Draft methodological tool

"Tool for estimation of GHG emissions related to fossil fuel combustion in A/R CDM project activities"

I. SCOPE, APPLICABILITY AND PARAMETERS

Scope and applicability

This tool allows for estimating increase in GHG emissions[1] (both project and leakage emissions) related to fossil fuel combustion in A/R CDM project activity. The sources of emissions are: vehicles (mobile sources, such as trucks, tractors, etc.) and mechanical equipments (e.g., chain saws and stationary sources such as, water pumps) required by A/R CDM project activity.

Parameters

This tool provides procedures to determine the following parameter:

Parameter	SI Unit	Description
$ET_{FC,y}$	t-CO_2	CO_2 emissions from fossil fuel combustion during the year *y*
$ET_{FC,j,y}$	t-CO_2	CO_2 emissions from fossil fuel combustion in vehicle/equipment *j* during the year *y*

II. PROCEDURE[2]

$$ET_{FC,y} = \sum_{j=1}^{J} ET_{FC,j,y}$$

Where:

$ET_{FC,y}$: CO_2 emissions from fossil fuel combustion during the year *y* (tCO_2)

$ET_{FC,j,y}$: CO_2 emission from fossil fuel combustion in vehicle/equipment type *j* during year *y* (tCO_2/yr)

j: number of each type of vehicle/equipment

J: total number of types of vehicle/equipment used in the project activity

For estimation of $ET_{FC,j,y}$ the following two methods can be used:

1) Direct method

2) Indirect method

These can be used interchangeably, or simultaneously.

1) Direct method

[1] For fossil fuel combustion in A/R project activities only CO2 emissions should be taken into account.
[2] Project proponents are reminded that the "Tool for testing significance of GHG emissions in A/R CDM project activities" could be applied to identify whether combustion emissions are insignificant for a particular CDM A/R project activity.

Direct method assumes availability of data on the amount of fuel combusted. The method may be used in estimating vehicle/equipment emission in the project activity, when the vehicle/equipment is captive (i.e. controlled by the project participant) and the entire fuel consumptions can be monitored. The equation is as follows.

$$ET_{FC,j,y} = \sum_{i=1}^{I} FC_{i,j,y} * EF_{CO2\,i} \quad \text{1a)}$$

Where:

$ET_{FC,j,y}$: CO_2 emission from fossil fuel combustion in vehicle/equipment type *j* during year *y* (tCO_2/yr)

$FC_{i,j,y}$: Quantity of fuel type *i* consumed in vehicle/equipment type *j* during year *y* (mass or volume unit / yr)

$EF_{CO2.i}$: CO_2 emission factor of the fuel type *i* combusted (tCO_2 / mass or volume unit)

i: fuel types combusted

I: total number of fuel types

2) Indirect method

This can be used when vehicle/equipment is not captive (i.e. when vehicle use is commissioned to third parties) and fuel consumption can't not be monitored by project, or in the case of ex ante estimation when key parameters are hypothetical.

For vehicles (mobile sources)[3]:

$$ET_{FC,j,y} = \sum_{i=1}^{I} n * MT_{j,y} / TL_{j,y} * AD_{j,y} * SECk_{j,i,y} * EF_{CO2.i} \quad \text{2a)}$$

or

$$ET_{FC,j,y} = \sum_{i=1}^{I} NV_{j,y} * TD_{j,y} * SECk_{j,i,y} * EF_{CO2.i,} \quad \text{2b)}$$

or

$$ET_{FC,j,y} = \sum_{i=1}^{I} n * MT_{j,y} * SECkt_{j,i,y} * EF_{CO2.i} \quad \text{2c)}$$

Where:

n: Indicator of return load (dimensionless)

$MT_{j,y}$: Total mass transported by vehicle type *j* during year *y* (tonne)

$TL_{j,y}$: Load capacity of vehicle type *j* during year *y* (tonne)

$AD_{j,y}$ Average single-trip distance for vehicle type *j* during year *y* (km)

$SECk_{j,i,y}$: Specific energy consumption of vehicle type *j* for fuel *i* during year *y* (quantity of fuel / km)

[3] For the estimation of GHG emissions related to transportation outside the project boundary only the distance up to the first point of commuting should be taken into consideration.

$EF_{CO2\,i}$: CO_2 emission factor of the fuel type *i* combusted (t-CO_2 / quantity of fuel)

$NV_{j,y}$: Number of vehicle type *j* during year *y* (dimensionless)

$TD_{j,y}$: Total travel distance for vehicle type *j* during year *y* (km)

$SECkt_{j,i,y}$: Specific energy consumption of vehicle type *j* for fuel *i* during year *y* (quantity of fuel / tonne-km)

i: fuel types combusted

I: total number of fuel types

Where $MT_{j,y}$ cannot be obtained according to vehicle types, then $(MT_{j,y}/TL_{j,y})$ can be substituted by $(MT_y/TL_{av,y})$ where MT_y is the total mass transported, and $TL_{av,y}$ is the indicative load capacity of the fleet (i.e. the type of vehicle which has carried the most load).

Parameters $SECk_{j,i,y}$ in 2b) and $SECkt_{j,i,y}$ in 2c), a reference figure can be used. Upon verification, the DOE will check the parameters to ensure that the conditions which the parameters apply correspond to the situation of the project activity, or that a more conservative assumption is used.

Approach 2a) is preferred to 2b), and 2b) to 2c).

For equipment (stationary sources):

$$ET_{FC,j,y} = \sum_{i=1}^{I} NE_{j,y} * TU_{j,y} * SECu_{j,i,y} * EF_{CO2.i}$$

Where:

$NE_{j,y}$: Number of equipment type *j* during year *y* (dimensionless)

$TU_{j,y}$: Total use for equipment type *j* during year *y* (hours)

$SECu_{j,i,y}$: Specific energy consumption of equipment type *j* for fuel *i* during year *y* (quantity of fuel / hour)

$EF_{CO2\,i}$: CO_2 emission factor of the fuel type *i* combusted (t-CO_2 / quantity of fuel)

i: fuel types combusted

I: total number of fuel types

III. REFERENCE AND ANY OTHER INFORMATION

Default values can be founded in:

- 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 2 Energy: Chapter 3 Mobile Combustion (available at http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf)
- IPCC Emission Factor Database (EFDB) – available at http://www.ipcc-nggip.iges.or.jp/EFDB/main.php

Data and parameters not monitored

Data / para-meter:	Data unit:	Description:	Source of data:	Measurement procedures (if any):	Monitoring frequency:	QA/QC procedures:	Any comment:
$AD_{j,y}$	Km	Average single-trip distance for vehicle type *j* during year *y* (such as the distance between the plantation site and the biomass plant)	Specification of project activity	To be checked upon verification by DOE according to PDD or supporting documents	Not monitored		
$EF_{CO2\,i}$	t-CO_2 / quantity of fuel	CO_2 emission factor of the fuel type *i* combusted	Country-specific data, IPCC		Not monitored		
$n_:$	Dimen-sion less	Indicator of return load	Specification of project	Use of default value as below, or to be determined upon validation and renewal of crediting period, checked by DOE.	Not monitored		n = 1 when return load is full (with other commodity), n = 2 when return load is empty. Intermediate values are possible if only a fraction of the return loads is empty.
$NE_{j,y}$	Dimen-sion less	Number of equipment type *j* during year *y*	Specification of project	To be checked upon verification by DOE	Not monitored		
$NV_{j,y}$	Dimen-sion less	Number of vehicle type *j* during year *y*	Specification of project	To be checked upon verification by DOE	Not monitored		

Data / para-meter:	Data unit:	Description:	Source of data:	Measurement procedures (if any):	Monitoring frequency:	QA/QC procedures:	Any comment:
$SECk_{j,i,y}$	Quantity of fuel / km	Specific energy consumption of vehicle type *j* for fuel *i* during year *y*	Fuel consumption record of fleet, and total travel distance		Not monitored		May be not monitored if a constant conservative value is applied. DOE to check that the default data reflects the situation of the project (e.g. with respect to vehicle size or road condition). Default values for $SECk_{j,i,y}$ * $EF_{CO2.i,y}$ (t-CO_2/km) can be applied in place of the two parameters.
$SECkt_{j,i,y}$	Quantity of fuel / tonne-km	Specific energy consumption of vehicle type *j* for fuel *i* during year *y*	Fuel consumption record of fleet, total mass transported and total travel distance		Not monitored		May be not monitored if a constant conservative value is applied To be determined upon verification by DOE
$SECu_{j,i,y}$	Quantity of fuel / hour	Specific energy consumption of equipment type *j* for fuel *i* during year *y*	Fuel consumption record of equipment, and hours used		Not monitored		May be not monitored if a constant conservative value is applied DOE to check that the default data reflects the situation of the project (e.g. with respect to equipment size). Default values for $SECu_{j,i,y}$ * $EF_{CO2.i,y}$ (t-CO_2/houtr) can be applied in place of the two parameters.

Data / para-meter:	Data unit:	Description:	Source of data:	Measurement procedures (if any):	Monitoring frequency:	QA/QC procedures:	Any comment:
$TL_{j,y}$	Tonne	Load capacity of vehicle type *j*	Annual inventory	To be determined upon verification by DOE	Not monitored		Overloading of vehicle may distort the data. While this may tilt the estimation in a conservative way for calculation of project emissions, the opposite effect happens in terms of baseline estimation. Such effect can be ignored for being small. In view of the generally small emission, a single representative vehicle type can be chosen for determination of TL (e.g. the commonest type, or the type which have carried the largest amount of substance.).

Data and parameters monitored

Data / para-meter:	Data unit:	Description:	Source of data:	Measurement procedures (if any):	Monitoring frequency:	QA/QC procedures:	Any comment:
$FC_{i,j,y}$	Mass (e.g. tonnes) or volume (e.g. kilolitres)	Quantity of fuel type *i* consumed in vehicle/equipment type *j* during year *y*	Onsite measurements	Procedures to keep record of fossil fuel consumption related to the project activity	Annually	Cross check with fuel purchase data. Check the appropriateness of receipt with other known parameters such as amount transported, etc.	
j	Dimen-sion less	Number of each type of vehicle/equipment used in the project activity	Onsite measurements		Annually		
J	Dimen-sion less	Number of types of vehicle/equipment used in the project activity	Onsite measurements		Annually		
$MT_{j,y}$	Tonnes	Total mass transported by vehicle type *j* during year *y*	Actual measurement	Weigh bridge, etc. Harvest volume or mass measurements	According to the project activity	According to the project activity	

Data / para-meter:	Data unit:	Description:	Source of data:	Measurement procedures (if any):	Monitoring frequency:	QA/QC procedures:	Any comment:
$TD_{j,y}$	Km	Total travel distance for vehicle type *j* during year *y*	Odometer. Information on traveled distances if transport destinations are known.		According to the project activity	It is desirable that the data on total harvest is cross checked with travel distance	Odometer is not applicable when vehicle has other purpose of use
$TU_{j,y}$	Hours	Total use for equipment type *j* during year *y*	Onsite measurements		According to the project activity		