions
Monitoring frequency:	Continuously
QA/QC procedures:	Crosscheck against methanol purchase receipts and calculated stochiometric requirements
Any comment:	Adjust for stock changes when comparing purchase data with consumption data; also used for leakage calculations. Use most conservative values. Any spills on-site and evaporation are accounted as consumption. Please note that data should also report the source of methanol - from fossil fuel or non-fossil fuel sources. As per the applicability only biofuel produced using fossil fuel based methanol can be credited

Data / Parameter table 22.

Data / Parameter:	$Q_{COD,y}$
Data unit:	m^3
Description:	Amount of wastewater treated anaerobically or released untreated from the feedstock production plant in year *y*
Source of data:	Measured value by flow meter
Measurement procedures (if any):	-
Monitoring frequency:	Monthly aggregated annually
QA/QC procedures:	The monitoring instruments will be subject to regular maintenance and testing to ensure accuracy
Any comment:	If the wastewater is treated aerobically, emissions are assumed to be zero, and hence this parameter does not need to be monitored

Data / Parameter table 23.

Data / Parameter:	$P_{COD,y}$
Data unit:	tCOD/m^3
Description:	Chemical Oxygen Demand (COD) of wastewater in year *y*
Source of data:	Measured value by purity meter
Measurement procedures (if any):	-
Monitoring frequency:	Monthly and averaged annually
QA/QC procedures:	The monitoring instruments will be subject to regular maintenance and testing to ensure accuracy
Any comment:	If the wastewater is treated aerobically, emissions are assumed to be zero, and hence this parameter does not need to be monitored

Data / Parameter table 24.

Data / Parameter:	$AF_{1,y}$
Data unit:	Fraction
Description:	Allocation factor for the production of biofuel in year *y*
Source of data:	
Measurement procedures (if any):	Estimated as per the Methodological tool: "Apportioning emissions from production processes between main product and co-and by-product"
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 25.

Data / Parameter:	$AF_{2,y}$
Data unit:	Fraction
Description:	Allocation factor for the biomass cultivation in dedicated plantations in year *y*
Source of data:	-
Measurement procedures (if any):	Estimated as per the Methodological tool: "Apportioning emissions from production processes between main product and co-and by-product"
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 26.

Data / Parameter:	$A_{s,y}$
Data unit:	Ha
Description:	Area in which biomass type *s* is cultivated for use in the project plant in year *y*
Source of data:	Project participants
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

- - - - -

Document information

Version	*Date*	*Description*
03.1	31 May 2017	Editorial revision to correct paragraph numbering.
03.0	4 May 2017	EB 94, Annex 6 Revision to: • include references to the tools "Project and leakage emissions from biomass", "Project and leakage emissions from transportation of freight", and "Upstream leakage emissions associated with fossil fuel use"; • broaden the applicability of the existing methodology to cover biofuels; • editorially revise the title.
02.1	29 September 2011	EB 63, Annex 17 Amendment to: • Simplify the determination of BDy (Quantity of biodiesel eligible for crediting in year *y*); • Improve the methodology by including missing parameters in the monitoring table, removing not required parameters from the monitoring table, correcting errors in the equations in the nomenclature of parameters and other editorial improvements.
02.0	17 September 2010	EB 56, Annex 8 Revision to clarify: • That the methodology is not applicable for the dedicated plantations established on peatlands; • That the possibility to account for the CO_2 emissions resulting from changes in soil carbon stocks as zero applies only to perennial plants.

Version	*Date*	*Description*
01.1	23 March 2010	Editorial revision to: • Correct Table 2, as emission factors for jatropha corresponded to Tropical **Dry** climates and not Tropical **Wet** climates; • Remove inconsistencies between the methodology and the excel sheet used to calculate the emission factors for the GHG emissions associated with the cultivation of land.
01.0	16 October 2009	EB 50, Annex 3 Initial adoption. This methodology is a consolidation of the approved methodology AM0047, incorporating cases NM0228, NM0233 and incorporating elements based on the request for revision AM_REV_0071.

Decision Class: Regulatory
Document Type: Standard
Business Function: Methodology
Keywords: biofuel, renewable energy generation, transport