

AMS-III.T

Small-scale Methodology

Plant oil production and use for transport applications

Version 03.0

Sectoral scope(s): 07



United Nations
Framework Convention on
Climate Change

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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)	Plant oil production that is used for transportation applications, where the plant oil is produced from pressed and filtered oilseeds from plants that are cultivated on dedicated plantations
Type of GHG emissions mitigation action	Fuel switch. Displacement of more-GHG-intensive petrodiesel for transport.

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology covers project activities involving the cultivation of oilseeds, the production of plant oil and the use of plant oil for transportation applications. Plant oil in contrast to bio-diesel is not trans-esterified but only pressed and filtered from oilseeds.

2.2. Applicability

3. This methodology is only applicable to plant oil that:
 - (a) Is used in blends of up to 10 per cent by volume of plant oil in unconverted vehicles;¹ or
 - (b) Is used as pure or in blends above 10 per cent by volume of plant oil.²
4. This methodology is applicable under the following conditions:
 - (a) In the baseline situation the vehicles use diesel;
 - (b) Plant oil must comply with national quality regulations or in absence of the latter with the quality standards stipulated in Table 2;
 - (c) The retailers, final users and the producer of the plant oil or its blend are bound by a contract that states that the retailers and final consumers shall not claim emission reductions resulting from its consumption. The contract also enables the producer to monitor the consumption of plant oil or its blend. Only the producer of the plant oil can claim emission reductions under this methodology;
 - (d) Under this methodology only the CO₂ emissions from diesel displaced by plant oil is considered;³

¹ The term 'vehicles' used throughout this document also includes other transportation applications such as domestic water borne transport. Domestic water borne transport as defined by IPCC 2006, vol.2, chapter 3 can be considered as eligible.

² Conversion measures include adaptations of fuel supply, fuel injection and combustion.

- (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. The plantations established on peatlands are not eligible under this methodology;
- (f) 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;
- (g) The export of the plant oil produced to Annex I countries is not allowed under this methodology.

Table 2. Proposed quality control parameters for plant oil

Properties	Unit	Proposed Limiting Value		Possible Testing Method
		Min.	Max.	
Acid Value	mg KOH/g	-	2.0	DIN EN ISO 660
Oxidation Stability (110°C)	h	5.0	-	ISO 6886
Ash Content	Mass-%	-	0.01	DIN EN ISO 6245
Contamination	mg/kg	-	25	DIN EN 12662
Phosphorus Content	mg/kg	-	15	ASTM D3231-99
Water Content	Mass-%	-	0.075	Pr EN ISO 12937
Kinematic Viscosity (40°C)	mm²/s	-	Variable	DIN EN ISO 3104

- 5. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO₂ equivalent annually.

2.3. Entry into force

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

3. Normative references

- 7. Project participants shall apply the “General guidelines for SSC CDM methodologies” and the “Guidelines on the demonstration of additionality of small-scale project activities” provided at
<http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> mutatis mutandis.

³ Project participants are encouraged to submit procedures to calculate upstream emissions related to the production and use of fossil fuel in the baseline for consideration and approval by the CDM Executive Board.

8. This methodology also refers to the latest approved versions of the following approved methodologies, guidelines⁴ and tools:
- (a) “General guidance on leakage in biomass project activities”;
 - (b) “AMS-III.F.: Avoidance of methane emissions through composting”;
 - (c) “AMS-III.G.: Landfill methane recovery”;
 - (d) “AMS-III.H.: Methane recovery in wastewater treatment”;
 - (e) “AMS-III.AK.: Biodiesel production and use for transport applications”;
 - (f) “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”;
 - (g) “Project emissions from cultivation of biomass”;
 - (h) “Project and leakage emissions from transportation of freight”;
 - (i) “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”.

4. Definitions

9. The definitions contained in the Glossary of CDM terms shall apply.
10. Furthermore, the following definitions apply:
- (a) **Plant oil**, or **vegetable oil**, is oil of plant origin composing of triglycerides. Although many different parts of the plants may yield oil, most often oil is extracted from the seeds or fruits of the plant. Examples of plant oil are sunflower oil, rapeseed oil and jatropha oil.

5. Baseline methodology

5.1. Project boundary

11. The project boundary is the geographical area of the cultivation, production and processing of oil-seeds and the areas where plant oil is blended and sold to the final users. The vehicles of the final users where the plant oil or blend is consumed are also included in the project boundary.

5.2. Baseline emissions

12. Baseline emissions (BE_y) are calculated based on the amount of plant oil consumed by the project. For this purpose the amount of diesel fuel that would have been consumed in absence of using plant oil is calculated. Calculations are based on the relative net calorific values of the fuels used.

$$FC_{D,y} = \sum_{k=1..n} \frac{NCV_k}{NCV_D} \times \min(FC_{k,y}, FP_{k,y}) \quad \text{Equation (1)}$$

⁴ Please refer to: <<https://cdm.unfccc.int/Reference/index.html>>.

Where:

$FC_{D,y}$	= Diesel fuel which would have been consumed in the absence of the project activity in the year y (m^3)
NCV_k	= Net calorific value of plant oil k (GJ/ m^3)
NCV_D	= Net calorific value of diesel (GJ/ m^3)
$FC_{k,y}$	= Plant oil type k consumed in the year y (m^3)
K	= Types of plant oil used (dependent on oil-seed source)

13. The net calorific values (in GJ/ m^3) of diesel and of plant oil used are determined based on direct measurements of a representative sample.
14. Only plant oil which is consumed in non-annex 1 countries by captive fleets and which is sold to the end users at filling stations and recorded by calibrated metering systems is included. Captive fleets, retailers and final consumers are bound by a contract that allows the producer to monitor the consumption of plant oil and states that the captive fleet, the retailer or end user shall not claim emission reductions resulting from its consumption.
15. Total baseline emissions are determined as follows:

$$BE_y = FC_{D,y} \times NCV_D \times EF_{CO_2,D} \times f_{PD,y} \quad \text{Equation (2)}$$

Where:

BE_y	= Baseline emissions in year y (t CO ₂ e)
NCV_D	= Net calorific value of diesel (GJ/ m^3)
$EF_{CO_2,D}$	= CO ₂ emission factor diesel (t CO ₂ e/GJ)
$f_{PD,y}$	= 1.0 if pure petro diesel is used for blending otherwise use the fraction of petrodiesel in the fuel used for blending ⁵ (blending fraction based on volume basis)

5.3. Project emissions

16. Project emissions (PE_y) are the emissions related to the cultivation of oil seeds and production of plant oil ("field-to-wheel" emissions). These emissions will be attributed to the plant oil produced, and not shared over the different co-products.⁶

⁵ It is expected that plant oil 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.

⁶ Project proponents are encouraged to submit procedures to allocate emissions associated with the cultivation of oil seeds and production of plant oil among by-products for consideration and approval by the Board.

17. The project emissions related to the cultivation of oil seeds are calculated using the latest version of the tool “Project emissions from cultivation of biomass”.
18. In addition to the emission sources included in paragraph 17 the following sources shall be considered:
 - (a) Emissions from energy use for processing (e.g. pressing and filtering) of plant oil;
 - (b) Where applicable methane emissions due to stockpiling, land filling, waste water generated in the plant oil production facility.
19. For each oilseed/plant oil type k the project emissions shall be calculated separately.

$$PE_y = \sum_k PE_{PO,k,y} \times FP_{k,y} \quad \text{Equation (3)}$$

Where:

PE_y = Total project emissions from plant oil production (t CO₂e) in year y

$PE_{PO,k,y}$ = Project emissions from plant oil production of crop k (t CO₂e/m³ plant oil k produced) in year y

$FP_{k,y}$ = Plant oil type k produced in the year y (tonne)

$$PE_{PO,k,y} = \frac{PE_{FA,k,y} + PE_{OFP,k,y} + PE_{CH4,k,y}}{H_{k,y} \times OY_{k,y}} \quad \text{Equation (4)}$$

Where:

$PE_{FA,k,y}$ = Project emissions from cultivation of crop k in year y (t CO₂e)

$PE_{OFP,k,y}$ = Project emissions from energy use for oil-seed processing (e.g. pressing and filtering) of crop k in year y (t CO₂)

$PE_{CH4,k,y}$ = Project emissions of CH₄ from solid waste and/or waste water treatment associated with crop k in year y (t CO₂)

$H_{k,y}$ = Harvest of crop k in year y (tonne crop)

$OY_{k,y}$ = Oil yield of crop k in year y (m³ oil/t crop)

20. Project emissions cultivation of oil crop k ($PE_{FA,k,y}$) are calculated using the latest version of the tool “Project emissions from cultivation of biomass”.
21. Project emissions from energy use for processing (e.g. pressing and filtering) of plant oil ($PE_{OFP,k,y}$) are calculated using the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion” (if fossil fuels are used) and/or “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (if electricity is used).
22. Project emission of CH₄ from solid waste disposal and/or waste water treatment ($PE_{CH4,k,y}$) are calculated as per provisions in AMS-III.G (landfill); AMS-III.F (composting), and/or AMS-III.H (waste water treatment).
23. Project emissions from transportation of oil seeds to the oil production plant are estimated using the latest version of the tool “Project and leakage emissions from

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

5.4. Leakage

24. Leakage emissions are calculated as follows:

$$LE_y = -LE_{upstream,y}$$

Equation (5)

Where:

LE_y	=	Leakage in year y (t CO ₂)
$LE_{upstream,y}$	=	Negative leakage due to reducing indirect emissions associated with the production of petrodiesel (t CO ₂)

25. The substitution of plant oil for petrodiesel reduces indirect (“upstream”) emissions associated with the production of petrodiesel ($LE_{upstream}$) and is treated as negative leakage⁷ and can be calculated as per the methodological tool “Upstream leakage emissions associated with fossil fuel use”.

5.5. Emission reduction

26. The emission reduction achieved by the project activity shall be calculated as the difference between the baseline emissions and the sum of the project emissions and leakage.

$$ER_y = BE_y - MAX(PE_y + LE_y, 0)$$

Equation (6)

Where:

ER_y	=	Emission reductions in the year y (t CO ₂ e)
BE_y	=	Baseline emissions in year y (t CO ₂ e)
PE_y	=	Project emissions from plant oil production in year y (t CO ₂ e)
LE_y	=	Leakage emissions in year y (t CO ₂ e)

27. The emissions from the production of plant oil are compared to the emissions 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 methodology

28. The following parameters shall be monitored as per the tables below. The applicable requirements specified in the “General guidelines for SSC CDM methodologies” (e.g.

⁷ Emission reduction from reducing international bunker fuel consumption is not eligible under CDM as per EB 25 report, paragraph 58.

calibration requirements, sampling requirements) are also an integral part of the monitoring guidelines specified below and therefore shall be referred by the project participants.

6.1. Data and parameters monitored

29. The following parameters shall be monitored and recorded during the crediting period:

Data / Parameter table 1.

Data / Parameter:	H_{k,y}
Data unit:	Tonnes
Description:	Harvest of crop <i>k</i> in year <i>y</i>
Measurement procedures (if any):	Measurements are undertaken using calibrated meters
Monitoring frequency:	Annually
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	OY_{k,y}
Data unit:	m ³ oil/ t crop
Description:	Oil yield of crop <i>k</i> in year <i>y</i>
Measurement procedures (if any):	Measured and calculated value. The plant oil extraction data shall be cross-checked with the amount of plant oil consumed by end-users
Monitoring frequency:	Annually
Any comment:	-

Data / Parameter table 3.

Data / Parameter:	
Data unit:	%
Description:	Oil content of oil seeds
Measurement procedures (if any):	Laboratory analysis to be carried out. The value is to be established on representative samples
Monitoring frequency:	Annually
Any comment:	-

Data / Parameter table 4.

Data / Parameter:	NCV_k
Data unit:	GJ/m ³
Description:	Net calorific value of plant oil <i>k</i>
Measurement procedures (if any):	Measured according to relevant national/international standards. Analysis has to be carried out by accredited laboratory

Monitoring frequency:	Annually
Any comment:	-

Data / Parameter table 5.

Data / Parameter:	NCV_D
Data unit:	GJ/m ³
Description:	Net calorific value of petrodiesel
Measurement procedures (if any):	Measured according to relevant national/international standards. Analysis has to be carried out by accredited laboratory
Monitoring frequency:	Annually
Any comment:	-

Data / Parameter table 6.

Data / Parameter:	FP_{k,y}
Data unit:	m ³
Description:	Plant oil type <i>k</i> produced in the year <i>y</i>
Measurement procedures (if any):	Measurement through direct weighting or volume
Monitoring frequency:	Continuously or in batches
Any comment:	-

Data / Parameter table 7.

Data / Parameter:	FC_{k,y}
Data unit:	m ³
Description:	Plant oil type <i>k</i> consumed in the year <i>y</i>
Measurement procedures (if any):	Measurements of the amount of plant oil sold to retailers and filled into vehicles of the final end users and captive fleets are undertaken using calibrated meters for volume. Measurements results shall be cross-checked with production and consumption data
Monitoring frequency:	Continuously or in batches
Any comment:	-

Data / Parameter table 8.

Data / Parameter:	f_{PD,y}
Data unit:	%
Description:	Fraction of petrodiesel in the fuel used for blending
Measurement procedures (if any):	Data from the supplier of the fuel used for blending
Monitoring frequency:	Continuously or in batches
Any comment:	-

30. The compliance of pure plant oil and plant oil blends with national regulations or in absence of latter compliance with the parameters identified in Table 2 shall be ensured through monitoring.
31. If paragraph 3(b) is applicable, the engine conversion of the vehicles shall be monitored and verified by sampling.
32. It shall be monitored and verified that no plant oil is exported to Annex I countries.

7. Project activity under a programme of activities

33. 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>
03.0	28 November 2014	EB 81, Annex 18 Revision to: (a) Introduce the methodological tool "Project emissions from cultivation of biomass", taking advantage of its procedures and applicability criteria, and removing obsolete procedure; (b) Streamline biomass cultivation procedures; (c) Streamline transport and energy consumption related project emissions procedures; (d) Improve the emission reduction calculations; (e) Remove restrictions for application in a PoA.
02.0	30 July 2010	EB 55, Annex 33 To include default factors for project emissions associated with the oil seed cultivation and procedures for accounting methane project emissions.
01.0	30 November 2007	EB 36, Annex 22 Initial adoption.

Decision Class: Regulatory
Document Type: Standard
Business Function: Methodology
Keywords: plant oil, simplified methodologies, transport, type (iii) projects
