Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

TYPE III - OTHER PROJECT ACTIVITIES

Project participants shall apply the "General guidelines to SSC CDM methodologies", information on additionality (attachment A to Appendix B) and "General guidance on leakage in biomass project activities" (attachment C to Appendix B), provided at <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> *mutatis mutandis*.

III.AT. Transportation energy efficiency activities installing digital tachograph systems or similar devices to ~~commercial freight~~ transport fleets

Technology/measure

1. This methodology is for project activities that install ~~digital tachograph systems in freight vehicles operating on a number of identified traceable routes.~~[1] ~~A digital tachograph system~~ digital tachograph systems or another device that monitors vehicle and driver performance ~~data~~ and provides real-time feedback to drivers (hereinafter referred to as "device"), in freight vehicles and/or commercial passenger vehicles. The device reduces GHG emissions associated with fossil fuel combustion in ~~freight transport~~ vehicles by providing to the driver feedback[2] against inefficient driving,[3] and thus encouraging efficient driver behaviour which results in improved vehicle fuel efficiency.

2. The functions of the ~~digital tachograph system~~ device to be installed shall include, but are not limited to:

(a) Provide ~~instant~~ real-time feedback during instances of inefficient driving, following which the driver must adjust to a more efficient driving pattern in order to deactivate the instant feedback;

(b) Continuously record the ~~freight truck~~ vehicles operation (e.g. position, speed, acceleration, RPM, etc.) over a period of time;

(c) Provide a graphical representation of a driver's performance based on recorded data in order to further improve driving efficiency.

3. This methodology applies to freight ~~truck~~ vehicle fleets and/or passenger vehicle fleets that are centrally controlled and managed by a single entity and are driven by contractors or employees of the central entity, and where this central entity (and not the drivers) is responsible for the cost of fuel.

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[1] ~~A traceable route is the most logical and appropriate route between pick-up and delivery points with similar traffic conditions and terrain in the same city or region (e.g. traffic density of the route and average speed of vehicles) as identified by the central controlling entity and recorded by the digital tachograph system.~~

[2] ~~Instant~~ Real-time feedback (e.g. by voice reminders, lighting, beeping sound, etc.) and periodic feedback (e.g. summary of driving operation records).

[3] That is, revving the engine, long idling, abrupt acceleration/braking.

Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

III.AT. Transportation energy efficiency activities installing digital tachograph systems to commercial freight transport fleets (cont)

4. Project participants must demonstrate that:

(a) The project activity is unlikely to change the level of service of the vehicle fleet provided before the project activity;[4]

(b) The project activity does not include measures to bring about a modal shift (e.g. a shift from truck to rail) in transport;

(c) The project activity does not involve a fuel switch in existing vehicles, except for an optional switch to biofuel blends where the blending ratio is not greater than 20% by volume, in which case emission reductions shall be discounted by the percentage of biofuel in the blend (e.g. 20% in the case of B20).

(d) A GPRS[5] network exists in the project area, in cases where the data collected by the project activity is transmitted to a server via GPRS.

5. This methodology is not applicable to project activities in locations where the installation of the device ~~digital tachograph systems~~ is mandatory by law and the existing mandatory policy/regulation has a high level of enforcement.

6. If the project activity involves freight vehicle fleets, project participants shall identify the following parameters for freight vehicles:

(a) The traceable routes along which the vehicles operate[6];

(b) The characteristics of those routes;[7]

(c) The level of service on each route;

(d) The vehicles that are in use on each traceable route before and after project implementation. These vehicles should not be part of another CDM project activity.

7. If the project activity involves passenger vehicle fleets, project participants shall identify the following for the passenger vehicles:

[4] That is, showing the frequency of operations is not decreased because of the CDM project activity, the characteristics of the travel route and/or that the freight capacity during the project activity crediting period is sufficient to service the level of freight transport previously provided. For passenger vehicles, it shall be demonstrated that the average number of passengers using the project transport type does not decrease during the crediting period.

[5] General Packet Radio Services (GPRS) is a packet-based wireless communication service

[6] A traceable route is the most logical and appropriate route between pick-up and delivery points with similar traffic conditions and terrain in the same city or region (e.g. traffic density of the route and average speed of vehicles) as identified by the central controlling entity and recorded by the Device.

[7] That is, the following route characteristics may be identified: distance, type of road, average speed, traffic density, traffic patterns, and whether these are urban or inter-city routes.

(a) The vehicles that are in use on each traceable route before and after project implementation. These vehicles should not be part of another CDM project activity.

(b) Passenger vehicles shall operate on comparable routes during the baseline and project scenarios. Comparable routes can be identified as urban traffic conditions, preferably in the same city. If the vehicles are used in inter-urban traffic conditions, the same routes should be used by baseline and project vehicles.

8. If there are any changes to the routes travelled by freight vehicles and/or inter-urban commercial passenger transport vehicles after implementation of the project activity, the baseline emission factor and fuel efficiency of the baseline vehicles shall be re-established in accordance with the procedures outlined below.

9. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.

10. The project design document shall include documentation of procedures to eliminate any potential double counting of emission reductions from, for example, the same vehicles participating in other CDM projects or Programmes of Activities.

Boundary

11. The project boundary includes the following:

(a) The fleet to which the devices ~~digital tachograph systems~~ are introduced;

(b) the geographical area covering the traceable physical routes along which these vehicles operate ;

(c) Auxiliary facilities such as fuelling stations and workshops and service stations that are visited by the vehicles in the fleet.

In the case that the project boundary crosses national borders, all relevant government regulations in the territories crossed by the project boundary should be assessed.

Baseline

12. The baseline emission factor is calculated separately for freight vehicles and for passenger vehicles as follows:

Freight Vehicles

13. ~~The first step to determine the baseline emissions is to calculate~~ For freight vehicles, the baseline emission factor is determined on the basis of emissions per tonne of goods per kilometre ~~for the baseline freight vehicle~~ (~~BEF_i~~ $BEF_{fv,i}$). For existing freight vehicles, the baseline emission factor is determined by dividing the emissions from the total annual distance travelled by each

Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

III.AT. Transportation energy efficiency activities installing digital tachograph systems to commercial freight transport fleets (cont)

baseline freight vehicle before the project begins (~~D_i~~ $D_{fv,i}$), by the total weight of goods transported by each baseline freight vehicle (~~P_i~~ $P_{fv,i}$), times the annual average distance of transportation per tonne (~~dp_i~~ $dp_{fv,i}$), before the project begins, based on at least one year of historical data, but preferably three years. Vehicle fuel efficiency for existing freight vehicles is determined as the average annual fuel consumption (*FC*) divided by the average distance travelled (*D*) by each vehicle based on at least one year of historical data and preferably three years.

$$BEF_{fv,i} = \frac{\sum_j D_{fv,i} \times \eta_{BLFVi} \times NCV_{fv,j} \times EF_{CO2,fv,j}}{P_{fv,i} * dp_{fv,i}} \quad \text{~~} BEF_i = \frac{\sum_j D_i * \eta_{BLVi} * NCV_j * EF_{CO2,j}}{P_i * dp_i} \text{~~} \qquad (1)$$

Where:

~~BEF_i~~ $BEF_{fv,i}$	Baseline emission factor per tonne of goods per kilometre for freight vehicle *i* under baseline conditions (tCO_2/ton km)
~~P_i~~ $P_{fv,i}$	Total annual weight of goods transported by each freight vehicle *i* under baseline conditions (tonnes)
~~dp_i~~ $dp_{fv,i}$	The annual average distance of transportation per tonne of freight by each freight vehicle *i* under baseline conditions (km)
~~D_i~~ $D_{fv,i}$	Total annual distance travelled by each vehicle *i* under baseline conditions (km)
~~η_{BLVi}~~ η_{BLFVi}	Fuel efficiency of freight vehicle *i* under baseline conditions (qty of fuel/km~~, see paragraph 13 for fuel efficiency of new vehicles~~)
~~NCV_j~~ $NCV_{fv,j}$	Net calorific value of fuel *j* of freight vehicle (MJ/Unit qty of fuel)
~~$EF_{CO2,j}$~~ $EF_{CO2,fv,j}$	CO_2 emission factor of fuel *j* used by freight vehicle (tCO_2/energy content of fuel, country specific data or IPCC default value)

Passenger Vehicles

14. For passenger vehicles, the baseline emission factor is determined on the basis of emissions per kilometer ($BEF_{pv,i}$). Vehicle fuel efficiency for existing commercial passenger transport vehicles is determined as the average annual fuel consumption (*FC*) divided by the average distance travelled (*D*) by each vehicle based on at least one year of historical data and preferably three years.

$$BEF_{pv,i} = \eta_{BLPV,i} \times NCV_{pv,j} \times EF_{CO2,pv,j}$$

Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

III.AT. Transportation energy efficiency activities installing digital tachograph systems to commercial freight transport fleets (cont)

Where:

$BEF_{pv,i}$	Baseline emission factor per kilometer for the baseline commercial passenger transport vehicle *i* in the year *y* (tCO_2/ km)
$\eta_{BLPV,i}$	Fuel efficiency of baseline commercial passenger transport vehicle *i* in the year *y* (t/km)
$NCV_{pv,j}$	Net calorific value of fuel *j* of commercial passenger transport vehicle (MJ/t)
$EF_{CO2,pv,j}$	CO_2 emission factor of fuel *j* of commercial passenger transport vehicle (tCO_2/MJ)

15. In the case that historical data is not available or less than one year of historical data is available for the determination of baseline emission factor, the fuel efficiency shall be determined in accordance with paragraph 18. The remaining parameters used for determining the baseline emission factor shall be estimated conservatively based on the data available at the time of calculation of the baseline emission factor.

16. In the baseline calculations, the remaining lifetime of the vehicles replaced shall be taken into account in accordance with the guidance provided by the Board (EB 22, annex 2).

17. The total baseline emissions are calculated on an annual basis using the monitored data as described below.

~~$BE_y = \sum P_{i,y} \times BEF_i \times dp_{i,y}$~~

$$BE_y = \sum P_{fv,i,y} \times BEF_{fv,i} \times dp_{fv,i,y} + \sum_i N_{pv,i,y} \times AD_{pv,i,y} \times BEF_{pv,i} \quad \textbf{(2)}$$

Where:

BE_y	Total baseline emissions in year *y* (tCO_2/yr)
~~$P_{i,y}$~~ $P_{fv,i,y}$	Total annual weight of goods transported by each project freight vehicle *i* in year *y* on each traceable route (tonnes)
~~BEF_i~~ $BEF_{fv,i}$	Baseline emission factor per tonne of goods per kilometre for freight vehicle *i* (tCO_2/tonne km) under baseline conditions
~~$dp_{i,y}$~~ $dp_{fv,i,y}$	Annual average distance of transportation per tonne of goods by freight vehicle *i* in year *y*(km)
$N_{pv,i,y}$	Number of operating project commercial passenger transport vehicle *i* in the year *y* with a remaining life-span (vehicles)

Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

III.AT. Transportation energy efficiency activities installing digital tachograph systems to commercial freight transport fleets (cont)

$AD_{pv,i,y}$	Annual average distance of project commercial passenger transport vehicle *i* in year *y* (km)
$BEF_{pv,i,}$	Baseline emission factor for project commercial passenger transport vehicle *i* (tCO_2/ km)

18. The baseline fuel efficiency (~~η_{BLVi}~~ η_{BLFVi} and/or $\eta_{BLPV,i}$) for vehicles added to the fleet after the start of the project activity and already installed with the project devices ~~digital tachograph system~~ (or in the case of changes to routes after implementation of the project activity or unavailability of historical data for the project vehicles) is determined using one of the following options:

(a) For existing vehicles, when a specific baseline vehicle can be identified from existing vehicles, i.e. a vehicle used along the same route and with similar operating conditions, the following applies: the baseline fuel efficiency(~~η_{BLVi}~~) is determined using baseline operational data from that existing vehicle based on at least one year of historical data and preferably three years as described in paragraph ~~10~~ 14. ~~Measurements shall be undertaken for all vehicles or for a representative sample of vehicles;~~

(b) For newly added vehicles, the baseline fuel efficiency(~~η_{BLVi}~~) is estimated by using the fuel efficiency of top 20% of similar type vehicles in the fleet before the project activity, as determined according to travel distance of each vehicle for the previous three years. If no data exists for the time period, a shorter period can be chosen, with a minimum of one year. ~~Otherwise, data on fuel efficiency can be obtained from manufacturer's specification, if it can be demonstrated that the value is conservative given the operating conditions of the vehicles in the baseline~~

(c) For newly added vehicles, if option (b) is not feasible, fuel efficiency can be obtained based on data from the manufacturer's specifications, if it can be demonstrated that the value is conservative given the operating conditions of the vehicles used in the baseline;

(d) If the above options are not feasible, the baseline fuel efficiency is determined by taking one year of real data before implementing the feedback mechanisms,[8] as is

[8] For example, baseline vehicle fuel efficiency may be determined by measuring the actual fuel consumption of a sample of comparable vehicles operating in comparable traffic situations without activating the feedback mechanism of the Devices. Comparable vehicles are those with similar age structure, motorization and load/ passenger capacity. In the case of passenger vehicles, comparable traffic situations are considered as vehicles operating in the same city or – in case of inter-urban traffic – operating on comparable inter-urban routes. In the case of freight vehicles, comparable traffic situations are considered as vehicles operating on the same routes. Measurements shall be undertaken on a representative sample of vehicles. Measurement principles and techniques used for the baseline sample shall be identical to the project sample.

described in paragraph ~~10~~ 15. Measurements shall be undertaken for all vehicles or for a representative sample of vehicles.

19. When measurements are undertaken for a representative sample of vehicles, project proponents shall follow the "Standard for sampling and surveys for CDM project activities and programme of activities".

20. Once measured, the baseline vehicle fuel efficiency will be fixed throughout the crediting period.

21. Note that if the baseline vehicle does not have air conditioning then the data used should also be from vehicles without air conditioning.

Leakage

22. No leakage calculation is required.

Project activity emissions

23. Project emissions are determined by monitoring the consumption of fuel or energy consumed by the vehicles introduced, according to the following formula:

$$PE_y = \sum_j \sum_i FC_{fv,i,j,y} \times NCV_{fv,j} \times EF_{CO2,fv,j} + \sum_j \sum_i FC_{pv,i,j,y} \times NCV_{pv,j} \times EF_{CO2,pv,j} \quad (3)$$

~~$PE_y = \sum_j \sum_i FC_{i,j,y} * NCV_j * EF_{CO2,j}$~~

Where:

PE_y	Total project emissions in year y (tCO_2/yr)
~~$FC_{i,j,y}$~~ $FC_{fv,i,j,y}$	Consumption of fuel j by freight vehicle i in year y (quantity of fuel)
~~NCV_j~~ $NCV_{fv,j}$	Net calorific value of fuel j of freight vehicle (as obtained by country specific data or IPCC default value)
~~$EF_{CO2,j}$~~ $EF_{CO2,fv,j}$	CO_2 emission factor of fuel j used by freight vehicle i under baseline conditions (tCO_2/energy content of fuel, country specific data or IPCC default value)
$FC_{pv,i,j,y}$	Consumption of fuel j by commercial passenger transport vehicle i in year y (quantity of fuel)

$NCV_{pv,j}$	Net calorific value of fuel *j* of commercial passenger transport vehicle (as obtained by country specific data or IPCC default value)
$EF_{CO2,pv,j}$	CO_2 emission factor of fuel *j* used by commercial passenger transport vehicle *i* under baseline conditions (tCO_2/energy content of fuel, country specific data or IPCC default value)

24. In project activities where the vehicles in the project activity have air conditioning whereas in the baseline scenario they did not, then seepage of HFC shall be taken into account. If data is available this should be calculated for the specific AC units and operating conditions of the vehicles in question. Otherwise a default value of 400 $kgCO_2e$/year should be used for each vehicle.

Monitoring

25. The following parameters shall be monitored:

Freight Vehicles

Abbr.	Item, unit	Monitoring method / item
~~$DT_{i,y}$~~ $DT_{fv,i,y}$	Total distance travelled by each freight vehicle *i* in year *y* (km/yr)	Driver logs and route maps, recorded by GPS tracking system
i	The vehicles are identified based on the age, characteristics and load capacity and availability of historical data	The data are periodically checked on annual basis and recorded electronically
~~$dp_{i,y}$~~ $dp_{fv,i,y}$	Annual average distance of transportation per tonne of freight by each project freight vehicle *i*	Monitored through company records

Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

III.AT. Transportation energy efficiency activities installing digital tachograph systems to commercial freight transport fleets (cont)

Abbr.	Item, unit	Monitoring method / item
~~$FC_{i,y}$~~ $FC_{fv,i,j,y}$	Consumption of fuel *j* by freight vehicle *i* in year *y* (quantity of fuel consumed)	Purchase or consumption records or fuel consumption data, whose higher value is taken to ensure conservativeness If the fuel consumption is determined by fuel flow sensors (meters), they shall be calibrated in accordance with the General guidelines to SSC CDM methodologies.
~~NCV_i~~ $NCV_{fv,j}$	Net calorific value of fuel *j* of freight vehicle(energy content of fuel/quantity of fuel)	Country specific data or IPCC default value
~~$EF_{CO2,j}$~~ $EF_{CO2,fv,j}$	CO_2 emission factor of fuel used by baseline freight vehicle (tCO_2/energy content of fuel)	Country specific data or IPCC default value
~~$P_{i,y}$~~ $P_{fv,i,y}$	Total annual goods transported by each project freight vehicle in year *y*	Monitored data during the project e.g. driver logs and route maps, plus sales receipts
$SL_{,k}$	Service level in terms of volume of goods times the average distance of transportation per tonne of freight by truck class *k* in year *y*	Monitored for each truck class, from company/operators records, e.g. driver logs and route maps, plus sales receipts
	Annual monitoring to check if devices ~~tachograph systems~~ have become a mandatory practice, or that highly-enforced anti-idling policies or legislation have been put into place	
	Monitoring to ensure that all devices ~~tachograph~~ and feedback systems including fuel flow sensors (meters) are operating correctly and have not been disabled	If any device ~~tachograph system~~ installed in a project vehicle is not operating correctly, no emissions reductions can be attributed to that vehicle for the period that the system has not been operating correctly

Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

III.AT. Transportation energy efficiency activities installing digital tachograph systems to commercial freight transport fleets (cont)

Commercial passenger vehicle fleet

Abbr.	Item, unit	Monitoring method / item
$DT_{,pv,i,y}$	Total distance travelled by each commercial passenger transport vehicle *i* in year *y* (km/yr)	Driver logs and route maps, recorded by GPS tracking system
$FC_{pv,i,j,y}$	Consumption of fuel *j* by commercial passenger transport vehicle *i* in year *y* (quantity of fuel consumed)	Purchase or consumption records or fuel consumption data, whose higher value is taken to ensure conservativeness If the fuel consumption is determined by fuel flow sensors (meters), they shall be calibrated in accordance with the General guidelines to SSC CDM methodologies.
$NCV_{pv,j}$	Net calorific value of fuel *j* of commercial passenger transport vehicle (energy content of fuel/quantity of fuel)	Country specific data or IPCC default value
$EF_{CO2,pv,j}$	CO_2 emission factor of fuel used by baseline commercial passenger transport vehicle (tCO_2/energy content of fuel)	Country specific data or IPCC default value
	Annual monitoring to check if devices ~~tachograph systems~~ have become a mandatory practice, or that highly-enforced anti-idling policies or legislation have been put into place	
	Monitoring to ensure that all devices ~~tachograph~~ and feedback systems including fuel flow sensors (meters) are operating correctly and have not been disabled	If any device ~~tachograph system~~ installed in a project vehicle is not operating correctly, no emissions reductions can be attributed to that vehicle for the period that the system has not been operating correctly

Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

III.AT. Transportation energy efficiency activities installing digital tachograph systems to commercial freight transport fleets (cont)

26. The following shall be determined once and remain fixed throughout the crediting period[9]:

Abbr.	Item, unit	Measurement method / item
~~$\eta_{BLV,i}$~~ $\eta_{BLFV,i}$	Efficiency of freight vehicle *i* under baseline conditions (km/quantity of fuel)	As detailed in paragraphs above
$\eta_{BLPV,i}$	Efficiency of commercial passenger transport vehicle *i* under baseline conditions (km/quantity of fuel)	As detailed in paragraphs above
~~P_i~~ $P_{fv,i}$	Total annual goods transported by each freight vehicle under baseline conditions	Measured data before feedback mechanisms are activated
D_i	Total distance travelled by each vehicle under baseline conditions	Measured data before feedback mechanisms are activated
~~dp_i~~ $dp_{fv,i}$	Average distance of transportation per tonne of freight by each freight vehicle *i* under baseline conditions	Calculated through company records
$SL_{BL,k}$	Service level of freight vehicles in terms of volume of goods times the average distance of transportation per tonne of freight by truck class *k* before the beginning of the project	Determined from company/operators records, e.g. driver logs and route maps, plus sales receipts

27. For freight vehicle fleets, service level determined by weight of goods times the average distance of transportation tonne of freight ($SL_{k,y}$) shall be capped at baseline level ($SL_{BL,k}$). Emission reductions beyond this level will not be counted. For commercial passenger vehicles, PPs shall provide the evidence (e.g. local data or national data) to show that the average number of passengers using the project transport type is not decreasing during the crediting period.

28. Considering that many other factors may impact fuel saving (e.g. expansion of road lanes, use of other fuel saving devices, more efficient tyres, etc), if annual emissions reductions are greater than 10% of baseline emissions in year *y,* then this must be appropriately justified as feasible based on relevant studies (i.e. studies of the potential emissions reductions from the project devices ~~tachograph systems~~).

Project activity under a Programme of Activities

29. No leakage calculation is required, even when applying to a project activity under a programme of activities.

[9] If there are additions of vehicles and/or changes to routes over the life of the project, the relevant parameters shall be updated when these changes or additions occur.

Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories

III.AT. Transportation energy efficiency activities installing digital tachograph systems to commercial freight transport fleets (cont)

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History of the document

Version	Date	Nature of revision
02	EB 66, Annex # 02 March 2012	Revision to expand the applicability to passenger vehicles with digital tachograph systems or other devices that can monitor vehicle and driver performance data and provide real-time feedback to drivers.
01	EB 60, Annex 15 15 April 2011	Initial adoption.
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