Draft methodological tool

"Project and leakage emissions from road transportation of freight"

(Version 01.0.0)

I.   DEFINITIONS, SCOPE, APPLICABILITY AND PARAMETER

Definitions

Vehicle. A self propelled machine powered by fossil fuels, biofuels or blended fuels that is used for transportation of freight by road. The vehicle should be designed for freight transportation and not for passenger transportation. The vehicle is not required to exclusively transport freight associated with the project activity, but may also transport other freight.

Gross vehicle mass (GVM). The maximum on-road mass of the fully-loaded vehicle, consisting of its tare mass (i.e. vehicle mass) and the mass of the load (i.e. the freight) the vehicle is allowed to carry according to its design specifications.

Vehicle class. This tool defines two vehicle classes based on their gross vehicle mass:

- **Light vehicles.** Vehicles with a GVM being less or equal to 26 tonnes;

- **Heavy vehicles.** Vehicles with a GVM being higher than 26 tonnes.

Freight. Goods and materials (including waste materials) that are transported by road vehicles.

Freight transportation activity. Trips undertaken under the project activity that can be grouped together as using the same vehicle class and transporting freight between the same origin and destination.

Scope and applicability

This tool provides procedures to estimate project or leakage CO_2 emissions from freight transportation with vehicles by road. Two options are given to determine these emissions:

- Option A: Monitoring fuel consumption; or

- Option B: Using conservative default values.

This tool is applicable to project activities which involve freight transportation by road and where transportation is not the main project activity[1]. This tool is not applicable to project activities where transportation is the main source of greenhouse gases emissions. This tool does not provide procedures to estimate baseline emissions from road transportation of freight. The tool only provides to determine CO_2 emissions. CH_4 and N_2O emissions are excluded for simplification as they are small compared to CO_2 emissions.

---

[1] This applicability condition ensures that transport-related emissions are small relative to the expected total emission reductions and, for this reason, enables to use a simplified approach to estimate project or leakage emissions from road transportation of freight.

Parameters

This tool provides procedures to determine the following parameter:

Parameter	SI Unit	Description
$PE_{TR,m}$	t CO_2	Project emissions from road transportation of freight in monitoring period m
$LE_{TR,m}$	t CO_2	Leakage emissions from road transportation of freight in monitoring period m

II.   METHODOLOGY PROCEDURE

Project participants may use two options to determine project or leakage emissions from road transportation of freight: monitoring fuel consumption (Option A) or using conservative default values (Option B). Project participants shall document in the CDM-PDD which freight transportation activities f will occur under the project activity, including for each transportation activity information on:

- The origin and destination of the freight (to the extent that this is known at validation);

- The type(s) of freight that are planned to be transported;

- The planned number of trips made and/or the planned quantity of freight that should be transported; and

- The option selected (A or B) to determine emissions.

For a particular freight transportation activity f, the option selected for determining emissions from freight transportation shall not be changed during the crediting period.

Option A: Monitoring fuel consumption

This option requires monitoring the fuel consumption of the vehicles used for the transportation of freight under the project activity. The monitored fuel consumption shall include fuel consumed by the vehicles on both outbound and return trips, even if the vehicles also transport freight not associated with the project activity.

Based on the amount of fuel consumed by the vehicles, project emissions are determined using the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". The following guidance is given for applying the tool:

- Parameter $PE_{FC,j,y}$ in the tool corresponds to the parameter $PE_{TR.m}$ or $LE_{TR,m}$ in this tool;

- Element process j corresponds to the combustion of fuels in the vehicles;

- If biofuels are used, then the corresponding CO_2 emission factor of the fossil fuels that would most likely be used in the absence of the use of biofuels should be used.[2] If biofuel blends are

---

[2] The GHG emissions associated with the production of biofuels may vary and are methodologically challenging to estimate (see, for example, methodology ACM0017). Given that this tool applies to cases where emissions from freight transportation are small relative to the overall emission reductions, this assumption is made to keep the tool simple to apply. The emission factors should be based on those fossil fuels that would most likely be used in the absence of the use of biofuels. For example, petrodiesel should be assumed in the case of biodiesel, natural gas in the case of biogas and gasoline in the case of ethanol.

consumed, then the CO_2 emission factor of the fossil fuel used in the blend shall be used, as a conservative simplification.

The monitoring plan shall document how data on fuel consumption is collected and checked. In addition, for each transportation activity f, the monitoring reports should contain information on the origin and destination and the number of trips conducted.

Option B: Using conservative default values

This option relies on conservative default emission factors to estimate project or leakage emissions from road transportation of freight. These default values are established for two vehicle classes k: light vehicles and heavy vehicles.

Under this option, the following data shall be monitored separately for each freight transportation activity f to estimate the emissions:

- The quantity of freight transported ($FR_{f,m}$);

- The origin and destination of the freight transported and the road distance between the origin and the destination ($D_{f,m}$); and

- The vehicle class k used.

Table 1 provides an example of how this information could be documented in monitoring reports.

Table 1: Documentation of freight transportation activities under the project activity

Activity #	Freight type	Weight (t)	Origin	Destination	Road distance (km)	Vehicle class
1	Sugar cane bagasse	4,518	Collection site A	Project plant	35	Light
2	Sugar cane bagasse	936	Collection Site B	Project plant	18	Heavy

Project or leakage emissions are determined as follows:

$$\left.\begin{matrix} PE_{TR,m} \\ LE_{TR,m} \end{matrix}\right\} = \sum_{f} D_{f,m} \cdot FR_{f,m} \cdot EF_{CO2,f,k} \cdot 10^{-6} \qquad (1)$$

Where:

$PE_{TR,m}$ =   Project emissions from road transportation of freight monitoring period m (t CO_2)

$LE_{TR,m}$ =   Leakage emissions from road transportation of freight monitoring period m (t CO_2)

$D_{f,m}$ =   Return trip road distance between the origin and destination of freight transportation activity f in monitoring period m (km)

$FR_{f,m}$ =   Total mass of freight transported in freight transportation activity f in monitoring period m (t)

$EF_{CO2,f,k}$ =   Default CO_2 emission factor for vehicle class k used for freight transportation activity f (g CO_2 / t km)

f   =   Freight transportation activities conducted in the project activity in monitoring period m

k   =   Vehicle classes used in the project activity

Data and parameters not monitored

Data / Parameter:	$EF_{CO2,f,k}$
Data unit:	g CO_2 / t km
Description:	Default CO_2 emission factor for vehicle class k used for freight transportation activity f
Value to be applied:	<table><tr><th>Vehicle class</th><th>Emission factor (g CO_2 / t km)</th></tr><tr><td>Light vehicles</td><td>245</td></tr><tr><td>Heavy vehicles</td><td>129</td></tr></table>
Any comment:	Applicable to Option B. The default CO_2 emission factors take into account emissions generated by loaded outbound trips and empty return trips. The default emission factors have been obtained from two sources. For light vehicles, the emission factor was obtained from empirical data from European vehicles.[3] For heavy vehicles, the emission factor has been derived based on custom design transient speed-time-gradient drive cycle (adapted from the international FIGE cycle), vehicle dimensional data, mathematical analysis of loading scenarios, and dynamic modelling based on engine power profiles, which, in turn, are a function of gross vehicle mass (GVM), load factor, speed/acceleration profiles and road gradient. The following assumptions on key parameters have been made: an average driving speed of 30 km/h, an average gradient of 1%, and a load factor attained when biomass[4] is transported were assumed.

Data and parameters monitored

Data / Parameter:	$D_{f,m}$
Data unit:	Kilometre
Description:	Return trip road distance between the origin and destination of freight transportation activity f in monitoring period m
Source of data:	Records of vehicle operator or records by project participants
Measurement procedures (if any):	Determined once for each freight transportation activity f for a reference trip using the vehicle odometer or any other appropriate sources (e.g., on-line sources)
Monitoring frequency:	To be updated whenever the road distance changes
QA/QC procedures:	-
Any comment:	Applicable to Option B

---

[3] 'Les émissions de CO2 par les poids lourds français entre 1996 et 2006 ont augmenté moins vite que les volumes transportés'. Commissariat Général au Développement Durable. # 25, 2009.

[4] Biomass is the most commonly transported material in existing CDM projects where transportation is not the main project activity. Due to a low bulk density of biomass, volumetric loading was used to derive the emission factor assuming that project proponents will extent the height of side panels to the height of 2.4 m to maximize their trip efficiency.

Data / Parameter:	$FR_{f,m}$
Data unit:	tonnes
Description:	Total mass of freight transported in freight transportation activity f in monitoring period m
Source of data:	Records by project participants or records by truck operators
Measurement procedures (if any):	
Monitoring frequency:	Continuously
QA/QC procedures:	-
Any comment:	Applicable to Option B

In addition, relevant provisions on data and parameters monitored in the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" apply in case of Option A.

- - - - -

History of the document

Version	Date	Nature of revision(s)
01.0.0	EB 63, Annex # 29 September 2011	To be considered at EB 63.
Decision Class: Regulatory **Document Type**: Tool **Business Function**: Methodology		