Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

TYPE I - RENEWABLE ENERGY PROJECTS

Note: Categories I.A., I.B. and I.C. involve renewable energy technologies that supply electricity, mechanical and thermal energy, respectively, to the user directly. Renewable energy technologies that supply electricity to a grid fall into category I.D.

Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html.

I.F. Plant oil production and use for transport applications

Technology/measure

1. This methodology covers project activities involving the cultivation of oilseeds, the production of plant oil[1] and the use of plant oil for transportation. Plant oil in contrast to bio-diesel is not trans-esterified but only pressed and filtered from oilseeds.

2. This methodology is only applicable to plant oil that is used in blends of up to 10% by volume of plant oil or used as pure. In case pure plant oil is used it shall be used as a fuel only in converted vehicles[2]. The use of pure plant oil in vehicles where engine conversions have not been carried out is not covered under this methodology.

3. This methodology is applicable under the following conditions:

(i) In the baseline situation the vehicles use diesel.

(ii) In case of blending, plant oil is blended with pure diesel and not with bio-diesel or bio-diesel blends.

(iii) Plant oil must comply with national quality regulations or in absence of the latter with the quality standards stipulated in table I.F.1.

(iv) 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.

(v) Under this methodology only the CO_2 emissions from diesel displaced by plant oil is considered.[3]

[1] 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 or jatropha oil.

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

[3] Project participants are encouraged to submit procedures to calculate upstream emissions related to the production and use of fossil fuel in the baseline

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I.F. Plant oil production and use for transport applications (cont)

(vi) 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.

(vii) No biomass and/or wastes generated/used in the cultivation and processing of the oilseeds will be stockpiled, disposed or treated in such a way as to allow anaerobic decay that result in methane emissions.

Table I.F.1: 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^{o}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^{o}C)	mm^2/s	-	Variable	DIN EN ISO 3104

4. The cumulative rated capacity of the vehicles using plant oil shall not exceed 15 MW. The rating of the vehicles shall be based on manufacturers specifications or based on the certificates issued by local road transport authorities (e.g vehicle registration documents, roadworthiness certificates etc.).

Boundary

5. 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.

Project Activity Emissions

6. Project activity emissions 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[4].

[4] 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

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I.F. Plant oil production and use for transport applications (cont)

7. Project emissions from the cultivation of oil seeds and production of oil plants, in accordance with the "General guidance on leakage in biomass project activities" for small scale project, are:

a) Emissions from energy use for processing (e.g. pressing and filtering) of plant oil;

b) N_2O emissions resulting from either from fertilizer application and/or from nitrogen in crop residues (above-ground and below-ground).

For each oilseed/plant oil type "k" the project emissions shall be calculated separately.

$$PE_y = \sum_k PE_{PO,k,y} \quad \textbf{(1)}$$

Where:

PE_y	Total project emissions from plant oil production (tCO_{2e}/ton plant oil produced) in year "y"
$PE_{PO,k,y}$	Project emissions from plant oil production of crop "k" (tCO_{2e}/ton plant oil "k" produced) in year "y"

$$PE_{PO,k,y} = \frac{PE_{FA,k,y} + PE_{OFP,k,y}}{H_{k,y} \times OY_{k,y}} \quad \textbf{(2)}$$

Where:

$PE_{OFP,k,y}$	Project emissions from energy use for oil-seed processing (e.g. pressing and filtering) of crop "k" in year "y" (tCO_2)
$PE_{FA,k,y}$	Project emissions of N_2O in cultivation of crop "k" in year "y" (tCO_{2e})
$H_{k,y}$	Harvest of crop "k" in year "y" (ton crop)
$OY_{k,y}$	Oil yield of crop "k" in year "y" (ton oil/t crop)

8. Project emissions from energy use for processing (e.g. pressing and filtering) of plant oil are determined as follows:

$$PE_{OFP,k} = EC_{OFP,k} \times EF_{CO2,ELEC} + \sum_i \left(FC_{OFP,i,k} \times NCV_i \times EF_{CO2,i} \right) \quad \textbf{(3)}$$

Where:

$EC_{OFP,k}$	Electricity consumption in processing (e.g. pressing and filtering) for crop "k" in year "y" (MWh)
$EF_{CO2,ELEC}$	Emissions factor for grid electricity supplied to the project plant using the calculation methods of AMS I.D (tCO_2e/MWh)
$FC_{,OFP,i,k}$	Consumption of fossil fuel "i" for filtering and pressing for crop "k" in year "y" (tons)
NCV_i	Net calorific value of fossil fuel "i" (GJ/ton)

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$EF_{CO2,i}$ Emissions factor of fossil fuel "i" (tCO_2/GJ fuel)

9. The N_2O emissions from cultivation of plant oil are determined as follows:

$$PE_{FA,k} = \left[\left(F_{ON,k} + F_{SN,k} + F_{CR,k}\right) \times EF_{N2O\_direct}\right] \times \frac{44}{28} \times GWP_{N2O} \quad \textbf{(4)}$$

Where:

$F_{ON,k}$ Amount of organic fertilizer nitrogen applied in crop "k" in year "y" (ton N)

$F_{SN,k}$ Amount of synthetic fertilizer nitrogen applied in crop "k" in year "y" (ton N)

$F_{CR,k}$ Amount of N in residues of crop "k" in year "y" (ton N). For N-fixing crops like soybean F_{CR} shall be taken into account. For other types of crops F_{CR} can be ignored. F_{CR} shall be calculated in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol 4, chapter 11

$EF_{N20\_}$ N_2O emission factor for emissions from N inputs (ton N_2O-N/ton N input). A default value of 0.01 can be taken in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol 4, Table 11.1 p.11.26

GWP_{N2O} Global warming potential of N_2O (tCO_{2e}/tN_2O) (value of 310)

10. Project emissions from clearance of lands are addressed by the applicability conditions of the methodology.

Baseline

11. Baseline emissions 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.

$$FC_{D,y} = \sum_{k=1..n} \frac{NCV_k}{NCV_D} \times FC_{k,y} \quad \textbf{(5)}$$

Where:

$FC_{D,y}$ Diesel fuel which would have been consumed in the absence of the project activity in the year "y" (tons)

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" (tons)

"k" Types of plant oil used (dependent on oil-seed source)

Under the condition of:

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$$FC_{k,y} \leq FP_{k,y} \quad \textbf{(6)}$$

Where:

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

12. 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.

13. 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.

14. Total baseline emissions are determined as follows:

$$BE_y = FC_{D,y} \times NCV_D \times EF_{CO2,D} \quad \textbf{(7)}$$

Where:

BE_y Baseline emissions in year "y" (tCO_2e)

NCV_D Net calorific value of diesel (GJ/ton)

$EF_{CO2,D}$ CO_2 emission factor diesel (tCO_2e/GJ)

Leakage

15. If equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.

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 plant oil is produced in the baseline situation in the area of land where plant oil is cultivated in the project situation, 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. Leakage shall be estimated accordingly and deducted from the emission reductions.

Monitoring

18. The following parameters shall be monitored:

(i) The crop harvest, oil content of the oil seeds and amount of plant oil produced per crop source per production location. The extent of the area where plant oil is produced should be consistent with the yield of the cultivation, the plant oil extraction and with the amount of plant oil consumed by end-users.

(ii) The energy use (electricity and fossil fuel) for the production of plant oil and the amount of fertilizer applied for the cultivation of plant oil per crop source per production location.

(iii) The occurrence of shift of pre-project activities and the competing uses of biomass shall be monitored and verified.

(iv) The NCV of plant oils are determined based on direct measurements of a representative sample.

(v) 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 I.F.1 .

(vi) The amount and type of plant oil sold to retailers and filled into the vehicles of the final end users and captive fleets must be recorded by a calibrated metering system. Records of these vehicles and the plant oil (blends) consumed by these vehicles shall be provided.

(vii) In case the plant oil is sold and/or used as blend then the following shall be recorded by the retailer or by the owner of the captive fleet:

(viii) The amount of plant oil bought (FB_{PO});

(ix) The amount of diesel bought (FB_D);

(x) The amount of blended plant oil used (FC_{PO}) by the captive fleet or sold to final clients.

(xi) In case of blending, the maximum blending ratio of 10% shall be controlled at the sites that sell the plant oil blends. FB_{PO} can be maximally 10% of FB_D. In addition the procedure for blending shall ensure that the blending ratio is maximally 10% by volume.

(xii) In case of use of pure plant oil it shall be monitored and verified by random sampling that the vehicles have carried out engine conversions.

(xiii) The contracts between the producer of plant oil and the final users and retailers specifying that only the producer of plant oil can claim CERs, the obligation for engine conversions in case of pure plant oil use and the rated capacity of the vehicles shall be recorded and verified by random sampling.

(xiv) It shall be monitored and verified that no plant oil is exported to annex 1 countries.

19. 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.

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(8)}$$

Where:

ER_y Emission reductions in the year "y" (t CO_2e)

LE_y Leakage in year "y" (t CO_2e)

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Project activity under a programme of activities

20. In order this methodology to be used under a programme of activities a further analyses is required, for instance a further analysis concerning issues related to the shift of the 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 a revision to this methodology to make this methodology applicable to a programme of activities for EB approval.

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