Voluntary Gold Standard Small-scale Methodology:

Thermal energy from plant oil for the user of cooking stoves

Version 1.0

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Section I: SOURCE AND APPLICABILITY

I.1 Sources and validity

This methodology makes use of elements of the latest approved versions of the following Voluntary Gold Standard and CDM methodologies:

- "Methodology for Improved Cook-stoves and Kitchen Regimes ";
- AMS-I.C "Thermal energy production with or without electricity ";
- AMS-I.E "Switch from Non-Renewable Biomass for Thermal Applications by the User";
- AMS-III.T "Plant oil production and use for transport applications";
- AMS-III.E "Avoidance of methane production from decay of biomass through controlled combustion, gasification or mechanical/thermal treatment";
- AMS-III.F "Avoidance of methane emissions through controlled biological treatment of biomass";
- AMS-III.H "Methane recovery in wastewater treatment";
- AMS-III.I "Avoidance of methane production in wastewater treatment through replacement of anaerobic systems by aerobic systems";

This methodology refers to the latest approved versions of the following CDM methodology tools and guidelines. (Version number at time of writing in brackets)

- "Tool for the demonstration and assessment of additionality";
- "General guidelines on sampling and surveys";
- "General guidance on leakage in biomass project activities";
- "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site";

I.2 Applicability

1. This methodology applies to the use of various plant oils[1] (e.g. physic nut oil, coconut oil, palm oil) within stoves for cooking and water heating, in households or small enterprises like restaurants or breweries.

2. The total installed/rated thermal energy generation capacity of the project equipment is equal to or less

[1] Plant oil, or vegetable oil, is oil of plant origin composing of triglycerides. Although many different part of the plants may yield oil, the most often oil is extracted from the seeds or fruits of the plant. Plant oil in contrast to bio-diesel is not trans-esterified but only pressed and filtered from oilseeds.

than 45 MW thermal[2]

3. This methodology covers the entire plant oil lifecycle, including cultivation of oilseeds or fruits, oil extraction and filtering process, and burning of oil in the stoves.

4. This methodology applies to plant oil that is used as pure plant oil.

5. This methodology is applicable under the following conditions:

(i) In the baseline situation the existing stoves use fossil fuels such as kerosene or LPG, or non-renewable biomass. The emission factor to consider in case of a baseline including the use of non-renewable biomass can either be based on the default wood carbon content and net calorific value provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories or on the proxy fuel approach described in the CDM small-scale methodology AMS.I.E. The non-renewable biomass fraction must be evaluated in line with the approach described in Annex 1 of the latest approved version of the Gold Standard VER "Methodology for Improved Cook-stoves and Kitchen Regimes ".

(ii) The use of the existing old stoves in parallel with the new stoves after project implementation is allowed for under the condition that a mechanism is put in place to provide an incentive for the surrendering of the old stoves. This mechanism can be in the form of a discount of emission reductions from the households where the old stoves are still in use, or a discount on the selling price of the stoves for households surrendering their old stove.

(iii) Plant oil must comply with national quality regulations or in absence of the latter with the quality standards stipulated by the CDM small-scale methodology AMS.III.T[3].

(iv) The stove producers, the retailers, and the producers of the plant oil are bound by a contract that clearly states who will claim the emission reductions resulting from the project. The contract must enable the project participants to monitor the consumption of plant oil and a copy of the contract must be provided at the time of submission for registration. A mechanism must be put in place so that end users are aware that they cannot claim for emission reductions from the project, e.g. waiver forms signed by end-users in exchange for a discount on the price of the stoves.

(v) Under this methodology emission reductions from kerosene, LPG or other fossil fuels displaced by plant oil are considered conservatively without upstream emissions related to the production and use of fossil fuel in the baseline.

(vi) Biomass and/or waste waters generated/used in the cultivation and processing of the oilseeds can be stockpiled, disposed or treated, including anaerobic decay with methane emissions. Emissions related to these waste streams must however be accounted for as project emissions and must be evaluated – see section on Project Emissions. Storage and treatment facilities of feedstock, products and waste must therefore be considered within the project boundaries, including those related to the existing plantations.

(Vii) The project activity must comply with GS specific requirements for biomass related project activities defined in the latest version of the Gold Standard rules. These criteria must apply to both plantations established for the project activity AND existing plantations that were established in the context of other activities but will supply plant oil to the project activity and therefore must be considered within the project activity boundaries. In particular:

- The plant oil is of renewable origin, i.e. it originates from plantations where sustainable management practices are undertaken to ensure in particular that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting) and any national or regional forestry, agriculture and nature

[2] Thermal energy generation capacity shall be manufacturer's rated thermal energy output, or if that rating is not available the capacity shall be determined by taking the difference between enthalpy of total output leaving the project equipment and the total enthalpy of input entering the project equipment.

[3] Table III.T.1

conservation regulations are complied with.

- The plant oil is not sourced from existing plantations to the detriment of other existing uses for similar or different activities. Convincing evidence must therefore be provided that the current users are in agreement with the shift of use, e.g. by inviting representatives of current users to the stakeholder consultation meetings and gauge their consent on the project activity. In the absence of such an agreement, the project applicant shall demonstrate ex-ante, at the beginning of each crediting period, that biodiesel has been produced from surplus plant oil (in accordance with the approach defined in the section on Leakage), and shall include this in the Sustainability Monitoring Plan.

- Project applicants shall demonstrate that the project activity makes use of otherwise set aside or marginal land, unless it can be demonstrated that the growing of dedicated energy crops is part of a traditional rotational cropping, and shall include this in the Sustainability Monitoring Plan. This prevents competition with e.g. food cropping or animal grazing and avoids the situation of a shift of pre-project activities.

- The eligibility of project activities making use of Palm oil shall be evaluated on a case-by-case basis by the Gold Standard Foundation in the light of a Pre-feasibility assessment. Project applicants must demonstrate that they have started the process for RSPO compliance at the time of submission for the pre-feasibility assessment.

- Project activities making use of GMOs shall declare so in a transparent way. Local stakeholders opinion on GMOs shall prevail and appropriate mitigation measures shall be put in place to address their concerns, if any, in a satisfactory way.

(Viii) Project emissions from clearance of land must be addressed in line with Clause 15 and Clause 16 of the "General guidance on leakage in biomass project activities"[4]. Furthermore, plantations must not have been established on peat lands subject to CO2 emissions after drainage.

Section II: BOUNDARY

6. The project boundary is the geographical area of the cultivation, production and processing of oil-seeds (production sites), the areas where the plant oil is distributed to the final users (distribution points), where the plant oil is used to generate renewable energy (consumption points), and where biomass and/or waste waters generated/used in the cultivation and processing of the oilseeds is stockpiled, disposed or treated.

Section III: ADDITIONALITY

7. The Additionality of the project activity shall be evaluated with the use of an approved UNFCCC tool or an approved GS tool for the evaluation and assessment of additionality (see GSv2.1 Toolkit, Table 2.2, p. 34).

[4] http://cdm.unfccc.int/methodologies/SSCmethodologies/AppB_SSC_AttachmentC.pdf

Section IV: BASELINE

8. It is assumed that in the absence of the project activity, the baseline scenario would either be the use of fossil fuels (kerosene, LPG) or of non-renewable biomass for meeting similar thermal energy needs in existing cookstoves, based on the observed boundary conditions prior to the installation of the new stoves. IPCC default values for emission coefficients may be used.

9. For heat produced replacing fossil fuel the baseline emissions are calculated as follows:

$$BE_y = \sum_i^n BE_{y,i} \quad (1)$$

$$BE_{y,i} = HG_y * f_{\text{fossil fuel i}} * EF_{\text{fossil fuel i, CO2}} * \eta th_{\text{fossil fuel i}}^{-1} \quad (2)$$

where:

Data	Description	Unit	Value	Reference
BE_y	Total baseline emissions from heat displaced by project activity during year "*y*"	tCO_2e/yr		Calculated on ex-post basis
$BE_{y,i}$	Baseline emissions from heat displaced by project activity of using fossil fuel i during year "*y*"	tCO_2e/yr		Calculated on ex-post basis
HG_y	Net quantity of heat supplied by the project activity during the year "*y*"	TJ/yr		From monitoring (equation 4)
$f_{\text{fossil fuel i}}$	Fraction of heat derived from fossil fuel *i* of the total of baseline used fossil fuel types	none		Determined from baseline surveys or national statistics. Sum of all fractions = 1
$EF_{\text{fossil fuel i, CO2}}$	CO_2 emission factor of fossil fuel "*i*" per unit of energy	tCO_2e/TJ		Default value from 2006 IPCC Guidelines
$\eta th_{\text{fossil fuel i}}$	Efficiency of the stove using fossil fuel *i* in the baseline scenario	none		Data to be provided by the project

10. The fraction of heat derived from different fuels in the baseline shall be determined with one of the following options:

(a) Static baseline monitoring: baseline household survey before the start of project and static projection of shares over the crediting period of 7 years (renewable) or 10 years (fixed). Evidence should be provided that the share of all fossil fuels used for cooking in the households is not likely to change over the crediting period. If the baseline fuel is biomass, the non-renewable biomass fraction must be re-assessed on a bi-annual basis.

(b) Dynamic baseline monitoring: identification of the fraction of heat derived from different fuels in the absence of the project activity in year y that can be established as fossil fuel or non-renewable biomass using survey methods. Bi-annual monitoring must be conducted for a sample of households similar to the households using project biofuel stoves to determine the share of different fossil fuels (e.g. kerosene, LPG), in line with the CDM "General Guidelines on Sampling and Surveys".

(c) Conservative worst case scenario: Baseline emission are assumed to be emitted by the least pollutant fossil fuel with a 1.0 fraction of this fossil fuel over the entire project period.

11. The efficiency of the baseline cooking stove units shall be determined by adopting one of the following options:

(a) Measured efficiency for a representative sample; sampling must be conducted in line with the CDM Draft General Guidelines on Sampling and Surveys.

(b) Appropriate and relevant referenced literature values,

(c) Maximum efficiency of 100%.

12. The net quantity of heat supplied by the project activity is calculated as follows:

$$HG_y = \sum_i^n HG_{y,i} \quad (3)$$

$$HG_{y,i} = FC_{VO,i,y} * NCV_{veg,i} * 10^{-3} * \eta th_{VO,i} \quad (4)$$

where:

Data	Description	Unit	Value	Reference
HG_y	Net quantity of heat supplied by the project activity during the year "*y*"	TJ/yr		Calculated on ex-post basis
$HG_{y,i}$	Net quantity of heat supplied by the project activity during the year y on basis of vegetable oil "*i*"	TJ/yr		Calculated on ex-post basis
$FC_{VO,i,y}$	Total quantity of vegetable oil type *i* used per year by oil stoves in the project	t/yr		Provided on ex-post basis by recording the volumes of vegetable oil distributed to the consumers by the distribution points
$NCV_{veg,i}$	Net calorific value of vegetable oil type "*i*" (TJ/Gg)	MJ/kg		NCV of plant oils are determined based on direct measurements of a representative sample[5].
$\eta th_{VO,i}$	Efficiency of the plant using vegetable oil '*i*'	none		Data to be provided by the project

13. The net quantity of heat supplied by the project determined through the amount of distributed vegetable oils will be cross-check with the total operating time of vegetable stoves which will be determined by periodic sampling (see monitoring section), in line with the CDM Draft General Guidelines on Sampling and Surveys.

$$FC_{VO,i,y} = N_{VO\ stoves,y} * CONS_{VO} * OT_{VO\ stove,y} * \rho_{VO} * 10^{-3} \quad (5)$$

[5] These measured values can be compared with values from the literature, e.g. 40.6 MJ/kg for physical nut (Eder & Eder 2006: Pflanzenöl als Kraftstoff. Ökobuch, Staufen), or 40.0 MJ/kg for crude palm oil (Sumiani Yusoff, 2006: Renewable energy from palm oil. Journal of Cleaner Production 14 (2006) 87-93, Elsevier).

where:

Data	Description	Unit	Value	Reference
$FC_{VO,i,y}$	Total quantity of vegetable oil type "*i*" used per year by oil stoves in the project	t/yr		Provided with sampled surveys of consumer cooking habits
$N_{VO\ stoves,\ y}$	Number of systems (vegetable oil stoves) in the project	none		Data to be provided by the project
$CONS_{VO}$	Consumption of vegetable oil of stove per hour	l / h		To be specified by the project activity
$OT_{VO\ stove,\ y}$	Operating time (average hours) of vegetable oil stove in year "*y*"	h		To be specified by the project activity
$\rho_{VO,i}$	Density of vegetable oil "*i*" used in the project activity	kg/l		Data to be provided by the project

Section V: LEAKAGES

14. If the energy generating equipment is transferred from or to another activity, potential leakage is to be considered.

15. When the project activity makes use of plant oil produced by existing plantations, project applicants must either provide convincing evidence that the plant oil considered is surplus plant oil or that the current users are in agreement with the shift of use. Applicants are required to use at least two of the following methods from the four methods defined below to capture the data on leakage (the DOE must check reliability of used data sources at the Validation stage and deliver a statement as part of the Validation Report):

a. Reliable official data from authorities: this option can be used for e.g in cases where information on plant oil generated from industries can be made available. This information should not be more than three years old from the time period when validation started.
b. Scientific publications: this can be a useful source of information for e.g. if research papers or articles have been published and are available in public domain that provide specific information about current uses of the plant oil used by the project. Such information should not be more than three years old from the time period when validation started. This can support other data sources but cannot be considered as only means to capture the intended data.
c. Interviews with producers and users of plant oil: this can be used as a source of information. Representatives of these companies can be then invited to stakeholder consultation meeting/or separate meeting can be organised and information on the current use practice can be collected. Customised questionnaires may be designed to collect this information.
d. Third party statistically representative surveys: these surveys can be used to capture quantitative information on plant oil production and use.

In defining the geographical boundary of the region within which the leakage issue must be assessed, project participants must take into account the maximum distance over which plant oil is transported, with as the upper limit the borders of the host country. The geographical boundary can be province(s) or state(s) where the plant oil is produced and distributed, or circular regions defined by a radius equal to the longer distance over which the plant oil is transported with the plantations as the centers. In case the project activity is located in a country where province or state boundaries are not clearly and officially defined, applicants must make use of the radius approach or consider the country as a whole

The plant oil sourced from existing plantations can be considered surplus plant oil if the project participant can demonstrate, ex ante, at the beginning of each crediting period, that the quantity of available biomass in the considered region as per the definition above, is at least 25% larger than the quantity of biomass that is utilised including the project activity. In such case, this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

If plant oil considered is not surplus plant oil, but current users are in agreement with the shift of use, project applicants must demonstrate that none of these current users will shift to fossil fuel due to implementation of the project activity (using the same approach as above), or this source of leakage shall be estimated and deducted from the emission reductions. A leakage penalty shall be applied as per the approach followed by the GS voluntary methodology 'Biodiesel from waste oil/fat from biogenic origin for use as fuel' (p. 12,13)[6].

Section VI: PROJECT EMISSIONS

16. Project activity emissions are upstream emissions related to the production and processing of the plant oil. Upstream project activity emissions are the emissions related to the cultivation of oil seeds and production of plant oil ("field-to-stove" emissions). These emissions are fully attributed to the plant oil produced and not shared over different co-products. Emissions from pre-heater have to be accounted if they are over 1% of project emissions and not renewable (e.g. fossil spirit).

17. Project emissions from the cultivation of oil seeds and production of oil plants are:

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

b) N_2O emissions resulting 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.

$$PE_{P,y} = \sum_{k} (PE_{PO,k,y} \times OY_{k,y}) \quad (6)$$

where:

Data	Description	Unit	Value	Reference
$PE_{P,y}$	Total project emissions from plant oil production in year "*y*"	tCO_2e		Calculated on ex-post basis
$PE_{PO,k,y}$	Project emissions from plant oil production of crop "*k*" in year "*y*"	tCO_{2e}/ton plant oil "k" produced		Calculated (see equation 7)
$OY_{k,y}$	Oil yield of crop "*k*" in year "*y*"	tons of oil		Value to be specified by the project activity

6 http://www.cdmgoldstandard.org/fileadmin/editors/files/6_GS_technical_docs/manuals_and_methodolgies/Biodiesel_from_waste_oil_and_fat_06_08_2009.pdf

$$PE_{PO,k,y} = \frac{PE_{FA,k,y} + PE_{OFP,k,y}}{H_{k,y} \times SOY_{k,y}} \quad (7)$$

where:

Data	Description	Unit	Value	Reference
$PE_{PO,k,y}$	Project emissions from plant oil production of crop "*k*" in year "*y*"	tCO_{2e}/ton plant oil "k" produced		Calculated
$PE_{FA,k,y}$	Project emissions of N_2O in cultivation of crop "*k*" in year "*y*"	tCO_{2e}		Calculated (see equation 8)
$PE_{OFP,k,y}$	Project emissions from energy use for oil-seed processing (e.g. pressing and filtering) of crop "k" in year "y"	tCO_2		Calculated (see equation 9)
$H_{k,y}$	Harvest of crop "k" in year "y"	ton crop		Value to be specified by the project activity
$SOY_{k,y}$	Specific oil yield of crop "k" in year "y"	ton oil/t crop		Value to be specified by the project activity

18. The N_2O emissions from cultivation of oil plants are determined as follows:

$$PE_{FA,k,y} = [(F_{ON,k} + F_{SN,k} + F_{CR,k}) \times EF_{N2O\_direct}] \times \frac{44}{28} \times GWP_{N2O} \quad (8)$$

where:

Data	Description	Unit	Value	Reference
$PE_{FA,k,y}$	Project emissions of N_2O in cultivation of crop "*k*" in year "*y*"	tCO_{2e}		Calculated
$F_{ON,k}$	Amount of organic fertilizer nitrogen applied in crop "*k*" in year "*y*"	ton N		Value to be specified by the project activity
$F_{SN,k}$	Amount of synthetic fertilizer nitrogen applied in crop "*k*" in year "*y*"	ton N		Value to be specified by the project activity
$F_{CR,k}$	Amount of N in residues of crop "*k*" in year "*y*". For N-fixing crops like soybean F_{CR} shall be taken into account. For other types of crops F_{CR} can be ignored.	ton N		Calculated in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 4, chapter 11
EF_{N20_direct}	N_2O emission factor for emissions from N inputs	ton N_2O-N/ton N input	0.01	Default value 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)		310	Default value. Rev. IPCC Guidelines

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

$$PE_{OFP,k,y} = EC_{OFP,k} \times EF_{CO2,ELEC} + \sum_i (FC_{OFP,i,k} \times NCV_i \times EF_{CO2,i}) \quad (9)$$

where:

Data	Description	Unit	Value	Reference
$PE_{OFP,k,y}$	Project emissions from energy use for oil-seed processing (e.g. pressing and filtering) of crop "*k*" in year "*y*"	tCO_2e		Calculated
$EC_{OFP,k}$	Electricity consumption in processing (e.g. pressing and filtering) for crop "*k*" in year "*y*"	MWh		Value to be specified by the project activity
$EF_{CO2,ELEC}$	Emissions factor for grid electricity	tCO_2e/MWh		Supplied to the project plant and/or using the calculation methods of AMS I.D
$FC_{OFP,i,k}$	Consumption of fossil fuel "*i*" for filtering and pressing for crop "*k*" in year "*y*"	tons		Value to be specified by the project activity
NCV_i	Net calorific value of fossil fuel "*i*"	GJ/ton		Value to be specified by the project activity
$EF_{CO2,i}$	Emissions factor of fossil fuel "*i*"	tCO_2/GJ fuel		Rev. IPCC Guidelines

20. Project methane emissions from solid waste disposals ($BE_{CH4,SWDS,y}$) or organic waste effluents ($BE_{CH4,OWE,y}$) shall be fully accounted on a CO_2e / t plant oil basis and deduced from the project emission reductions.

21. If solid organic waste (e.g. empty fruit bunches) is disposed to decay under anaerobic conditions resulting methane emissions (tCO_2e) are calculated according to the "*Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site*" and small-scale methodology AMS-III.E ("Avoidance of methane production from decay of biomass through controlled combustion, gasification or mechanical/thermal treatment") or AMS-III.F ("Avoidance of methane production from decay of biomass through composting") can be applied. The amount of organic waste per tonne of plant oil is determined on the basis of production records, or if such records are not available, on the basis of conservative estimates based on scientific or technical literature.

22. If organic effluents are treated in anaerobic conditions resulting methane emissions (tCO_2e) are calculated according to small-scale methodology AMS-III-H ("Methane recovery in wastewater treatment") or AMS-III-I ("Avoidance of methane in wastewater treatment through replacement of anaerobic lagoons by aerobic systems"). The amount of organic effluents per tonne of plant oil is determined on the basis of production records, or if such records are not available, on the basis of conservative estimates based on scientific or technical literature.

23. 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 as follows:

$$ER_{total,,y} = BE_y - BE_{CH4,SWD,y} - BE_{CH4,OWE,y} - PE_{P,y} - LE_y \quad (10)$$

where:

Data	Description	Unit	Value	Reference
$ER_{total,,y}$	Total annual project emission reductions in year "*y*"	tCO_2e/y		Calculated on ex-post basis
BE_y	Total baseline emissions from heat displaced by project activity during year "*y*"	tCO_2e/yr		Calculated on ex-post basis
$BE_{CH4,SWD,y}$	Project methane emissions from solid waste disposals	tCO_2e/yr		Calculated on ex-post basis
$BE_{CH4,OWE,y}$	Project methane emissions from organic waste effluents	tCO_2e/yr		Calculated on ex-post basis
$PE_{P,y}$	Total project emissions from plant oil production in year "*y*"	tCO_2e/yr		Calculated on ex-post basis
LE_y	Leakage emissions in year "*y*"	tCO_2e/yr		Calculated on ex-post basis

Section VII: MONITORING

24. The following parameters for the stove systems shall be monitored, and sampling procedures must be conducted in line with the CDM Draft General Guidelines on Sampling and Surveys:

(i) Annually the number of systems operating ($N_{VO\ stoves,y}$) (evidence of continuing operation, such as on-going rental/lease payments could be a substitute) is recorded.
(ii) The annual hours of operation of an average system ($OT_{VO\ stove,y}$) is estimated, if necessary using survey methods. Annual hours of operation can be estimated from total output (e.g. litres of water boiled) and output per hour if an accurate value of output per hour is available.
(iii) The amount of plant oil ($FC_{VO\ stove,y}$)and fossil fuel ($FC_{ph,y}$)input shall be determined for each type of fuel on a sample basis for cross-checking with the distributed amounts.
(iv) The calorific capacity of the stove (EC_{VO}), specific plant oil consumption per hour, type and amount of starting fuel of the stove shall be recorded and verified by random sampling.

25. For the plant oil production, processing and distribution systems, the following parameters shall be monitored:

(i) The crop harvest ($H_{k,y}$), oil content of the oil seeds (OC_i) and amount of plant oil produced per crop source ($OY_{k,y}$)per production location. The extent of the area where plant oil is produced should be consistent with crop yield, plant oil extraction and with the amount of plant oil consumed by end-users.
(ii) The amount of solid organic waste (W_x) left to decay under anaerobic conditions, the fraction of methane eventually captured (f), the weight fraction of the regarded waste type in the total solid organic waste ($p_{n,j,x}$) and the number of waste type samples collected in each year (z).
(iii) The amount of organic waste effluents ($Q_{WW,y,m}$) in anaerobic conditions and its chemical oxygen demand ($COD_{y,m}$).
(iv) Alternatively it may be considered if a conservative fixed relation of both W_x and $Q_{WW,y,m}$ per tonne of plant oil produced can be utilized.
(v) The energy use (electricity ($EC_{OFP,k}$) and fossil fuel ($FC_{OFP,k}$)) for the production of plant oil being used and the amount of organic ($F_{ON,k}$) and synthetic ($F_{SN,k}$) fertilizer applied for the cultivation of plant oil per crop source per production location.
(vi) The occurrence of shift of pre-project activities and the competing uses of plant oil shall be monitored and verified.
(vii) The NCV of plant oils are determined based on direct measurements of a representative sample.

(viii) The compliance of plant oil with national regulations or in absence of latter compliance with the with the quality standards stipulated by the CDM small-scale methodology AMS_III.T.

(ix) The amount and type of plant oil sold to retailers and distributed by them to each of the final end users must be recorded with a certified measuring system (Plant oil trading flow).

(x) The contracts between the producer of plant oil, retailers and the final users should specify will claim the emission reductions resulting from the project.