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

TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS

Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html.

III.AA. Transportation Energy Efficiency Activities using Retrofit Technologies

Technology/measure

1. This category comprises the engine retrofit of existing/used vehicles for commercial passenger transport resulting in increased fuel efficiency of the vehicle with consequent reduction in GHG emissions. Vehicles are of the same type, use the same fuel and a single type of retrofit technology (e.g., direct in cylinder fuel injection to substitute carburretted fuel supply) to reduce greenhouse gas emissions.

2. Types of vehicles covered by the methodology are public transit vehicles including vehicles such as buses, motorized rickshaws or taxis.

3. This methodology is not applicable to:

   (a) Introduction of brand new vehicles or low-emission vehicles (e.g., CNG, LPG, electric or hybrid vehicles);

   (b) fuel switch in existing vehicles (e.g., fossil fuel to plant oil use);

   (c) Freight transport activities;

   (d) Modal shift in transportation.

Activities referred to in 3 (a) to 3 (d) may be eligible under one of the following methodologies: AMS-III.C, AMS-III.S, AMS-III.T and AMS-III.U.

4. If biofuel blends are used, the blending ratio in the baseline and the project situation must be the same.

5. The retrofit technology employed must improve energy efficiency and not combustion efficiency according to the guidance from the Board (see EB 32 paragraph 28).

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

7. Vehicles shall operate during the baseline and project situation on comparable routes. Comparable routes can be identified as urban traffic situations, preferably in the same city. If the vehicles are used in inter-urban traffic situations the same routes should be used by baseline and project vehicles.

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

III.AA. Transportation Energy Efficiency Activities using Retrofit Technologies (cont)

Boundary

8. The project boundary is the physical, geographical location of the retrofit vehicles that are part of the project activity being implemented. This can be cities (for vehicles used on urban routes) or routes between cities (for vehicles used in peri-urban routes).

Baseline

9. For each retrofitted vehicle the average remaining life-time without retrofit is determined. The remaining life-span of a vehicle is determined as the average life-span of comparable non-retrofitted vehicles minus the vehicle age. Credits can only be earned for the remaining life span.

10. The first step to determine the baseline emissions is to calculate a baseline emission factor per kilometer for a sample of baseline vehicles ($BEF_{i,y}$) in year *y*.

$$BEF_{i,y} = \eta_{BV,i,y} \times NCV_j \times EF_{CO2,j} \quad \textbf{(1)}$$

Where:

$BEF_{i,y}$ Baseline emission factor per kilometer for the baseline vehicle i in the year *y* (tCO2/ km)

$\eta_{BV,,y}$ Fuel efficiency of baseline vehicle *i* in the year *y* (t/km)

NCV_j Net calorific value of fuel *j* (MJ/t)

$EF_{CO2,j}$ CO_2 emission factor of fuel *j* (tCO_2/MJ)

11. Baseline emissions are those caused by the average annual distance driven of project vehicles times the baseline emission factor times the actual number of operating project vehicles. Total baseline emissions are calculated on an annual basis using the monitored data as below:

$$BE_y = \sum_i N_{PJ,i,y} \times AD_{PJ,i,y} \times BEF_{i,y} \quad \textbf{(2)}$$

Where:

BE_y Total baseline emissions in year *y* (tCO_2)

$N_{PJ,i,y}$ Number of operating project vehicles *i* in the year *y* with a remaining life-span (vehicles)

$AD_{PJ,i,y}$ Annual average distance of project vehicle *i* in year *y* (km)

$BEF_{i,y}$ Baseline emission factor for vehicle *i* in the year *y* (tCO_2/ km)

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

III.AA. Transportation Energy Efficiency Activities using Retrofit Technologies (cont)

12. The following parameters shall be determined *ex ante* and shall not be monitored:

Abbr.	Item / Unit	Measurement method / item
NCV_j	Net calorific value of fuel	Country specific data or IPCC default value
$EF_{CO2,j}$	CO_2 emission factor of fuel (tCO2/energy content of fuel)	Country specific data or IPCC default value
J	Fuel type	Interviews/ engine specifications

13. Baseline vehicle fuel efficiency (η_{BV}) is determined by measuring the actual fuel consumption of a sample of non-retrofitted comparable vehicles operating in comparable traffic situations. Comparable vehicles are those that with similar age structure, motorization and passenger load capacity (if relevant also the same share of vehicles with/without AC in the baseline and project sample). 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. Measurements shall be undertaken on representative sample of vehicles in accordance with the statistical methods (Use 90% confidence interval and ±10% error margin to determine the sample size). Measurement principles and techniques used for the baseline sample shall be identical to the project sample. The lower 95% confidence interval is taken for baseline fuel efficiency. If 100% of vehicles have been retrofitted the lowest value of the last three measured years (if available, otherwise the last year) can be taken.

Project Activity Emissions

14. Project emissions are emissions from fuel consumption per distance driven of the vehicle with the retrofit technology in place. Project emissions constitute emissions resulting from the fossil fuel emissions of the vehicle after the retrofit process.

15. Project emissions are determined by monitoring the consumption of fuel or energy consumed by a sample of project vehicles, according to the following formula:

$$PE_y = \sum_i \eta_{PJ,i,y} \times NCV_j \times EF_{CO2,j} \times AD_{PJ,i,y} \times N_{PJ,i,y} \quad \textbf{(3)}$$

Where:

PE_y Total project emissions in year y (tCO_2)

$\eta_{PJ,i,y}$ Fuel efficiency of project vehicle i in the year y (t/km)

NCV_j Net calorific value of fuel j (MJ/t)

$EF_{CO2,j}$ CO_2 emission factor of fuel j (tCO_2/MJ)

$AD_{PJ,i,y}$ Annual average distance of project vehicle i in year y (km)

$N_{PJ,i,y}$ Fuel efficiency of project vehicle i in the year y (t/km)

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

III.AA. Transportation Energy Efficiency Activities using Retrofit Technologies (cont)

16. The same measurement principles and techniques as used for the baseline sample need to be applied when determining the fuel consumption of the project sample. The upper 95% confidence interval is taken for project fuel efficiency.

17. The number of actually operating vehicles is determined either through actual and controlled annual vehicle registrations or by using the following formula. The number of project vehicles theoretically in operation is the sum of all retrofitted vehicles which still have a remaining life-span in the respective year y. The share of project vehicles in operation (between 0 and 100%) corresponds to the number of actually operating project vehicles based e.g., on a random survey. This allows the exclusion of vehicles which were retrofitted but are not in usage any longer.

$$N_{PJ,i,y} = NT_{PJ,i,y} \times OR_{i,y} \quad \textbf{(4)}$$

Where:

$N_{PJ,i,y}$ Number of operating project vehicles *i* in the year y with a remaining life-span (vehicles)

$NT_{PJ,i,y}$ Number of theoretically operating project vehicles *i* in the year y with a remaining life-span (vehicles)

$OR_{i,y}$ Share of project vehicles actually in operation (%)

Leakage

18. No leakage calculation is required.

Monitoring

Table: Parameters not monitored

Abbr	Item	Monitoring method
NCV	Net calorific value	National values or IPCC lower 95% boundary Values need to be updated if national values or IPCC values change.
EF_{CO2}	CO_2 emission factor	National values or IPCC value lower 95% boundary Values need to be updated if national values or IPCC values change. If the baseline and project fuel is blended with biofuel, the biofuel component must be accounted as a zero emission source.

LS	Remaining technical life-span of baseline vehicles (not retrofitted)	Based on average life-span of comparable vehicles, Based on registration statistics calculating the lifespan as twice the average age or on a sample/survey of vehicles determining the average age taking the lower 95% confidence interval of the sample (life span = average age *2).

Table: Parameters Monitored

Abbr	Item	Monitoring method	frequency
η_{BV}	Fuel efficiency baseline vehicle (per vehicle type)	Based on sample measurement of comparable vehicles in comparable traffic situation using lower 95% confidence interval.	annually
η_{PJ}	Fuel efficiency project vehicle (per vehicle type)	Based on sample measurement using same approach as for baseline vehicle using upper 95% confidence interval.	annually
AD_{PJ}	Average annual distance driven of project vehicles	Based on sample of project vehicles e.g., based on odometer reading. Lower 95% confidence interval of sample is taken.	annually
NT_{PJ}	Number of theoretically operating project vehicles	Sum of all retrofitted vehicles which still have a remaining life-span in the respective year y. Based on retrofitting registrations. For each retrofitted vehicle the average remaining life-span is determined based on technical life-span minus actual vehicle age. Only retrofitted vehicles are included which still have a remaining life-span.	annually
OR	Share of project vehicles in operation	Based on registration statistics or on survey to determine % of retrofitted vehicles still in operation. Lower 95% confidence interval is taken if based on sample/survey.	annually

Project activity under a programme of activities

The following conditions apply for use of this methodology in a project activity under a programme of activities:

19. In case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be

implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.

- - - - -

History of the document

Version	Date	Nature of revision
01	EB xx, Annex # 28 May 2009	To be considered at EB xx.