

**Draft approved baseline and monitoring methodology AM00XX****“Avoided emissions from biomass wastes through use as feed stock in pulp and paper production”****I. SOURCE AND APPLICABILITY****Source**

This methodology is based on the project activity "Avoided emissions from biomass wastes through use as feed stock in pulp and paper production, Kunak, Sabah", whose baseline and monitoring methodology and project design document were prepared by SV Carbon, Malaysia.

For more information regarding the proposal and its consideration by the Executive Board please refer to case NM0220: “Avoided emissions from biomass wastes through use as feed stock in pulp and paper production” on <http://cdm.unfccc.int/goto/MPappmeth>

This methodology also refers to the latest approved version of the following tools<sup>1</sup>:

- “Tool for the demonstration and assessment of additionality”,
- “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”,
- “Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion”; and
- “Tool to calculate project emissions from electricity consumption”.

**Selected approach from paragraph 48 of the CDM modalities and procedures**

“Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment”

**Definitions**

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

- **Agricultural wastes** include by-products and residues or waste streams from food production and processing, but excludes wastes from wood production and processing and municipal solid waste.

**Applicability**

The methodology is applicable for project activities using agricultural wastes as feed stock for pulp and paper production similar in characteristics and quality to existing high quality products in the market and does not require special use or disposal methods, henceforth referred to as high quality paper.

The following conditions apply to the methodology:

- The project activity is the construction of a new pulp and paper production facility that uses agricultural wastes as feedstock;
- The waste should not be stored in conditions that would lead to anaerobic decomposition and, hence, generation of CH<sub>4</sub>;
- The pulp and paper produced with the agricultural wastes is of similar characteristics and quality to existing high quality products in the market and does not require special use or disposal methods.

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<sup>1</sup> Please refer to: <http://cdm.unfccc.int/goto/MPappmeth>

- During the production of pulp and paper, no significant additional process leading to emissions of greenhouse gas compared to the baseline scenario, except for electricity and fossil fuel consumption, is envisaged (an example of this can be the use of substance produced with highly GHG intensive activities). If this is the case, then the project participant must submit a request for deviation to include emissions from this source.
- In case the biomass is combusted for the purpose of providing heat or electricity to the plant, the biomass fuel is derived from biomass residues, as specified in ACM0006.

The on-site energy generation source supplying energy to the pulp and paper production plant can be a CDM project activity. To allow this option, only the amount of agricultural waste used as a feedstock for pulp and paper production shall be considered for the purpose of calculating baseline emissions. For this purpose, the amount of agricultural waste recovered and supplied to the pulp and paper plant but used for other purposes such as heat and power production also needs to be monitored.

## II. BASELINE METHODOLOGY PROCEDURE

### Project boundary

The spatial extent of the project boundary is the site of the project activity where the pulp and paper production plant is established. This includes the facilities for processing the agricultural waste into pulp and paper, on-site electricity generation and/or consumption, onsite fuel use, and the thermal energy generation.

The project boundary should include the transportation of the agricultural waste to the pulp and paper production plant in the case where transport distances have increased compared to the conventional handling of the waste.

**Table 1: Summary of gases and sources included in the project boundary, and justification / explanation where gases and sources are not included.**

	Source	Gas	Included?	Justification / Explanation
Baseline	Emissions from decomposition of agricultural waste at the landfill site	CO <sub>2</sub>	No	CO <sub>2</sub> emissions from the decomposition of organic waste are not accounted.
		CH <sub>4</sub>	Yes	The major source of emissions in the baseline.
		N <sub>2</sub> O	No	N <sub>2</sub> O emissions are small compared to CH <sub>4</sub> emissions from landfills. Exclusion of this gas is conservative.
Project Activity	Transportation of agricultural waste to the project site	CO <sub>2</sub>	Yes	Main greenhouse gas emitted.
		CH <sub>4</sub>	No	Excluded for simplification. CH <sub>4</sub> emissions are assumed to be very small.
		N <sub>2</sub> O	No	Excluded for simplification. N <sub>2</sub> O emissions are assumed to be very small.
	Emissions from onsite use of fossil fuels	CO <sub>2</sub>	Yes	CO <sub>2</sub> emissions from the on site use of fossil fuels can be significant.
		CH <sub>4</sub>	No	Excluded for simplification. CH <sub>4</sub> emissions are assumed to be very small.
		N <sub>2</sub> O	No	Excluded for simplification. N <sub>2</sub> O emissions are assumed to be very small.
	Emissions from onsite use of electricity	CO <sub>2</sub>	Yes	CO <sub>2</sub> emissions from on site use of electricity can be significant.
		CH <sub>4</sub>	No	Excluded for simplification. CH <sub>4</sub> emissions are assumed to be very small.
		N <sub>2</sub> O	No	Excluded for simplification. N <sub>2</sub> O emissions are assumed to be very small.

### Identification of the baseline scenario

Project proponents shall determine the most plausible baseline scenario through the application of the following steps:

*Step 1. Identify all realistic and credible alternatives to the project activity*

Project participants should use step 1 of the latest version of the “Tool for the demonstration and assessment of additionality”, to identify all realistic and credible baseline alternatives. In doing so, relevant policies and regulations related to the management of agricultural waste should be taken into

account. Such policies or regulations may include local regulation on open burning of the agricultural waste, incentives for use of the agricultural waste for energy production, etc. In addition, the assessment of alternative scenarios should take into account local economic and technological circumstances.

Realistic and credible alternatives should be developed separately regarding:

- (1) How the agricultural waste would have been treated?
- (2) What is the alternative feedstock for the paper production?

For the baseline for the agricultural waste (1) at least the following alternatives should be analysed:

- B1 Use of agricultural waste as material for paper production, not implemented as a CDM project.
- B2 The agricultural waste is dumped or left to decay under mainly aerobic conditions, such as stockpiling.
- B3 The agricultural waste is dumped or left to decay under clearly anaerobic conditions, such as landfilling.
- B4 The agricultural waste is burnt in an uncontrolled manner without utilizing it for energy purposes.
- B5 The agricultural waste is used for heat and/or electricity generation or as other source of energy in other projects.
- B6 The agricultural waste is used for non-energy purposes, e.g. as mulching

For the production of paper (2) at least the following alternatives should be analysed:

- P1 The project activity undertaken without CDM.
- P2 Construction of a new pulp and paper plant and paper production using other locally available sources of cellulose.
- P3 No installation of a new pulp and paper plant at the project site but paper production in other new and/or existing paper plants at other sites, using locally available cellulose typically used in the region.

*Step 2. Eliminate alternatives that face prohibitive barriers or are economically not attractive*

Project participants should use steps 2 of the latest version of the “Tool for the demonstration and assessment of additionality” to assess which of the above alternatives should be excluded from further consideration (e.g. alternatives facing prohibitive barriers or those clearly economically unattractive).

*Step 3: Selection of baseline scenario*

Where more than one credible and plausible alternative remains, project participants shall, as a conservative assumption, use the alternative baseline scenario that results in the lowest baseline emissions as the most likely baseline scenario. The least emission alternative will be identified for each component of the baseline scenario. In assessing these scenarios, any regulatory or contractual requirements should be taken into consideration.

The methodology is only applicable if:

- (i) The most plausible baseline scenario for the agricultural waste is identified as the disposal of the waste in a landfill (Scenario B3); and
- (ii) The most plausible baseline scenario for the production of paper is either paper production using other locally available sources of cellulose (P2) or no installation of a paper plant at the project site but paper production in other new and/or existing paper plants at other sites using locally available cellulose typically used in the region (P3).

If the identified scenario is B3, then either of the following needs to be demonstrated to ensure that the condition is expected to last during the crediting period:

- Establish that the identified landfill(s) can be expected to accommodate the agricultural waste to be used for the project activity for the duration of the crediting period, or
- Establish that it is common practice in the region to dispose of the agricultural waste in solid waste management site (landfill).

### Additionality

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*”.

The barriers may include the following:

- The use of agricultural waste may face technological barriers;
- The raw material is either not used or less than 10% of the paper production in the region is based on agricultural waste.

### Baseline emissions

Baseline emissions include methane emissions from the agricultural wastes that would be dumped at the landfill as well as baseline emissions from production of paper in the absence of the project activity in either a new plant at the project site (P2) or in other (new) paper production facilities using locally available cellulose typically used in the region in the absence of the project activity (P3). As a conservative simplification, baseline emissions from production of paper are assumed to be zero.

Baseline emissions are calculated as follows:

$$BE_y = BE_{CH_4,SWDS,y} \quad (1)$$

Where:

- $BE_y$  = Baseline emissions in year  $y$  (tCO<sub>2</sub>e/yr)  
 $BE_{CH_4,SWDS,y}$  = Methane emissions avoided during the year  $y$ , calculated according to the latest approved version of the “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”

NOTE: For the purpose of this methodology, the value  $W_{j,x}$  of the tool should correspond to the amount of agricultural waste used as feedstock for paper production.

### Project emissions

Project emissions are calculated as follows:

$$PE_y = PE_{FC,j,y} + PE_{EC,y} + PE_{CO_2,TR,y} \quad (2)$$

Where:

- $PE_y$  = Project emissions in year  $y$  (tCO<sub>2</sub>e/yr)  
 $PE_{FC,j,y}$  = Project emissions from fossil fuel combustion in process  $j$  during the year  $y$  (tCO<sub>2</sub> / yr)  
 $PE_{EC,y}$  = Project emissions from electricity consumption by the project activity during the year  $y$  (tCO<sub>2</sub>e/yr)  
 $PE_{CO_2,TR,y}$  = Project emissions from increased transport of agricultural waste to the plant in year  $y$

(tCO<sub>2</sub>e/yr)*Project emissions from fossil fuel combustion (PE<sub>FC,j,y</sub>)*

The project emissions from fossil fuel combustion (PE<sub>FC,j,y</sub>) will be calculated following the latest version of “Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion”. For this purpose, the processes *j* in the tool corresponds to all fossil fuel combustion in the paper plant established as part of the project activity, as well as any other on-site fuel combustion for the purposes of the project activity.

*Project emissions from electricity consumption by the project activity (PE<sub>EC,y</sub>)*

The project emissions from electricity consumption (PE<sub>EC,y</sub>) will be calculated following the latest version of “Tool to calculate project emissions from electricity consumption”. Electricity consumption by the project activity may include, inter alia, electricity consumption by the paper plant or any electricity requirements for the treatment of the biomass. While it is stated in the tool that it is not applicable to cases where captive renewable power generation technologies installed at the project site supply the electricity consumed by the project activity, it is applicable for the purpose of this methodology on the condition that the biomass used for power and heat provision (if any) are from biomass residues.

*Project emissions from transport of agricultural waste to the plant (PE<sub>CO<sub>2</sub>,TR,y</sub>)*

In cases where the agricultural waste is not generated directly at the project site, project participants shall determine CO<sub>2</sub> emissions resulting from transportation of the agricultural waste to the project plant.

Project participants may choose between two different approaches to determine emissions: an approach based on distance and vehicle type (option 1) or on fuel consumption (option 2).

Option 1:

Emissions are calculated on the basis of distance and the number of trips (or the average truck load):

$$PE_{CO_2,TR,y} = N_y \cdot AVD_y \cdot EF_{km,CO_2,y} \quad (3)$$

or

$$PE_{CO_2,TR,y} = \frac{\sum_k BF_{PJ,k,y}}{TL_y} \cdot AVD_y \cdot EF_{km,CO_2,y} \quad (4)$$

Where:

- PE<sub>CO<sub>2</sub>,TR,y</sub> = Project emissions from transport of agricultural waste to the plant in year *y* (tCO<sub>2</sub>e/yr)
- N<sub>*y*</sub> = Number of round trips (from and to) truck had during the year *y*
- AVD<sub>*y*</sub> = Average round trip distance (from and to) between the agricultural waste supply sites and the site of the project activity during the year *y* (km)
- EF<sub>km,CO<sub>2</sub>,y</sub> = Average CO<sub>2</sub> emission factor for the trucks measured during the year *y* (tCO<sub>2</sub>/km)
- BF<sub>PJ,k,y</sub> = Quantity of agricultural waste type *k* used for paper production as a result of the project activity during the year *y* (tons) For the purpose of determining PE<sub>CO<sub>2</sub>,TR,y</sub> this

should include all agricultural waste (including those for the purpose of energy production).

$TL_y$  = Average truck load of the trucks used (tons)

### Option 2:

Emissions are calculated based on the actual quantity of fossil fuels consumed for transportation of agricultural waste (including agricultural waste used for the purpose of energy production).

$$PE_{CO_2,TR,y} = \sum_i FC_{TR,i,y} \cdot NCV_i \cdot EF_{CO_2,FF,i} \quad (5)$$

Where:

$PE_{CO_2,TR,y}$  = Project emissions from transport of agricultural waste to the plant in year y (tCO<sub>2</sub>e/yr)

$FC_{TR,i,y}$  = Fuel consumption of fuel type *i* in trucks for transportation of agricultural waste during the year y (mass or volume unit)

$EF_{CO_2,FF,i}$  = CO<sub>2</sub> emission factor for fossil fuel type *i* (tCO<sub>2</sub>/MJ)

$NCV_i$  = Net calorific value of fuel (MJ)

### **Leakage**

Leakage is calculated as follows:

$$LE_y = L_{y,disp} + L_{y,fossil} \quad (6)$$

Where:

$LE_y$  = Leakage in year y (tCO<sub>2</sub>e/yr)

$L_{y,disp}$  = Leakage from possible disposition of recycled paper (tCO<sub>2</sub>e/yr)

$L_{y,fossil}$  = Leakage from replacement of biomass fuel with fossil fuel

#### *Leakage from possible disposition of recycled paper ( $L_{y,disp}$ )*

Leakage can conceptually occur if the implementation of the project activity leads to a situation where other raw materials for pulp and paper production will be replaced by agricultural waste and eventually end up in a landfill and thus give rise to GHG emissions. This can be assumed not to occur under the following circumstances:

- There is negligible use of recycled paper in the region for the quality of paper produced by the project activity.
- When it can be clearly demonstrated (e.g. according to the category of paper produced) that the project activity will replace virgin pulp and paper from hard or soft wood.

In all other cases, leakage could occur since there is a possibility that the paper produced from the project activity replaces recycled paper, which in turn could be landfilled. For the purpose of estimating this leakage, if there is an increase in amount of collection and use of recycled paper for pulp and paper production in the country/region of the CDM project activity during the operation of the plant, then this type of leakage can be ignored. If there is a reduction in the amount of collection of paper for recycling in the country/region then the reduction in recycled amount (but not more than the production of the plant) must be calculated as leakage, and emissions calculated on the assumption that this amount of paper is landfilled.

For calculation of the leakage the first order decay model should be used as prescribed in the latest version of the “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”.

*Leakage from increased fossil fuel use ( $L_{y,fossil}$ )*

Another potential source of leakage for this project activity is an increase in emissions from fossil fuel combustion due to diversion of agricultural waste from other uses to the project plant as a result of the project activity. Changes in carbon pools in the LULUCF sector are expected to be insignificant since this methodology is limited to agricultural waste, as defined in the applicability conditions above.

Where the most likely baseline scenario is that the agricultural wastes are dumped or left to decay project participants shall demonstrate that the use of the agricultural wastes does not result in increased fossil fuel consumption elsewhere. For this purpose, project participants shall assess as part of the monitoring the supply situation for the types of agricultural waste used in the project plant. The following options may be used to demonstrate that the agricultural waste used in the plant did not increase fossil fuel consumption elsewhere:

- L<sub>1</sub> Demonstrate that there is an abundant surplus of the agricultural waste in the region of the project activity, which is not utilized. For this purpose, demonstrate that the quantity of available agricultural waste in the region is at least 25% larger than the quantity of agricultural waste that is utilized (e.g. for energy generation or as feedstock), including the project plant.
- L<sub>2</sub> Demonstrate that suppliers of the agricultural waste in the region of the project activity are not able to sell all of their agricultural waste. For this purpose, project participants shall demonstrate that the ultimate supplier of agricultural waste (who supplies the project) and a representative sample of agricultural waste suppliers in the region had a surplus of agricultural waste (e.g. at the end of the period during which the agricultural waste is sold), which they could not sell and which is not utilized.

Project participants shall clearly define the geographical boundary of the region and document it in the CDM-PDD. In defining the geographical boundary of the region, project participants should take the usual distances for agricultural waste transports into account, i.e. if agricultural waste is transported up to 50 km, the region may cover a radius of 50 km around the project activity. In any case, the region should cover a radius around the project activity of at least 20 km but not more than 200 km. Once defined, the region should not be changed during the crediting period(s).

Project participants shall apply a leakage penalty to the quantity of biomass, for which project participants cannot demonstrate with one of the approaches above that the use of the agricultural waste does not result in leakage. The leakage penalty aims at adjusting emission reductions for leakage effects in a conservative manner, assuming that this quantity of biomass is substituted by the most carbon intensive fuel in the country/region.

If for a certain type of biomass  $i$  used in the project activity, leakage effects cannot be ruled out with one of the approaches above, leakage effects for the year  $y$  shall be calculated as follows:

$$L_{y,fossil} = EF_{CO_2,CI} \cdot \sum_j BF_{j,y} \cdot NCV_j \quad (7)$$

Where:

- $L_{y,fossil}$  are the leakage emissions from increased use of fossil fuels during the year  $y$  in tons of CO<sub>2</sub>,
- $EF_{CO_2,CI}$  is the CO<sub>2</sub> emission coefficient (per an energy unit) of the most carbon intensive fuel used in the country,
- $BF_{j,y}$  is the quantity of agricultural waste type  $j$  used as feedstock in the project plant during the year  $y$  in a volume or mass unit,

$j$  are the types of biomass for which leakage effects could not be ruled out with one of the approaches  $L_1$ ,  $L_2$  above,  
 $NCV_j$  is the net calorific value of the agricultural waste type  $j$  (per volume or mass).

In the case that negative overall emission reductions arise in a year through application of the leakage penalty, 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 year concerned. (For example: if negative emission reductions of 30 tCO<sub>2</sub>e occur in the year  $t$  and positive emission reductions of 100 tCO<sub>2</sub>e occur in the year  $t+1$ , only 70 CERs are issued for the year  $t+1$ .)

### Emission Reductions

Emission reductions are calculated as follows:

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

Where:

$ER_y$  = Emission reductions during the year  $y$  (tCO<sub>2</sub>/yr)  
 $BE_y$  = Baseline emissions during the year  $y$  (tCO<sub>2</sub>/yr)  
 $PE_y$  = Project emissions during the year  $y$  (tCO<sub>2</sub>/yr)  
 $LE_y$  = Leakage emissions during the year  $y$  (tCO<sub>2</sub>/yr)

### Changes required for methodology implementation in 2<sup>nd</sup> and 3<sup>rd</sup> crediting periods

At the renewal of the crediting period, the procedure to update the data should follow the “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”

This revision is not necessary if the project proponent has developed specific values for the raw material used in the project.

### Data and parameters not monitored

The data and parameters not monitored tables used in the “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”, the “Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion” and the “Tool to calculate project emissions from electricity consumption” should be applied.

### III. MONITORING METHODOLOGY

#### Monitoring procedures

Monitoring involves an annual assessment of the conditions at the solid waste disposal site (SWDS) where the waste would in the absence of the project activity be dumped.

The monitoring will also include measuring the amounts of raw material used for the pulp and paper production. Where relevant, the energy produced on site and the amount of agricultural waste utilised as fuel should be monitored.

Describe and specify in the 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. Meters should be installed, maintained and calibrated according to equipment manufacturer instructions and be in line with national standards, or, if these are not available, international standards (e.g. IEC, ISO).

All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period. 100% of the data should be monitored if not indicated differently in the comments in the tables below.

#### Data and parameters monitored

<b>Data / parameter:</b>	<b>MB<sub>v</sub></b>
Data unit:	tCO <sub>2</sub> e
Description:	Methane produced in the landfill in the absence of the project activity in year 'y'.
Source of data:	Calculated as per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Measurement procedures (if any):	As per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Monitoring frequency:	As per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
QA/QC procedures:	As per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Any comment:	

<b>Data / parameter:</b>	<b>PE<sub>FC,i,y</sub></b>
Data unit:	tCO <sub>2</sub>
Description:	Project emissions from fossil fuel combustion in process <i>j</i> during the year <i>y</i> .
Source of data:	Calculated as per the "Tool to calculate project or leakage CO <sub>2</sub> emissions from fossil fuel combustion"
Measurement procedures (if any):	As per the "Tool to calculate project or leakage CO <sub>2</sub> emissions from fossil fuel combustion"
Monitoring frequency:	As per the "Tool to calculate project or leakage CO <sub>2</sub> emissions from fossil fuel combustion"
QA/QC procedures:	As per the "Tool to calculate project or leakage CO <sub>2</sub> emissions from fossil fuel combustion".
Any comment:	

<b>Data / parameter:</b>	<b>PE<sub>EC,y</sub></b>
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Data unit:	tCO <sub>2</sub>
Description:	Project emissions from electricity consumption by the project activity during the year y .
Source of data:	Calculated as per the “Tool to calculate project emissions from electricity consumption”
Measurement procedures (if any):	As per the “Tool to calculate project emissions from electricity consumption”
Monitoring frequency:	As per the “Tool to calculate project emissions from electricity consumption”
QA/QC procedures:	As per the “Tool to calculate project emissions from electricity consumption”
Any comment:	

<b>Data / parameter:</b>	<b>N<sub>v</sub></b>
Data unit:	-
Description:	Number of round trips (from and to) truck had during the year y
Source of data:	On-site measurements
Measurement procedures (if any):	-
Monitoring frequency:	Continuously
QA/QC procedures:	Check consistency of the number of round trips of truck with the quantity of agricultural waste used in paper production.
Any comment:	Project participants have to monitor either this parameter or the average truck load TL <sub>y</sub> .

<b>Data / parameter:</b>	<b>TL<sub>v</sub></b>
Data unit:	Tons or litre
Description:	Average truck load of the trucks used
Source of data:	On-site measurements
Measurement procedures (if any):	Determined by averaging the weights of each truck carrying agricultural waste to the project plant
Monitoring frequency:	Continuously, aggregated annually
QA/QC procedures:	-
Any comment:	Project participants have to monitor either the number of truck trips N <sub>y</sub> or this parameter.

<b>Data / parameter:</b>	<b>AVD<sub>v</sub></b>
Data unit:	Km
Description:	Average round trip distance (from and to) between the agricultural waste supply sites and the site of the project plant during the year y
Source of data:	Records by project participants on the origin of the agricultural waste
Measurement procedures (if any):	
Monitoring frequency:	Continuous, aggregated annually
QA/QC procedures:	Check consistency of distance records provided by the truckers by comparing recorded distances with other information from other sources (e.g. maps).
Any comment:	If agricultural waste is supplied from different sites, this parameter should correspond to the mean value of km travelled by trucks that supply the agricultural waste to the plant.

<b>Data / parameter:</b>	<b>FC<sub>TR,i,y</sub></b>
Data unit:	Mass or volume unit

Description:	Fuel consumption of fuel type $i$ in trucks for transportation of agricultural waste during the year $y$
Source of data:	Fuel purchase receipts or fuel consumptions meters in the trucks
Measurement procedures (if any):	
Monitoring frequency:	Continuously, aggregated annually
QA/QC procedures:	Cross-checked the resulting CO <sub>2</sub> emissions for plausibility with a simple calculation based on the distance approach (option 1).
Any comment:	This parameter only needs to be monitored if option 2 is chosen to estimate CO <sub>2</sub> emissions from transportation.

<b>Data / parameter:</b>	<b>EF<sub>km,CO<sub>2</sub>,v</sub></b>
Data unit:	tCO <sub>2</sub> /km
Description:	Average CO <sub>2</sub> emission factor per km for the trucks during the year $y$
Source of data:	Conduct sample measurements of the fuel type, fuel consumption and distance travelled for all truck types. Calculate CO <sub>2</sub> emissions from fuel consumption by multiplying with appropriate net calorific values and CO <sub>2</sub> emission factors. For net calorific values and CO <sub>2</sub> emission factors, use reliable national default values or, if not available, (country-specific) IPCC default values. Alternatively, choose emission factors applicable for the truck types used from the literature in a conservative manner (i.e. the higher end within a plausible range).
Measurement procedures (if any):	
Monitoring frequency:	At least annually
QA/QC procedures:	Cross-check measurement results with emission factors referred to in the literature.
Any comment:	

<b>Data / parameter:</b>	<b>NCV<sub>i</sub></b>
Data unit:	MJ/mass or volume units of fuel
Description:	Net calorific value of fuel
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):	
Monitoring frequency:	Annually or <i>ex-ante</i>
QA/QC procedures:	
Any comment:	

<b>Data / parameter:</b>	$EF_{CO_2,FF,i}$
Data unit:	tCO <sub>2</sub> /MJ
Description:	CO <sub>2</sub> emission factor for fossil fuel type <i>i</i>
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):	
Monitoring frequency:	Annually or ex-ante.
QA/QC procedures:	
Any comment:	

<b>Data / Parameter:</b>	$L_{dep}$
Data unit:	Tons
Description:	Tonnes of paper collected and recycled in the country
Source of data:	Authoritative market survey
Measurement procedures (if any):	N/A
Monitoring frequency:	Annually, using the most updated information available
QA/QC procedures:	Compare with data from the previous year and ascertain that the methodology and data are comparable
Any comment:	Use for evaluation of possible leakage by replacing recycled paper (option $L_{dep1}$ )

<b>Data / Parameter:</b>	$BF_{PJ,k,y}$
Data unit:	tons
Description:	Quantity of agricultural waste type <i>k</i> used for paper production as a result of the project activity during the year <i>y</i> For the purpose of determining $PE_{CO_2,TR,y}$ , this should include all agricultural waste (including those for the purpose of energy production).
Source of data:	Measurements by project participants
Measurement procedures (if any):	The agricultural waste going into the pulp and paper production plant.
Monitoring frequency:	Continuously, aggregated at least annually
QA/QC procedures:	The weighing equipment will be calibrated according to procedures to be established in operations manual for the plant. Measurements using mass meters at the plant site should be verified with an annual mass balance of the pulp and paper production plant that is based on purchased quantity and stock changes.
Any comment:	

<b>Data / parameter:</b>	-
Data unit:	
Description:	Demonstration that the agricultural waste type <i>k</i> from a specific source would continue not to be collected or utilized, e.g. by an assessment whether a market has emerged for that type of agricultural waste (if yes, leakage is assumed not be ruled out) or by showing that it would still not be feasible to utilize the agricultural waste for any purposes.
Source of data:	Information from the site where the agricultural waste is generated
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	Compare with data from the previous year and ascertain that the methodology and data are comparable
Any comment:	Monitoring of this parameter is applicable if approach L1 is used to rule out Leakage

<b>Data / Parameter:</b>	-
Data unit:	Tons
Description:	Quantity of agricultural waste of type <i>k</i> that are utilized (used for energy generation) in the defined geographical region
Source of data:	Survey or statistics
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	Compare with data from the previous year and ascertain that the methodology and data are comparable
Any comment:	Monitoring of this parameter is applicable for approach L <sub>2</sub> is used to rule out leakage

<b>Data / Parameter:</b>	-
Data unit:	Tons
Description:	Quantity of available agricultural waste type <i>k</i> in the region
Source of data:	Survey or statistics
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	Compare with data from the previous year and ascertain that the methodology and data are comparable
Any comment:	Monitoring of this parameter is applicable for approach L <sub>2</sub> is used to rule out leakage

<b>Data / Parameter:</b>	-
Data unit:	
Description:	Availability of a surplus of agricultural residue type $k$ (which can not be sold or utilized) at the ultimate supplier to the project and a representative sample of other suppliers in the defined geographical region.
Source of data:	Surveys
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	Compare with data from the previous year and ascertain that the methodology and data are comparable
Any comment:	Monitoring of this parameter is applicable if approach $L_3$ is used to rule out Leakage

<b>Data / parameter:</b>	$NCV_j$
Data unit:	GJ/ton of dry matter or GJ/liter
Description:	Net calorific value of agricultural waste type $j$
Source of data:	Measurements
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards. Measure the NCV based on dry agricultural.
Monitoring frequency:	At least every six months, taking at least three samples for each measurement.
QA/QC procedures:	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry agricultural.
Any comment:	

<b>Data / parameter:</b>	$EF_{CO_2,CI}$
Data unit:	tCO <sub>2</sub> /GJ
Description:	CO <sub>2</sub> emission factor of the most carbon intensive fuel used in the country
Source of data:	Identify the most carbon intensive fuel type from the national communication, other literature sources (e.g. IEA). Possibly consult with the national agency responsible for the national communication / GHG inventory. If available, use national default values for the CO <sub>2</sub> emission factor. Otherwise, IPCC default values may be used.
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	
Any comment:	

<b>Data / parameter:</b>	$BF_{i,y}$
Data unit:	volume or mass unit
Description:	Quantity of agricultural waste type $j$ used as feedstock in the project plant during the year $y$
Source of data:	The weighing equipment will be calibrated according to procedures to be established in operations manual for the plant. Measurements using mass meters at the plant site should be verified with an annual mass balance of the pulp and paper production plant that is based on purchased quantity and stock changes.
Measurement procedures (if any):	
Monitoring frequency:	Continuously, aggregated at least annually
QA/QC procedures:	
Any comment:	$j$ are the types of agricultural for which leakage effects could not be ruled out with one of the approaches $L_1$ , $L_2$ or $L_3$ .e

<b>Data / parameter:</b>	<b>Moisture content of the biomass residues</b>
Data unit:	% Water content
Description:	Moisture content of each biomass residue type $k$
Source of data:	On-site measurements
Measurement procedures (if any):	
Monitoring frequency:	Continuously, mean values calculated at least annually
QA/QC procedures:	
Any comment:	In case of dry biomass, monitoring of this parameter is not necessary.