

TOOL12

Methodological tool

**Project and leakage emissions from
transportation of freight**

Version 01.1.0



United Nations
Framework Convention on
Climate Change

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1. Introduction

1. This tool provides procedures to estimate project and/or leakage CO₂ emissions from road transportation of freight by vehicles. Two options are provided to determine these emissions:
 - (a) Option A: Monitoring fuel consumption; or
 - (b) Option B: Using conservative default values.
2. The tool also provides default conservative emission factors to estimate project and/or leakage CO₂ emissions from freight transportation by rail. The tool is applicable to project activities which involve transportation of freight and where transportation is not the main project activity.

2. Scope, applicability, and entry into force

2.1. Scope

3. This tool provides procedures to estimate project or leakage CO₂ emissions from freight transportation. Two options are given to determine these emissions:
 - (a) Option A: monitoring fuel consumption; or
 - (b) Option B: using conservative default values.

2.2. Applicability

4. 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 CO₂ emissions. CH₄ and N₂O emissions are excluded for simplification as they are small compared to CO₂ emissions.
5. In addition, the tool is applicable for the determination of project or leakage emissions from freight transportation by rail in project activities where transportation is not the main project activity.

2.3. Entry into force

6. The date of entry into force is the date of the publication of the EB 70 meeting report on the 23 November 2012.

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 transportation of freight.

3. Definitions

7. The definitions contained in the Glossary of CDM terms shall apply.
8. For the purpose of this methodology, the following definitions apply:
- (a) **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;
 - (b) **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;
 - (c) **Vehicle class** - This tool defines two vehicle classes based on their gross vehicle mass:
 - (i) **Light vehicles** - Vehicles with a GVM being less or equal to 26 tonnes;
 - (ii) **Heavy vehicles** - Vehicles with a GVM being higher than 26 tonnes;
 - (d) **Freight** - Goods and materials (including waste materials) that are transported;
 - (e) **Freight transportation activity** - Trips undertaken under the project activity that shall be grouped together as using the same vehicle class and transporting freight between the same origin and destination;
 - (f) **Monitoring period m** - The period for which a monitoring report is submitted, the verification is performed and for which issuance of CERs is requested by the Designated Operational Entity (DOE).

4. Parameters

9. This tool provides procedures to determine the following parameter:

Parameter	SI Unit	Description
$PE_{TR,m}$	t CO ₂	Project emissions from transportation of freight in monitoring period m
$LE_{TR,m}$	t CO ₂	Leakage emissions from transportation of freight in monitoring period m

5. Methodology procedure

10. 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).

11. If project or leakage emissions from freight transportation by rail are calculated with the use of this tool, Option B shall be selected, and the default emission factor for heavy vehicles² shall be used.
12. 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:
 - (a) The origin and destination of the freight (to the extent that this is known at validation);
 - (b) The type(s) of freight that are planned to be transported;
 - (c) The planned number of trips made and/or the planned quantity of freight that should be transported; and
 - (d) The option selected (A or B) to determine emissions.
13. For a particular freight transportation activity f , the option selected for determining emissions from freight transportation shall not be changed during the crediting period.

5.1. Option A: Monitoring fuel consumption

14. 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.
15. 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 CO₂ emissions from fossil fuel combustion”. The following guidance is given for applying the tool:
 - (a) Parameter $PE_{FC,j,y}$ in the tool corresponds to the parameter $PE_{TR,m}$ or $LE_{TR,m}$ in this tool;
 - (b) Element process j corresponds to the combustion of fuels in the vehicles;
 - (c) If biofuels are used, then the corresponding CO₂ emission factor of the fossil fuels that would most likely be used in the absence of the use of biofuels should be used.³ If biofuel blends are consumed, then the CO₂ emission factor of the fossil fuel used in the blend shall be used, as a conservative simplification.

² Project proponents wishing to use other default values for freight transportation by rail may propose a revision to this tool.

³ The GHG emissions associated with the production of biofuels may vary and are methodologically challenging to estimate (see, for example, methodology “ACM0017: Production of biodiesel for use as fuel”). 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.

16. 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.

5.2. Option B: Using conservative default values

17. 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: light vehicles and heavy vehicles.
18. 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 (or rail line) distance between the origin and the destination ($D_{f,m}$); and
 - The vehicle class used, if the freight is transported by road.
19. 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

20. Project or leakage emissions are determined as follows:

$$\left. \begin{matrix} PE_{TR,m} \\ LE_{TR,m} \end{matrix} \right\} = \sum_f D_{f,m} \times FR_{f,m} \times EF_{CO_2,f} \times 10^{-6} \quad \text{Equation (1)}$$

Where:

- $PE_{TR,m}$ = Project emissions from transportation of freight monitoring period m (t CO₂)
- $LE_{TR,m}$ = Leakage emissions from transportation of freight monitoring period m (t CO₂)
- $D_{f,m}$ = Return trip 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)

- $EF_{CO_2,f}$ = Default CO₂ emission factor for freight transportation activity f (g CO₂/t km)
- f = Freight transportation activities conducted in the project activity in monitoring period m

5.3. Data and parameters not monitored

Data / Parameter table 1.

Data / Parameter:	$EF_{CO_2,f}$						
Data unit:	g CO ₂ /t km						
Description:	Default CO ₂ emission factor for freight transportation activity f						
Source of data:	-						
Measurement procedures (if any):	-						
Monitoring frequency:	-						
QA/QC procedures:	-						
Value to be applied:	<table border="1"> <thead> <tr> <th>Vehicle class</th> <th>Emission factor (g CO₂/t km)</th> </tr> </thead> <tbody> <tr> <td>Light vehicles</td> <td>245</td> </tr> <tr> <td>Heavy vehicles</td> <td>129</td> </tr> </tbody> </table>	Vehicle class	Emission factor (g CO ₂ /t km)	Light vehicles	245	Heavy vehicles	129
Vehicle class	Emission factor (g CO ₂ /t km)						
Light vehicles	245						
Heavy vehicles	129						
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. ⁴ 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 ⁵ is transported were assumed						

⁴ 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.

⁵ 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 table 2.

Data / Parameter:	$D_{f,m}$
Data unit:	Kilometre
Description:	Return trip 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 distance changes
QA/QC procedures:	-
Any comment:	Applicable to Option B

Data / Parameter table 3.

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

21. In addition, relevant provisions on data and parameters monitored in the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion” apply in case of Option A.

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
01.1.0	23 November 2012	EB 70, Annex 23 The amendment expands the applicability to freight transport by rail and provides default values to calculate project or leakage emissions from rail transportation of cargo as well as changes the title from "Project and leakage emissions from road transportation of freight" to Project and leakage emissions from transportation of freight".
01.0.0	29 September 2011	EB 63, Annex 10 Initial adoption.

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