METHODOLOGY FOR DETERMINING GHG EMISSION REDUCTIONS THROUGH BICYCLE SHARING PROJECTS - 2011v04.4

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Relationship to Approved or Pending Methodologies

No approved methodology under the VCS Program or any approved GHG program could reasonably be revised to meet the objective of this proposed methodology; thus justifying the need for a new methodology element. Here lies a list of all relevant approved methodologies within the Sector 7, "Transport" scope under the VCS or approved GHG programs:

Methodology Name	Reference Number	GHG Program	Status
Baseline Methodology for Bus Rapid Transit Projects	AM0031 (v3)	CDM – UNFCCC	Approved
Baseline Methodology for Mass Rapid Transit Projects	ACM0016 (v2)	CDM – UNFCCC	Approved

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1. SOURCES

While portions of this methodology are entirely novel, core elements of the approved methodologies listed in the "Relationship to Approved or Pending Methodologies" section above were referenced (and further enhanced) to determine the general approach to mode shift and baseline emission factors per mode of transit; including core parameter determinations.

The approved methodologies are only applicable for mode shifts towards mass transit means which have different characteristics than individual bicycle usage.

Therefore, while using core elements of approved mode shift methodologies, a new methodology is required to match the proposed project activity type.

This methodology refers to the latest approved versions of the following tools:

Tool	Source
Tool to calculate project or leakage CO2 emissions from fossil fuel combustion	CDM – UNFCCC
Tool to calculate baseline, project and/or leakage emissions from electricity consumption	CDM – UNFCCC
General guidelines for sampling and surveys for small-scale CDM project activities	CDM – UNFCCC
Tool to calculate the emission factor for an electricity system	CDM – UNFCCC
Tool for the demonstration and assessment of additionality	CDM – UNFCCC
Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories - Version 13, EB 54 Annex 13	CDM - UNFCCC
Guidelines on the Assessment of Investment Analysis - Version 03, EB 51 Annex 58	CDM - UNFCCC
Guidelines for Objective Demonstration and Assessment of Barriers - Version 01, EB 50 Annex 13	CDM - UNFCCC

2. SUMMARY DESCRIPTION OF THE METHODOLOGY

The proposed new methodology is designed for project activities that reduce GHG emissions through the usage of public sharing-based bicycle projects.

These projects/systems introduce an attractive, alternate, more efficient (most times zero-emitting) mode of public transportation to displace other, more carbon-intensive modes.

Baseline emissions include the emissions that would have happened due to the transportation of the passengers who use the project activity, had the project activity not been implemented. Project emissions include those which stem from the project activity itself i.e. bicycling.

The only leakage source is accounted for via the “detour” survey control question (see Annex 4). Therefore, to ensure that emission reductions are conservative bicycle users are asked if they made a significant detour from their original origin (aka OO) to get to the check-out bike share station location (aka COBSSL) to use the bicycles so as to determine if the full baseline trip distance would have been significantly shorter than the project trip i.e. from the COBSSL to the check-in bike share station location (aka CIBSSL). The same control question addresses whether or not the bicycle user made a significant detour from the CIBSSL to their final destination (FD) so as to determine if the full baseline trip distance would have been significantly shorter than the project trip i.e. from COBSSL to CIBSSL. Refer to Annex 4 and 5 within the Appendix Section 15 for more information.

3. DEFINITIONS (and abbreviations)

TERM	DEFINITION
Bicycle(s) aka Bike(s)	Standard, exclusively human-powered peddle bicycles i.e. non-motorized (road, mountain, cruiser, etc.).
e-bicycle(s) aka e-bike(s)	Electric bikes (aka mopeds, etc.) are battery operated electric two-wheeler items which may also be peddle-assisted. Electric bikes included are such with restricted power capacity (≤ 4.0 kW) and with limited speeds (e.g. ≤ 50 km/h). Electric bikes like those included in general do not need a vehicle certification. In general such vehicles can be driven also by children below the regular vehicle license age (e.g. 14 years old in some countries) and with a different license type than regular motorcycles.
Bicycle Sharing aka Public Bicycle Systems (PBS) or Community Bike Programs	Bike sharing is an emerging form of environmentally friendly public transportation that incorporates information technology with shared bicycles to allow for an alternative form of short-term, one-way transit. Bike share programs have a fleet of bikes that may be taken by multiple users from one bike share station and returned to any other station within the same network. Examples of such programs are found in an array of locations across the globe, typically in urban settings. Bike share programs can come under a multitude of names or headers and can be implemented by private, public or mixed entities.

TERM	ABBREVIATION
GHG	Green House Gas
PD/D	Project Description (aka Project Description Document)

LTR	Light Rail Transit
EB	Executive Board
VCS	Verified Carbon Standard
CDM	Clean Development Mechanism
UNFCCC	United Nations Framework Convention on Climate Change
IPCC	Intergovernmental Panel on Climate Change
CNG	Compressed Natural Gas
LPG	Liquefied Petrol Gas
NCV	Net Calorific Value
COBSSL	Check-out bike share station location, i.e. the bike share station the project passenger checks their bike out from prior to traveling to the check-in bike share station location (aka CIBSSL)
CIBSSL	Check-in bike share station location, i.e. the bike share station the project passenger checks their bike in from after traveling from their check-out bike share station location (aka COBSSL)
OO	Original origin of project passenger, for e.g. their home outside of the city, prior to commencing their project activity trip instance from the COBSSL
FD	Final destination of project passenger, for e.g. their work within the city
DLL	Detour leakage level of project passengers, as determined through the "detour" leakage control survey question (see Annex 4 and 5)
API	Application Program Interface

4. APPLICABILITY CONDITIONS

Project Activity

The proposed new methodology is applicable for project activities that reduce GHG emissions through the usage of public sharing-based bicycle transportation systems; typically found in an urban setting. Refer to the definition of "Bicycle Sharing" above for more information.

Applicable bicycle types include standard, exclusively human-powered peddle bikes as well as e-bikes which may also be peddle-assist; defined above.

The proposed methodology typically applies to those project activities that induce modal shift in transportation from carbon-intensive modals to less-intensive modals as enabled by the project activity itself (e.g. bicycle sharing enables shared bicycle usage by making them available in a slew of locations within the public setting).

The following applicability conditions apply:

1. Users have several modal options (e.g. cars, taxis, public transit modes, NMT, etc.) available to get from Point A to Point B in the baseline scenario.
2. The project activity is road-based. The baseline transport system including public transit means are road or rail-based (the methodology excludes air and water-based systems from analysis).
3. The analysis of possible baseline scenario alternatives leads to the result that a continuation of current modes of transport reasonably represent the emissions by sources of greenhouse gases (GHG) that would occur in the absence of the proposed project activity (i.e. the baseline scenario).
4. The project activity is applicable to new bike sharing initiatives and/or extensions of existing bike sharing initiatives. Extensions include basically the establishment of new and additional facilities to rent bicycles thus expanding the outreach and density of an existing program. To be applicable the new and additional locations must represent an expansion of at minimum the appropriate percentage of the pre-existing number of project units i.e. bicycles in accordance with the following scale: for projects with less than 10,000 bicycles – 10%; for projects with 10,000 or greater but less than 30,000 bicycles – 7.5%; and for projects with greater than 30,000 bicycles – 5%.
5. The project must be located in urban or sub-urban zones.
6. Projects must have at least 60% of their bike share stations powered by renewables, e.g. solar and must incorporate emission-free mechanisms by which to abate any emissions that may be associated with redistributing bicycles throughout the program, for e.g., providing users incentives to return bicycles to under-utilized stations so as to induce self-regulating systems; all considered as standard practice. If projects don't adhere to this criterion, project proponents must refer to the CDM "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" to calculate any such emissions from their project, defined as KR_y (see equation #8).

5. PROJECT BOUNDARY

The spatial extent of the project boundary encompasses the geographic bounds in which the project takes place. As the project cannot control the trip origins or destinations of passengers the spatial area of the project is the entire zone in which the project operates. The geographic bounds are the trip origins and trip destinations of passengers. These are defined by the outreach of the bike-sharing system. A map with all bike sharing facilities has to be included in the PD. The geographic region is thereafter the zone of influence of the bike sharing facilities.

The PD must contain, at minimum a map of the region with the proposed area which encompasses the project boundary outlined.

In case of using electricity from an interconnected grid or captive power plant for the propulsion of the transport systems included in the project boundary, the project boundary also includes the power plants connected physically to the electricity system that supply power to those transport systems. As a reference for further clarification, please refer to the CDM "Tool to calculate baseline, project and/or leakage emissions from electricity consumption."

Emission sources not considered in the methodology (outside the project boundary) include:

1. Those caused by the remaining transport system (taxis, cars, conventional public transport, etc.).
2. Those caused by freight, ship, and air transport.

Emission sources considered in the methodology (inside the project boundary) include:

1. Project Emissions – Emissions stemming from the project activity i.e. bicycling.
2. Baseline Emissions – Emissions stemming from baseline activity.

For liquid fuels only CO2 is included while for gaseous fuels CO2 and CH4 is included. N2O emissions are not included.

Emissions sources included or excluded from the project boundary:

Baseline or Project Activity	Source	Gas	Included	Explanation/Justification
Baseline	Mobile source emissions of different modes of road and/or rail transport for passengers which use project activity and would have used other modes of transit in absence of the project (buses, passenger cars, motorcycles, taxis, rail based, etc.).	CH4	Yes	Included only if gaseous fuels are used (major emission source). For liquid fuels vehicle tailpipe CH_4 emissions are excluded. Combined CH_4 and N_2O emissions make in diesel/gasoline vehicles less than 2% of total CO_{2eq} emissions. Its exclusion in baseline as well as project emissions is conservative as fuel consumption and thus also CH_4 emissions are reduced through the project.
		N20	No	Combined CH_4 and N_2O emissions make in diesel/gasoline vehicles less than 2% of total CO_{2eq} emissions. Its exclusion in baseline as well as project emissions is conservative as fuel consumption and thus also N_2O emissions are

				reduced through the project.
		C02	Yes	Major emissions source.
Project Activity	Bikes	CH4	No	Bikes don't use gaseous fuels
		N20	No	See above argument
		CO2	Yes	Potential emissions source in case of KR_y (see applicability condition #6)
		C02	Yes	Potential emissions source in case of e-bikes.

6. PROCEDURE FOR DETERMINING THE BASELINE SCENARIO

Project participants shall determine the most plausible baseline scenario through the application of the following steps:

Step 1: Identification of realistic and credible alternative scenarios to the proposed project activity that are consistent with current laws and regulations

Identify alternative scenarios in accordance with the CDM "Tool for the demonstration and assessment of additionality", which shall consider at minimum:

1. The proposed project activity not being registered as a VCS project activity;
2. The continuation of the current public and individual transport systems.

The alternative scenarios assessed can include combinations of public transport systems and individual modes of transportation, such as passenger cars, taxis, motorcycles and non-motorized transport.

In the context of a bike-sharing project the two alternatives listed above are considered as sufficient as the investor in a bike sharing project as well as the type of investment is most always completely different in nature to investments into different types of Mass Transit Options for public transit or investments into additional road infrastructure, for e.g. Therefore only the two alternatives listed above in general need to be included.

Step 2: Assessment of options

Options identified in Step 1 above are assessed, and the most plausible baseline scenario identified.

Analyse all options identified in Step 1 using the latest version of the CDM "Tool for the demonstration and assessment of additionality."

7. PROCEDURE FOR DEMONSTRATING ADDITIONALITY

Additionality shall be determined by using the most recent version of the "Tool for the demonstration and assessment of additionality" as approved by the EB of the CDM.

The project additionality can be proven based on a financial assessment (investment analysis) or on barriers.

In case of using an investment analysis the most recent guidelines of the EB of the UNFCCC on the assessment of investment analysis shall be used (Guidelines on the Assessment of Investment Analysis).

In case of using a barrier analysis the most recent "Guidelines for Objective Demonstration and Assessment of Barriers" of the EB of the UNFCCC shall be used. Typical barriers prevalent in this project type include but are not limited to:

- Investment barrier including lack of capital to start-up operations
- Lack of know-how or prevailing practice barrier

The common practice test is made in two steps:

1. Has the mode share of bicycles increased in the project geographical region in the last decade by more than five percentage points? (Yes /No).
2. Does the project compete in its geographical zone with other bike-sharing projects? (Yes/No).

In case one of any or both questions is answered with "Yes" the project is considered as "common practice" and therefore the project would not be additional.

8. QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

8.1 Baseline Emissions

Baseline emissions like in most any carbon finance project are determined ex-post based on the activity level of the project. The methodology fixes however ex-ante the baseline emission factors per mode of transport in terms of emissions per passenger-kilometer per mode. The activity level which is the distance per bicycle user which would have used mode i in absence of the project is monitored and determined therefore ex-post.

Baseline emissions include the emissions that would have happened due to the transportation of the passengers who use the project activity, had the project activity not been implemented. This is differentiated according to the modes of transport (relevant vehicle categories) that the passengers would have used in the absence of the project.

$$BE_y = \sum_i \frac{[P_{i,y} * (1 - DLL\ )] \times AD_{i,y} \times EF_{PKM,i}}{10^\wedge 6}$$

(1)

Where:

BE_y	=	Baseline emissions in the year y (tCO2)
$P_{i,y}$	=	Passengers of the project which in absence of the project would have used mode i in the year y (passengers)
DLL	=	Percentage of passengers of the project which were determined to take a detour i.e. detour leakage level to/from the COBSSL or CIBSSL (percentage). Refer to parameter monitored, $DPR_{y=1}$.
$AD_{i,y}$	=	Average trip distance of project passengers from COBSSL to CIBSSL which in absence of the project would have used mode i in the year y (km)
$EF_{PKM,i}$	=	Emission factor per passenger-kilometer for vehicle category *i* (gCO_2/PKM)
i	=	Modes of transport the passenger of the project would have used in absence of the project

'AD' is for cars, taxis and motorcycles the shortest possible road trip distance between the COBSSL and CIBSSL of each bike trip based on a geocoded distance query or on beeline. A geocoded distance query is the process of submitting the origin and destination i.e. the COBSSL and CIBSSL addresses or exact GPS coordinates of such to a mapping service (typically referred to as a geocoding API) which will provide the shortest possible road trip distance traveled for the selected mode. In case of public transit modes the project can choose between the alternative of the shortest possible distance based on the shortest possible geocoded public transit route distance query or beeline (same as cars). If a geocoded public transit route distance query is used, the geocoding API shall support the public transit mode that was selected. The two alternatives are considered as equivalently acceptable. However projects might choose to base their distance estimates on geocoded public transit routes which reflect a more precise, baseline distance. This variable is recorded per trip with records of origin-destination i.e. COBSSL-CIBSSL per trip and mode which would have been used in that trip.

The variable 'P' includes all persons using the project bike sharing program.

The baseline mode which would have been used in absence of the project is recorded from users of the project system either through electronic/mechanical controls or through surveys.

(1) Identification of the relevant vehicle categories (modes of transport)

The relevant vehicle categories may include *inter alia*:

- Buses, differentiating between the sub-categories of large, medium and small buses, if appropriate;

- Passenger cars;
- Taxis;
- Motorcycles;
- Motorized tricycles or motorcycles with more than two wheels used for transporting passengers;
- Subway/metro, rail, LTR (Light Transit Rail), trolley or tram;
- NMT (Non-Motorized Transport);
- Other.

The relevant vehicle categories should be clearly identified in the PD. Vehicle categories must be separated further according to fuel types used including, if applicable, gasoline, diesel, gaseous fuels, electricity (hybrids). Only fuel types used by more than 10% of the same vehicle category need to be included in line with AM0031.

If some vehicle categories are not explicitly identified or do not fit into one of the categories above, they should be subsumed as “others”. Baseline emissions of this category are counted as zero-emissions. The index *i* is used to identify each relevant vehicle category (mode of transport) included in the analysis.

(2) Determination of the emission factor per passenger-kilometer

Passenger-kilometer (PKM) is defined as the average passenger trip distance multiplied by the number of passengers. The emission factors per PKM are determined *ex ante* for each vehicle category.

The emission factor per PKM are calculated as follows:

(2.1) Case 1: Emission factor per PKM for vehicles using electricity

For electricity-based vehicle categories such as metro, LTR, electric trolleybuses etc., the following equation can be used:

$$EF_{PKM,i} = \frac{TE_{EL,i}}{P_{EL,i} \cdot TD_{EL,i}} \quad (2)$$

Where:

$EF_{PKM,i}$ = Emission factor per passenger-kilometer for electricity-based vehicle category *i* (gCO_2/PKM)

$TE_{EL,i}$ = Total emissions from the electricity-based vehicle category *i* (tCO_2)

$P_{EL,i}$ = Total passengers transported per year by the electricity-based vehicle category *i* (passengers)

$TD_{EL,i}$ = Average trip distance of passengers using the electricity-based vehicle category *i* (km)

The total emissions from the electricity-based vehicle category *i*, $TE_{EL,i}$, should be calculated, for each vehicle category *i*, using the approved CDM “Tool to calculate baseline, project and/or leakage emissions from electricity consumption.”

(2.2) Case 2: Emission factors per PKM for fossil fuel-based transport systems

For fossil fuel-based vehicle categories such as cars, taxis, buses etc., the emission factor per PKM should be calculated as:

$$EF_{PKM,i} = \frac{EF_{KM,i}}{OC_i} \quad (3)$$

Where:

$EF_{PKM,i}$	=	Emission factor per passenger-kilometer of vehicle category *i* (CO_2/PKM)
$EF_{KM,i}$	=	Emission factor per kilometer of vehicle category *i* (gCO_2/km)
OC_i	=	Average occupation rate of vehicle category *i* (passengers)
i	=	Relevant vehicle category
y	=	Year of the crediting period

Equation 3 can also be used for electric powered vehicles depending on data availability. In this case the EF_{KM} is based on the specific electricity consumption applying the approved CDM "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" to determine the EF. This is e.g. also the case for hybrid vehicles using re-charging facilities.

(2.2.1) Determination of the average occupation rate (OC_i)

The average occupation rate of vehicle category *i* is determined for example based on visual occupation studies for all vehicle categories *i*. For buses, besides the visual occupation studies, the occupation rate can also be based on boarding-alighting studies or electronic smart tickets, with expansion factors for routes served to determine the average occupation rate along the entire route or on data obtained e.g. from survey which determine the average trip distance on buses. In the case of taxis, the driver should not be included.

The detailed procedures concerning visual occupation studies and boarding-alighting studies are presented in Annexes 1, 2 and 3.

For buses, as an alternative, the occupation rate can be based on average trip distance of bus passengers, total passengers and total distance driven of buses, using the following equation:

$$OC_B = \frac{P_B \cdot TD_{P,B}}{DD_B} \quad (4)$$

Where:

OC_B	=	Average occupation rate of buses (passengers)
P_B	=	Passengers transported by buses (passengers)

$TD_{P,B}$ = Average trip distance of passengers using bus (kilometer)

DD_B = Distance driven by all buses (kilometer)

(2.2.2) Determination of the emission factors per kilometer ($EF_{KM,i}$)

Relevant fuel types, for each vehicle category, have to be identified. The emission factor per kilometer is re-calculated every 10 years based on the recorded (last available official records) share of fuels per category. Only fuel types used by more than 10% of the same vehicle category need to be included in line with AM0031.

In case biofuel blends are used the biofuel share of the blend should be accounted for with zero emission factor ($EF_{CO2,x,y}$).

If various sub-categories of buses exist (e.g. small, medium, large units) the emission factor is calculated for each bus sub-category, and after aggregated as explained further below. The emission factor per kilometer is not constant but annually updated. Two options can be used to calculate $EF_{KM,i,y}$. For each vehicle category the project can choose which option to take. During the crediting period the project cannot change between one and the other option, i.e. the decision is fixed for the crediting period. Option 1 is the preferred option if data is easily available. The preference for Option 1 is based on the fact that this option reflects actual emission performance of baseline vehicles. Option 2 is a conservative default value and is taken if Option 1 is not available or results in high costs for data acquisition.

In case of electricity the EF_{KM} is based on the specific electricity consumption applying the approved CDM "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" to determine the EF. This is e.g. also the case for hybrid vehicles using re-charging facilities.

(2.2.2.1) Option 1: Annual monitoring of the specific fuel consumption (SFC) of the respective vehicle category *i*:

$$EF_{KM,i} = \frac{\sum_x \left(SFC_{i,x,y} \cdot NCV_{x,y} \cdot EF_{CO2,x,y} \cdot N_{x,i} \right)}{N_i} \quad (5)$$

Where:

$EF_{KM,i}$ = Emission factor per kilometer of vehicle category *i* (gCO_2/km)

$SFC_{i,x,y}$ = Specific fuel consumption of vehicle category *i* using fuel type *x* in year *y* (mass or volume units of fuel/km)

$NCV_{x,y}$ = Net calorific value of fuel *x* in year *y* (J/mass or volume units of fuel)

$EF_{CO2,x,y}$ = Carbon emission factor for fuel type *x* in year *y* (gCO_2/J)

$N_{x.i}$ = Number of vehicles of category *i* using fuel type x (units) y = Year of the crediting period

(2.2.2.2) Option 2: Use of a fixed technology improvement factor (IR) for the respective vehicle category i:

$$EF_{KM,i} = (IR_i)^{t+y} \cdot \frac{\sum_x (SFC_{i,x} \cdot NCV_x \cdot EF_{CO2,x} \cdot N_{x,i})}{N_i} \quad (6)$$

Where:

$EF_{KM,i}$ = Emission factor per kilometer of vehicle category *i* (g CO_2/km)

$SFC_{i,x}$ = Specific fuel consumption of vehicle category *i* using fuel type *x* (mass or volume units of fuel/km)

NCV_x = Net calorific value of fuel *x* (J/mass or volume units of fuel)

$EF_{CO2,x}$ = Carbon emission factor for fuel type *x* (g CO_2/J)

N_i = Number of vehicles of category *i* (units)

IR_i = Technology improvement factor for the vehicle of category *i* per year *t+y* (ratio)

t = Years of annual improvement (dependent on age of data per vehicle category)

y = Year of the crediting period

The technology improvement factor as listed in the following table.

Table 1.0: Default Technology Improvement Factors (per annum):

Vehicle Category	Technology Improvement Factor (IR)
Buses	0.99
Passenger cars	0.99
Taxis	0.99
Motorcycles (incl. tricycles)	0.99

Source: ACM0016 Table

For both Options 1 and 2 above, if various sub-categories of buses exist (e.g. small, medium, large units), after the emission factor for each sub-category ($EF_{KM,L,y}$, $EF_{KM,M,y}$, $EF_{KM,S,y}$) is calculated using the equation for $EF_{KM,i,y}$ presented above, the following aggregated emission factor has to be calculated and used:

$$EF_{KM,B} = \frac{EF_{KM,L} \cdot DD_L + EF_{KM,M} \cdot DD_M + EF_{KM,S} \cdot DD_S}{DD_L + DD_M + DD_S} \quad \textbf{(7)}$$

Where:

$EF_{KM,B}$ = Emission factor per kilometer of buses (gCO_2/km)

$EF_{KM,L/M/S}$ = Emission factor per kilometer of buses sub-category *L* (large buses), *M* (medium sized buses) and *S* (small buses) (gCO_2/km)

$DD_{L/M/S}$ = Total distance driven of buses sub-category *L* (large buses), *M* (medium sized buses) and *S* (small buses) (kilometer)

The distance driven of buses can be based on the average annual distance and the number of units. In other cases however companies might have reliable records on total distance driven of units.

(3) Determination of Average Distance Driven per Mode

Baseline emissions cover the emissions which would have been caused by the project passenger in absence of the project for the trip segment made on the project system. The trip distance is based on origin and destinations of the project trip distance i.e. COBSSL and CIBSSL, which is used as baseline trip distance and thus monitored for each passenger.

(4) Determination of Passenger per Mode

The mode the passenger would have used in absence of the project system is determined either through electronic/mechanical controls or through a survey.

8.2 Project Emissions

The project emissions shall only stem from the new transport system i.e. project activity.

Project activity emissions equate to zero ‘0’ if zero-emitting human-powered peddle bicycles are utilized throughout the project and provided applicability condition #6 is met. Else, project activity emissions are the electricity consumed by the electric-powered project units in addition to those potential emissions determined by KR_y; in which case the project proponent shall also refer also to the, “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” and “Tool to calculate baseline, project and/or leakage emissions from electricity consumption.”

$$PE_y = \sum_i \frac{EF_{PJ,km,y} \times DD_y \times N_{EB,y}}{10^6} + KR_y$$

(8)

Where:

PE_y = Project emissions in year y (tCO_2)

$EF_{PJ,km,y}$ = Emission factor per kilometer of project e-bikes in the year y (gCO_2/km)

DD_y = Annual average distance driven of project e-bikes in the year y (km)

$N_{EB,y}$ = Number of project e-bikes in circulation in the year y

KR_y = Bike station kiosk and bike redistribution related emissions in year y (tCO_2).

Refer also to the, "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" and "Tool to calculate baseline, project and/or leakage emissions from electricity consumption."

$$EF_{PJ,km,y} = \sum_i EC_{PJ,km,y} \times EF_{grid,CM,y} \times \left(1 + TDL_y\right) \quad \textbf{(9)}$$

Where:

$EF_{PJ,km,y}$ = Emission factor per kilometer of project e-bikes in the year y (gCO_2/km)

$EC_{PJ,km,y}$ = Quantity of electricity consumed per kilometer of project e-bikes in the year y (kWh)

$EF_{grid,CM,y}$ = Emission factor for electricity generation in the grid based on combined margin in the year y (gCO_2/kWh)

TDL_y = Average technical transmission and distribution losses for providing electricity in the year y

**Refer also to "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" and "Tool to calculate the emission factor for an electricity system."*

The GHG emissions of all units are included which form part of the project bike sharing program.

8.3 Leakage

The impact on traffic (additional trips) induced by the new transport system is included as project emissions and thus is not part of leakage. This is addressed by including, as project emissions, the emissions from the trips of passengers who would not have travelled in the absence of the project.

Hypothetically seen it could be possible that the bike user has made a significant detour to reach the COBSSL or to get to the CIBSSL which he/she would not have made in the baseline trip thus resulting in minute leakage emissions to/from the COBSSL or CIBSSL which are not considered thus potentially overstating emission reductions. Herein lies the only identified source of leakage that is warranted for inclusion. Therefore, to ensure that emission reductions are conservative bicycle users are asked if they made a significant detour from their original origin (aka OO) to get to the check-out bike share station location (aka COBSSL) to use the bicycles so as to determine if the full baseline trip distance would have been significantly shorter than the project trip i.e. from the COBSSL to the check-in bike share station location (aka CIBSSL). The same control question addresses whether or not the bicycle user made a significant detour from the CIBSSL to their final destination (FD) so as to determine if the full baseline trip distance would have been significantly shorter than the project trip i.e. from COBSSL to CIBSSL. In case of positive response to this question this person and its baseline emissions are excluded from the project thus being conservative.

Thereafter the first monitoring year, the same potential detour leakage level (aka DLL) as determined by the percentage of respondents with a longer trip length i.e. positive response

($DPR_{y=1}$) will be used for subsequent years within the project period. In this case project proponents shall determine $DPR_{y=1}$ which will be taken to calculate DLL (refer to data/parameters monitored/not monitored).

The only leakage source is accounted for via the “detour” survey control question. Refer to Annex 4, 5 and the “Supplemental Leakage Explanation” within the Appendix Section 15 for more information. Leakage emissions variable LE_y equate to zero ‘0’ since DLL carried over and used to reduce $P_{i,y}$ (see equation #1).

8.4 Summary of GHG Emission Reductions and/or Removals

Emissions reductions are calculated as:

$$ER_y = BE_y - PE_y - LE_y \quad (10)$$

Where:

ER_y = Emissions reductions in year *y* (tCO2)

BE_y = Baseline emissions in year *y* (tCO2)

PE_y = Project emissions in year *y* (tCO2)

LE_y = Leakage emissions in year *y* (tCO2)

9. MONITORING

9.1 Data and Parameters (not monitored) Available at Validation

In addition to the parameters listed in the tables below, the provisions on data and parameters not monitored in the tools referred to in this methodology apply.

Data / Parameter:	$TD_{EL,i}$
Data Unit	Kilometers
Description	Average trip distance of passengers using the electricity-based vehicle category *i* (km)
Source of Data	Municipal transit authorities or specific studies done by the project proponent or a third party.
Measurement Procedure	In general based on surveys or electronic cross-referencing with usage statistics e.g. ticketing, etc. Vintage maximum 5 years.
Comments	-

Data / Parameter:	$OC_i/OC_B/OC_T/OC_C/OC_{MR}/OC_R/ OC_M$
Data Unit	Passengers
Description	Average occupation rate of vehicle category *i* prior to project start. In particular, B stands for buses, T for taxis, C for passenger cars, R for rail, M for motorcycles and MR for motorized rickshaws.
Source of Data	Municipal transit authorities or specific studies done by the project proponent or a third party.
Measurement Procedure	Based in general visual occupation studies for all vehicle categories. Vintage maximum 5 years. For buses the occupation rate can be based on boarding-alighting studies, surveys determining the average trip distance, electronic smart tickets or on visual occupation studies with expansion factors for routes served to determine the average occupation rate along the entire route. In the case of taxis (including motorized rickshaws) the driver should not be counted. The detailed procedures concerning visual occupation and boarding alighting studies are presented in Annexes 1, 2 and 3.
Comments	-

Data / Parameter:	P_B
Data Unit	Passengers
Description	Passengers transported by buses (per day or year)
Source of Data	Municipal transit authorities or bus operators.
Measurement Procedure	Vintage maximum 5 years. Use the same vintage as for the parameter $TD_{P,B}$.
Comments	-

Data / Parameter:	$TD_{P,B}$
Data Unit	Kilometer
Description	Average trip distance of passengers using buses

Source of Data	Municipal transit authorities or specific studies done by the project proponent or a third party
Measurement Procedure	In general based on a survey asking passengers entry and exit station and calculating the trip distance on the bus. Vintage maximum 5 years. Use the same vintage as for the parameter $P_{B.}$
Comments	Used to determine the average occupation rate of buses together with the total number of buses and the total distance driven of buses

Data / Parameter:	$DD_B/DD_L/DD_M/DD_S$
Data Unit	Kilometers
Description	Total distance driven by buses of various sub-categories prior to project start. B stands for all buses, L for large buses, M for medium buses and S for small buses
Source of Data	Data from bus companies (company records), municipal transit authorities or specific studies done by the project proponent or a third party.

Measurement Procedure	Distance driven of buses is often recorded by bus companies based on odometer reading or on route distance multiplied with daily turn-arounds per route plus “dead” kilometers (to/from route). Preferable is GPS or other electronic means, however this may not yet be frequent in bus companies. Data can also be based on sample measurements based in general on daily distance driven (measured by odometer or GPS) plus the average number of operation days of a bus (based on bus operator information). The total distance driven of all buses is the multiplication of average annual distance driven per bus and the number of registered buses operating in the project geography bounds. Vintage maximum 5 years.
Comments	-

Data / Parameter:	$N_{x,i}$
Data Unit	Vehicles
Description	Number of vehicles of category *i* using fuel type x (units)
Source of Data	Municipal transit authorities based on vehicle registration statistics from the respective city or data from vehicle control stations (technical and emission control stations). If no city/municipal data is available regional data or as last option national data can be used.
Measurement Procedure	- Vintage maximum 5 years.
Comments	For buses as well as for taxis informal or illegal units may operate. While estimates on the number of informal units may be available these are due to their nature not trustworthy. For both categories it is thus recommended to only include formally registered units. As the methodology is based on emissions per PKM absolute numbers are not relevant for determining this parameter. It is however important that transported passengers are also based on the official records thus not including passenger trips of informal units.
Data / Parameter:	$SFC_{i,x}$
Data Unit	Mass or volume units of fuel/km
Description	Specific fuel consumption of vehicle category *i* using fuel type *x*
Source of Data	In decreasing order of preference: 1. Local measured data not older than 5 years (studies e.g. performed by universities or ordered by project proponent); 2. National or international data from studies not older than 5 years; 3. IPCC default values for the respective vehicle categories (latest published year)

Measurement Procedure	The following alternatives are proposed to determine specific fuel consumption (in order of preference): Alternative 1: Measurement of fuel consumption data using total data (if available e.g. from bus or taxi companies) or a representative sample for the respective category and fuel type. Sampling per category and fuel should include, if data is available as core characteristics vehicle age and motorization to ensure that the sample is as close as possible to the actual vehicle composition of geographic project activity location. To be conservative specific fuel consumptions based on samples shall be based on the lower limit of the uncertainty band at a 95% confidence level, i.e. with 95% security the actual average fuel consumption is equal to or higher than the value used by the project. Preferred alternative as directly related to actual situation at project location. Alternative 2: Use of fixed values based on the national or international literature. The literature data can either be based on measurements of similar vehicles in comparable surroundings (e.g. from comparable cities of other countries) or may include identifying the vehicle age and technology of average vehicles circulating in the project region. Second best alternative if data is not available or costly. Published data is neutral. Alternative 3: Latest IPCC default values reported matching the respective vehicle category, age, vehicle origin and technology. IPCC default values are conservative and the option if local data is not available.
Comments	-

Data / Parameter:	NCV_x
Data Unit	J/mass or volume units of fuel
Description	Net calorific value of fuel *x*

<table>
<tr><td>Source of Data</td><td>The following data sources may be used if the relevant conditions apply:
<table>
<tr><th>Data source</th><th>Conditions for using the data source</th></tr>
<tr><td>(a) Values provided by the fuel supplier in invoices taken from a sample of fuel stations in the larger urban zone of the city</td><td>This is the preferred source if the carbon fraction of the fuel is not provided</td></tr>
<tr><td>(b) Measurements by the project participants taken from a sample of fuel stations in the larger urban zone of the city</td><td>If (a) is not available</td></tr>
<tr><td>(c) Regional or national default values</td><td>If (a) is not available

This source can only be used for liquid fuels and should be based on well documented, reliable sources (such as national energy balances)</td></tr>
<tr><td>(d) IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories</td><td></td></tr>
</table>
</td></tr>
<tr><td>Measurement Procedure</td><td>For (a) and (b): measurements should be undertaken in line with national or international fuel standards</td></tr>
<tr><td>Monitoring frequency</td><td>For (a) and (b): the NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated.

For (c): review appropriateness of the values annually

For (d): any future revision of the IPCC Guidelines should be taken into account</td></tr>
<tr><td>QA/QC procedures</td><td>Verify if the values under (a), (b) and (c) are within the uncertainty range of the IP

CC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in (a), (b) or (c) should have ISO17025 accreditation or justify that they can comply with similar quality standards</td></tr>
<tr><td>Comments</td><td>The parameter is used for baseline emissions and vehicle owners or operators can buy fuel from a variety of sources (fuel stations). In practice therefore it is</td></tr>
</table>

	considered as simpler to determine the parameter using options (c) or (d). Any of the options are materially equivalent. Local data is preferable but in practice either national data or IPCC values can be readily obtained. IPCC is conservative as the lower 95% confidence level is taken.

Data / Parameter:	$EF_{CO2,x}$
Data Unit	gCO_2/J
Description	CO_2 emission factor for fuel type *x*
Source of Data	The following data sources may be used if the relevant conditions apply:

Data source	Conditions for using the data source
(a) Values provided by the fuel supplier in invoices taken from a sample of fuel stations in the larger urban zone of the city	This is the preferred source
(b) Measurements by the project participants taken from a sample of fuel stations in the larger urban zone of the city	If (a) is not available
(c) Regional or national default values	If (a) is not available. This source can only be used for liquid fuels and should be based on well documented, reliable sources (such as national energy balances)
(d) IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories	

Data / Parameter:	$EF_{grid,CM}$
Data Unit	gCO_2/kWh
Description	Emission factor for electricity generation in the grid based on combined margin
Source of Data	Follow procedures as in the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
Measurement Procedure	"Tool to calculate baseline, project and/or leakage emissions from electricity consumption" shall be applied
Comments	Any of the options are materially equivalent. Local data is preferable but in practice either national data or IPCC values can be readily obtained. IPCC is conservative as the lower 95% confidence level is taken.

Data / Parameter:	**TDL**
Data Unit	-
Description	Average technical transmission and distribution losses for providing electricity
Source of Data	Follow procedures as in the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
Measurement Procedure	"Tool to calculate baseline, project and/or leakage emissions from electricity consumption" shall be applied
Comments	-

Data / Parameter:	**DLL**
Data Unit	Dimensionless (percentage)
Description	Percentage of passengers of the project which were determined to take a detour i.e. detour leakage level to/from the COBSSL or CIBSSL (percentage)
Source of Data	Bike share operator
Measurement Procedure	Based on: $DLL = DPR_{y=1} / [\sum P_{i,y}]$ Where DLL = Percentage of passengers of the project which were determined to take a detour i.e. detour leakage level to/from the COBSSL or CIBSSL (percentage) $P_{i,y}$ = Passengers of the project which in absence of the project would have used mode i in the year y (passengers). This includes the entire universe of project passengers which in absence of the project would have used mode i in the year y. $DPR_{y=1}$ = Passenger of the project which was determined to take a detour i.e. detour leakage level to/from the COBSSL or CIBSSL, determined through detour control question (passengers).
Comments	Parameter calculated/determined for the first year of each crediting period, then used for all following until a renewed crediting period commences; at which time the parameter is re-calculated just the same.

9.2 Data and Parameters Monitored

Default parameters are not included in this section and not monitored.General principles in accordance with the “Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories” Version 13 EB 54 Annex 13:

1. Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years;
2. The measured data with high levels of uncertainty or without adequate calibration should be compared with location/national data and commercial data to ensure consistency;
3. Wherever a statistical sample is proposed for monitoring, the general guidelines for sampling and surveys for small-scale project activities shall be referred.

Data / Parameter:	$P_{i,y}$
Data Unit	Passengers
Description	Passengers of the project which in absence of the project would have used mode i in the year y. This includes the entire universe of project passengers which in absence of the project would have used mode i in the year y; so every project passenger which in absence of the project would have used mode i in the year y increases this parameter by '1' unit.
Source of Data	Bike share operator
Measurement Procedure	Based in general on: Option 1: Electronic/mechanical controls (refer to "Survey A – Electronic/mechanical Means" in Annex) … OR Option 2: Through face-to-face surveys (refer to "Survey B – Face-to-Face Means" in Annex). Passengers who respond with a positive answer to the "detour" leakage survey control question are not included. This leakage control question asks if the user has made a significant detour to/from his OO or FD to the COBSSL or CIBSSL.
Monitoring frequency	Option 1: Ongoing, continually during project activity and annually aggregated at least once (depending on measurement procedure process outlined above, and in accordance with comments below). Option 2: Taken in accordance with the "General Guidelines For Sampling and Surveys for Small-scale CDM Project Activities" tool. Refer to Annex for surveying techniques.
QA/QC procedures	Option 1: Refer to "Survey A – Electronic/mechanical Means" in Annex. Option 2: For measurement procedure Option 2, refer to survey design in "General Guidelines for Sampling and Surveys for Small-scale CDM Project Activities". Refer to Annex for surveying techniques. Cross-checked with usage statistics.
Comments	Option 1: Total data is preferable. Refer to "Survey A – Electronic/mechanical Means" in Annex. Option 2: Samples i.e. measurement procedure Option 2 are a good second-best option. In case of the latter, the lower 95% confidence interval is taken with surveys and thus a conservative approach is used.

Data / Parameter:	$DPR_{y=1}$ (Detour Passenger Respondent)
Data Unit	Passengers
Description	Passenger of the project which was determined to take a detour i.e. detour leakage level to/from the COBSSL or CIBSSL, determined through detour control question (passengers). Utilized to determine data/parameter DLL. This includes only those passengers which answered positively to the detour leakage control questions; so every case increases this parameter by '1' unit.
Source of Data	Bike share operator
Measurement Procedure	Based in general on: Option 1: Electronic/mechanical controls (refer to "Survey A – Electronic/mechanical Means" in Annex) … OR Option 2: Through face-to-face surveys (refer to "Survey B – Face-to-Face Means" in Annex). Passengers which respond with a positive answer to the "detour" leakage survey control question are used to determine this parameter. This leakage control question asks if the user has made a significant detour to/from his OO or FD to the COBSSL or CIBSSL.
Monitoring frequency	Option 1: Annually, during the first year of each crediting period. Parameter calculated/determined for the first year of each crediting period, then used for all following until a renewed crediting period commences; at which time the parameter is re-calculated just the same. Option 2: Taken in accordance with the "General Guidelines For Sampling and Surveys for Small-scale CDM Project Activities" tool. Refer to Annex for surveying techniques. Parameter calculated/determined for the first year of each crediting period, then used for all following until a renewed crediting period commences; at which time the parameter is re-calculated just the same.
QA/QC procedures	Option 1: Refer to "Survey A – Electronic/mechanical Means" in Annex. Option 2: For measurement procedure Option 2, refer to survey design in "General Guidelines for Sampling and Surveys for Small-scale CDM Project Activities". Refer to Annex for surveying techniques. Cross-checked with usage statistics.
Comments	Option 1: Total data is preferable. Refer to "Survey A – Electronic/mechanical Means" in Annex Option 2: Samples i.e. measurement procedure Option 2 are a good second-best option. In case of the latter, the lower 95% confidence interval is taken

	with surveys and thus a conservative approach is used.

Data / Parameter:	$AD_{i,y}$
Data Unit	Kilometers
Description	Average trip distance of project passengers from COBSSL to CIBSSL which in absence of the project would have used mode i in the year y
Source of Data	Bike share operator, COBSSL and CIBSSL GPS coordinates or geocoded distance query via mapping service (aka geocoding API)
Measurement Procedure	Based in general on: Option 1: Electronic/mechanical controls (refer to "Survey A – Electronic/mechanical Means" in Annex) … OR Option 2: Through face-to-face surveys (refer to "Survey B – Face-to-Face Means" in Annex). AD is for cars, taxis and motorcycles the shortest possible road trip distance between the COBSSL and CIBSSL of each bike trip based on a geocoded distance query or on beeline. A geocoded distance query is the process of submitting the origin and destination i.e. the COBSSL and CIBSSL addresses or exact GPS coordinates of such to a mapping service (typically referred to as a geocoding API) which will provide the shortest possible road trip distance traveled for the selected mode. In case of public transit modes the project can choose between the alternative of the shortest possible distance based on the shortest possible geocoded public transit route distance query or beeline (same as cars). If a geocoded public transit route distance query is used, the geocoding API shall support the public transit mode that was selected. The two alternatives are considered as equivalently acceptable. However projects might choose to base their distance estimates on geocoded public transit routes which reflect a more precise, baseline distance. This variable is recorded per trip with records of origin-destination i.e. COBSSL-CIBSSL per trip and mode which would have been used in that trip. For trips taken where the origin i.e. COBSSL and return i.e. CIBSSL are the same bike rental station the trip distance is conservatively determined as '0'.
Monitoring frequency	Option 1: Ongoing, aggregated annually during project activity. Option 2: Taken in accordance with the "General Guidelines For Sampling and Surveys for Small-scale CDM Project Activities" tool. Refer to Annex for surveying techniques.
QA/QC procedures	Option 1: Refer to "Survey A – Electronic/mechanical Means" in Annex. Option 2: Refer to survey design in "General Guidelines for Sampling and Surveys for Small-scale CDM Project Activities". Refer to Annex for surveying techniques.

Comments	Option 1: Total data is preferable. Refer to "Survey A – Electronic/mechanical Means" in Annex Option 2: Samples i.e. measurement procedure Option 2 are a good second-best option. In case of the latter, the lower 95% confidence interval is taken with surveys and thus a conservative approach is used.

Data / Parameter:	DD_y
Data Unit	Km
Description	Annual average distance driven of e-bikes in the year "y"
Source of Data	Bike share operator
Measurement Procedure	Based in general on: Option 1: Electronic/mechanical controls (e.g. odometer readings supplemented by GPS). Refer to "Survey A – Electronic/mechanical Means" in Annex … OR Option 2: Sample Based in general on electronic/mechanical controls (e.g. odometer readings supplemented by GPS). Therefore the annual distance driven can be based on the complete fleet of e-bikes or on a sample. In case of a sample the upper 95% confidence interval is used.
Monitoring frequency	Option 1: Ongoing, aggregated annually during project activity. Option 2: Taken in accordance with the "General Guidelines For Sampling and Surveys for Small-scale CDM Project Activities" tool. Refer to Annex for surveying techniques.
QA/QC procedures	Option 1: Refer to "Survey A – Electronic/mechanical Means" in Annex. Option 2: Refer to survey design in "General Guidelines for Sampling and Surveys for Small-scale CDM Project Activities." Refer to Annex for surveying techniques.
Comments	Option 1: Total data is preferable. Refer to "Survey A – Electronic/mechanical Means" in Annex. Option 2: Samples i.e. measurement procedure Option 2 are a good second-best option. In case of the latter, the lower 95% confidence interval is taken with surveys and thus a conservative approach is used.

Data / Parameter:	$N_{EB,y}$
Data Unit	e-bikes
Description	Average number of e-bikes in circulation in the year y
Source of Data	Bike share operator
Measurement Procedure	Inventory
Monitoring frequency	Monthly
QA/QC procedures	-
Comments	The average number of e-bikes per annum is based on the cumulative monthly data divided by the number of months included.

Data / Parameter:	$EC_{PJ,km,y}$
Data Unit	kWh
Description	Quantity of electricity consumed per kilometer (project) of e-bikes in the year "y"
Source of Data	Bike share operator
Measurement Procedure	Based in general on: Option 1: Based on total electricity consumption recorded … OR Option 2: Samples If based on samples the upper 95% confidence interval is used
Monitoring frequency	Option 1: Ongoing monthly, aggregated annually during project activity. Option 2: Taken in accordance with the "General Guidelines For Sampling and Surveys for Small-scale CDM Project Activities" tool. Refer to Annex for surveying techniques.
QA/QC procedures	Measurement procedure Option 1: Reference invoices for electricity. Measurement procedure Option 2: Refer to survey design in "General Guidelines for Sampling and Surveys for Small-scale CDM Project Activities".
Comments	Option 1: Total data is preferable. Refer to "Survey A – Electronic/mechanical Means" in Annex. Option 2: Samples i.e. measurement procedure Option 2 are a good second-best option. In case of the latter, the lower 95% confidence interval is taken with

	surveys and thus a conservative approach is used.

9.3 Description of the Monitoring Plan

Monitoring Methodology Procedures

Project proponents must describe and specify in the PD all monitoring procedures, including the type of measurement instrumentation used, as well as the responsibilities for monitoring and QA/QC procedures that will be applied.

Where the methodology provides different options (e.g., use of default values or on-site measurements), specify which option will be used. All meters and instruments should be calibrated regularly as per industry practices. In addition to the parameters listed in the tables below, the procedures contained in the tools referred to in this methodology also apply.

All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period. 100% of the data should be monitored if not indicated differently in the comments in the tables below.

10. REFERENCES AND OTHER INFORMATION

Annex 1

Guideline for the establishment of load factor studies for buses based on visual occupation

Load factor surveys based on visual occupation studies use the following procedures:

1. Vehicle categories are defined according to the characteristics of the fleet and types of services (e.g. with or without standing passengers);
2. Occupation categories are defined (usually five or six), for instance <50% occupied, 50-100% seats occupied, 100% seats occupied, <50% space for standing passengers occupied, 50-100% of standing space occupied, overload (>100% of legally permitted space occupied);
3. Formats for field study are prepared;
4. Field data collectors are trained;
5. Locations, days and times for field study are defined. Points are strategically located to cover all the routes with the minimum of points. Atypical seasons (school or university vacations) should be avoided. The recommended time period for the study is the entire period of operation of the selected buses. Measurements should be realized for all weekdays proportional to the number of buses displaced on these days.
6. Field data is collected. Coverage of the occupation counts should be higher than 95% of the number of buses that cross the checkpoint. 100% coverage is desired. To control this outcome, a separate vehicle count is advised. Data can be adjusted with the actual count.

Annex 2

Guideline for the establishment of load factor studies for buses based on boarding-alighting surveys

Load factor surveys based on boarding alighting studies for buses use the following procedure:

1. Routes for the survey must be selected, weighted upon the expected number of passengers per route. Only active routes are included;
2. The load factor (occupation rate) is defined as the average percentage of capacity of the vehicle used by passengers. The average load factor of a route is based on the average of each load factor between each station of the specified route;
3. The common operational procedure used is to ride on the unit and count at each station the number of passengers boarding and alighting. Instead of manual controls electronic or mechanical controls can be used;
4. Locations, days and times for the survey are defined. Atypical seasons (school or university vacations) should be avoided. The recommended time period for the study is the entire period of operation of the selected buses. Measurements should be realized for all weekdays proportional to the number of buses displaced on these days.
5. The survey must be conducted during the entire operation period of buses (not only peak or off-peak hours);
6. The units selected are clearly identified including license plate, day monitored, number of turn-arounds, route and route distance;
7. Data are digitized and its quality is controlled. In case of mistakes in data collection, counts should be repeated.

Boarding and alighting information can also be obtained in some cases from electronic means such as electronic ticketing, digital camera passenger identification per bus, monitoring of average bus weight per station etc.

Annex 3

Guideline for the establishment of load factor studies for taxis/motorcycles or passenger cars

The actual number of passengers excluding the driver of taxis is counted in a given point within a given time period. The counting is based on visual occupation counting the number of passengers occupying the vehicle excluding the driver in the case of taxis. The procedures to establish visual occupation are:

1. Locations, days and times for field study are defined, avoiding days immediately after or before a holiday. Atypical seasons (school or university vacations) should be avoided. Field data is collected. Coverage of the occupation counts should be higher than 95% of the number of taxis that cross the checkpoint. One hundred percent coverage is desired. To control this outcome a separate vehicle count is advised. Data can be adjusted with the actual count;
2. Occupation is the number of passengers using the vehicle. The driver is not counted in the case of taxis. Taxis without passengers are counted as no (zero) occupation;
3. The total number of vehicles and the total number of passengers is reported. The average occupation rate of vehicles is the total number of passengers divided by the total number of vehicles in which counts were performed;
4. The study is realized in different locations of the larger urban zone of the city.

Annex 4

Basically, two interrelated datasets need to be collected:

1. Origin and destination of bike trip i.e. COBSSL and CIBSSL required to determine the baseline trip distance
2. Mode the person would have used in absence of the project.

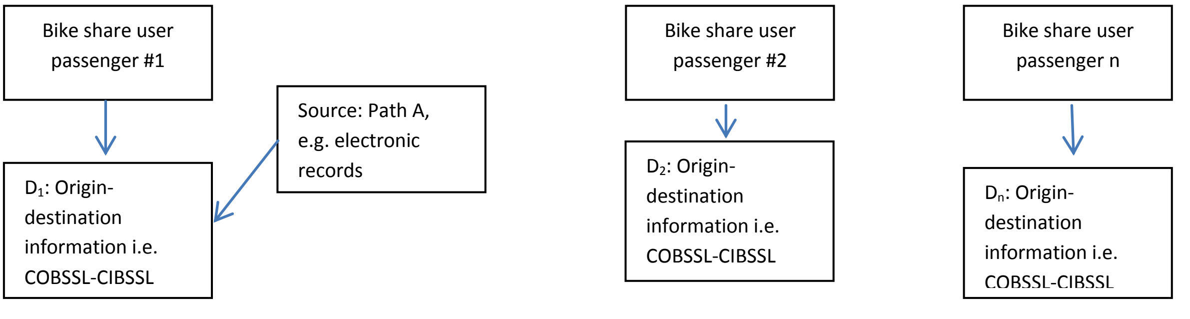
These two parameters are related i.e. each distance has to be attributed in a unique manner with the mode the person would have used. Collecting the distance independently from the mode is not valid as a baseline emission per individual client has to be determined.

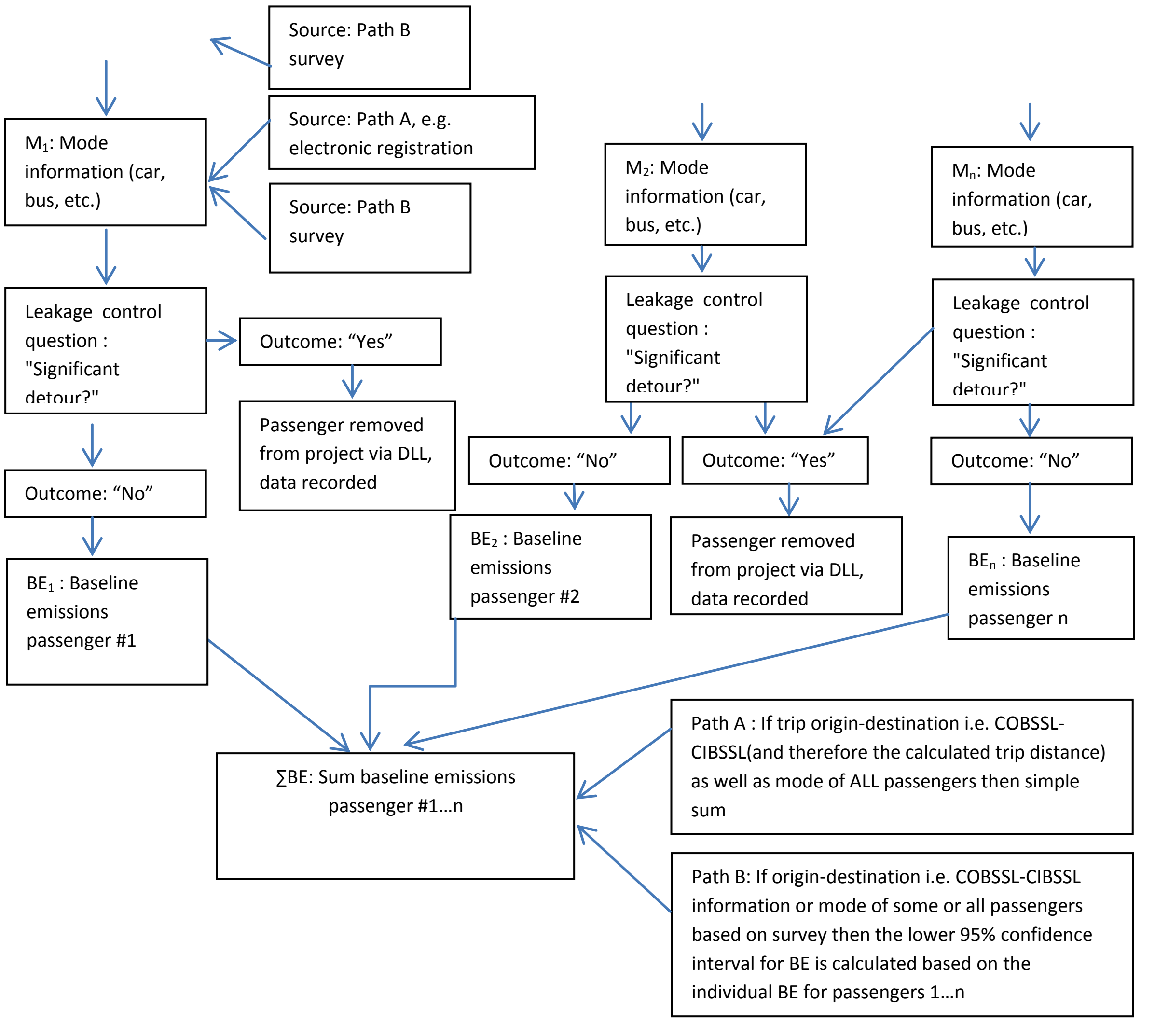
Basically, two paths can be followed:

1. Information on all users is available through electronic or mechanical means (Survey A i.e. Path A). In this case both the origin/destination i.e. COBSSL/CIBSSL per bike trip and the mode used has to be registered per passenger. The origin-destination i.e. COBSSL-CIBSSL shall be traced, unique to each individual mode, e.g. passenger ID #1 has origin site AA (COBSSL) and destination BB (CIBSSL) and would have used mode “car”, passenger ID #2 has origin AB (COBSSL) and destination BC (CIBSSL) and would have used mode “bus”, etc.
2. The information required is obtained through surveys based on samples asking the bicycle user what mode he would have used and the origin and destination i.e. COBSSL and CIBSSL point of his bike trip (based on these points the trip distance is calculated).

Information flow-chart

The information has to be collected individually per bicycle user.





Survey A – Electronic/mechanical Means

Origin-destination i.e. COBSSL-CIBSSL of each unique bicycle trip is often recorded by operators based on GPS readings, linked to individual users. This is the preferred survey means. Else, at a minimum the following data must be measured so that the trip distance may be calculated based on origin-destination i.e. COBSSL-CIBSSL and shortest route..

The operator, therefor captures the following in real-time, per each unique trip instance at the point of bicycle check-out/in:

1. Participant ID – Each participant trip instance of the project activity must be tied to unique participant identifications.
2. Trip Start and End Coordinates – Each participant trip instance of the project activity must track the exact GPS coordinates of the trip start and end points, Point A and B i.e. COBSSL and CIBSSL. This criteria therefore is restricted to only the portion i.e. share of the participant journey in which the project activity components were utilized, and does not include a requirement to track the GPS coordinates of the passenger's initial origin i.e. OO nor final destination i.e. FD (in the case of multi-modal use journeys).
3. Displaced mode - Users advise the system which trip their project activity trip is displacing through an electronic survey administered, for e.g. via a touch screen or numerical

computer keypad at the bike station. In this sense, project operators, include a process by which technologies are utilized to capture user defined inputs for the displaced mode each unique project activity trip is displacing. Survey design essentially emulates that of *Question #1* below.

4. Leakage control question must address each user by asking the following, for e.g., "Have you made a significant detour which you would not have otherwise to either reach the bike station where you checked your bike out from or to your final destination from the bike station where you checked your bike in to i.e. is your total trip distance now significantly longer than if you would not have used the bicycle? *By significant we mean that your total trip distance from your original origin to final destination has increased by at least 20%.*" Answer options: Yes and No. Survey design essentially emulates that of *Question #4* below.

Survey B – Face-to-Face Means

Preferable is via GPS coordinates of COBSSL and CIBSSL of each bike trip based on a geocoded distance query or on beeline, or other electronic means, however this technology may not yet be frequent with most operators. Data can also be based on sample measurements, taken in accordance with the "General Guidelines For Sampling and Surveys for Small-scale CDM Project Activities" tool.

The questionnaire has to be adapted to local circumstances using local wording and language. The default questionnaire constitutes the following framework:

Question 1: What mode of transit would you have used for this same trip you are now performing on this bike?

1. Car
2. Taxi
3. Bus
4. Metro/LRT/Tram (rail)
5. Bike (personal or other)
6. Motorcycle
7. By foot
8. I would not have made the trip i.e. I only make this trip due to the existence of the bike share program
9. Other (please specify)

Question 2: Where is/was the exact origin i.e. start-location of this bike trip (where did you take a bike)?

1. Bike station number (unique identifier)
2. Bike station location (address)

Question 3: Where is/was the exact destination i.e. end-location of this bike trip (where did you leave the bike)?

1. Bike station number (unique identifier)
2. Bike station location (address)

*Question 4: "*Have you made a significant detour which you would not have otherwise to either reach the bike station where you checked your bike out from or to your final destination from the bike station where you checked your bike in to i.e. is your total trip distance now significantly longer than if you would not have used the bicycle? *By significant we mean that your total trip distance from your original origin to final destination has increased by at least 20%.*

1. *Yes*
2. *No*

Project proponents are encouraged to use creative means by which to survey/poll their user base to gather supplemental data to enhance the accuracy of the displacement data collected to determine baseline emissions. Such examples include but are not limited to harnessing software applications, social media technologies, e-mail marketing and SMS text messaging direct to each participant at the time of project activity trip usage. Daily, electronic surveys conducted via data input mechanisms on the project activity component terminal(s) i.e. bike share station kiosks themselves shall therefore be preferred and recorded on the site of each physical component of the project activity to capture the mode shift of each unique trip, from each unique passenger in real-time (e.g. computer touch pad). Creative technologies may be incorporated and utilized to achieve the same through other means (e.g. mobile applications, interactive SMS messages to participants, etc.) to serve the same.

Annex 5

SUPPLEMENTAL LEAKAGE EXPLANATION

Preface

The only leakage source is accounted for via the "detour" survey control question (see Annex 4).

Leakage Sources

Following potential leakage sources were assessed:

1. **Upstream construction emissions:** These are marginal as material usage for bike sharing activities is minimal. In the baseline case traditional transit means such as cars all require much more upstream emissions be it for the vehicle itself or be it for road construction. Thus upstream material based emissions are surely lower in the project compared to the baseline case. Its non-inclusion is thus conservative.
2. **Upstream fuel emissions:** Non-inclusion of these upstream emissions is conservative as bikes use no fuel or, in the case of e-bikes, only marginal amounts of electricity. In the case of electricity, upstream emissions are included by the CDM tool to calculate the emission factor of electricity. The upstream emissions of liquid and gaseous fuels used in the baseline are not included. Thus baseline upstream fuel emissions are significantly higher than project upstream fuel emissions; by logic. Its non-inclusion is thus conservative.

Non-inclusion of upstream emissions is also in accordance with recent decisions of the EB of the UNFCCC to exclude such emission sources in transport projects. ACM0016 which is for mode shift towards MRTS has therefore excluded upstream emissions from leakage sources. Also the new version of AM0031 (Version 03; for BRT systems) has excluded upstream emissions (in contrast to the original version 01). Also the approved small scale methodology for cable cars has no upstream emissions included.

Change of load factor

Change of load factor of buses or taxis has been excluded as the number of units affected by a bike sharing project is small. Taxis will operate in other areas of the city where demand is growing Also taxis operate in general as radio taxis and only move upon demand i.e. if demand is lower than taxi movement is less. The project impact on average occupation rates of buses and taxis is deemed to be marginal as other effects such as normal replacement of buses plus additional demand for services due to city growth will far out-weight the effect of the bike sharing project.

Reduced congestion (leading potentially to rebound effect and higher avg. speeds)

Reduced congestion on roads leading potentially to a rebound effect plus a change (increase) of average vehicle speed. The two effects of reduced congestion (increased vehicle speed versus rebound effect) tend to cancel each other out as increased speed leads to reduced GHG and the rebound effect of increased GHG emissions. Both effects however will be marginal in the case of bike sharing projects as no new roads are built and the number of vehicles not circulating anymore on the roads (taxis and buses basically) is limited for this type of small-scale project. The considerable efforts required to monitor and estimate the congestion effect are in no relation to the marginal effect expected. For example TransMilenio, being a large scale and city wide project with significant congestion effect has positive GHG emission reductions from reduced congestion (reduced GHG emissions due to higher speed is more than increased GHG emissions due to the rebound effect) and latter is only 2% of total project emission reductions (this is far less than the upstream fuel emissions of around 14% which are conservatively not included).

Small scale activity

The project is a small scale activity. The non-inclusion of an exhaustive leakage analysis outside of the “detour” leakage control survey question is thus also justified in terms of marginal potential impact and simplicity of the methodology including monitoring.

Additional Trips

The impact on traffic (additional trips) induced by the new transport system is included as project emissions and thus is not part of leakage. This is addressed by including, as project emissions, the emissions from the trips of passengers who would not have travelled in the absence of the project.

Additional Reduction of Baseline Trip Modes: Additionally, while public bike share systems generally result in increased private bike ridership thus reducing additional baseline trip emissions. This consequence is not considered thus having a conservative approach.

EMISSION SOURCES

CH4 & N20

Emission sources include only CO2 for liquid fossil fuel powered vehicles (CH4 is included for gaseous powered vehicles). N2O and CH4 emissions account for significantly less than 2% of total GHG emissions caused by liquid fossil fuel powered vehicles. Not accounting for CH4 and N2O emissions in the baseline as well as the project emissions is conservative as total fuel consumed is reduced and the project thus also contributes to reducing CH4 and N2O emissions. Omitting N2O and CH4 tailpipe emissions simplifies the methodology.

The following sources clearly show that N2O emissions even with technology change in fossil fuel powered vehicles are not significant enough to warrant inclusion:

1. IPCCC 2006 National Guideline for GHG Inventories reports table 3.2.5. for EC based on
2. COPERT model has only one factor for urban buses and coaches independent of the technology.
3. The same report based on USEPA table 3.2.3. reports only on N2O factor for HDV diesel vehicles.
4. IPCC 1996 table 1-32 relevant for US HDV diesel (relevant for buses) indicates as maximum for uncontrolled units 0.031gN2O per km and for advanced control units 0.025gN2O. The delta is thus 0.006. Based on the GWP of N20 and the lower average fuel consumption of 41.7l/100km of the same table the total CO2 emissions for an average bus are 1110grCO2eq due to CO2 emissions and between 9.6grCO2eq and 7.8grCO2eq due to N2O emissions. The maximum difference due to different technology levels is thus 1.86grCO2eq or 0.2%. This difference of 0.2% is considered to be non-significant.
5. The table on IPCC 1996 1.68 refers basically to gasoline vehicles. In this case uncontrolled
6. Gasoline vehicles might have factor 8 lower emissions than advanced control passenger gasoline vehicles. The methodology and the project are however not predominantly about the replacement of passenger cars. The technology used by passenger cars is not affected by the project directly or indirectly.
7. Also Corinair/COPERT 2006 shows that N2O are relevant basically for gasoline and light duty vehicles. Table 8.52 page shows differences for these vehicle categories based on the Euro standard, not so however for any HDV including buses where only one value (0.03grN2O/km) is used independent of the Euro category. (Emission Inventory Guidebook, 2006, B710-69).

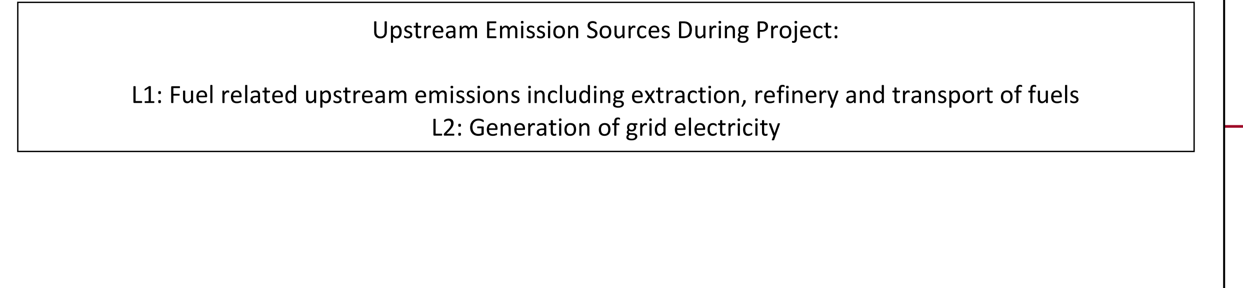
The aforementioned sources therefore show fossil fuel powered vehicles emit only small N2O emission differences and these are marginal if compared to total CO2eq emissions (less than 0.2% of differences).

POTENTIAL EMISSION SOURCES FROM BICYCLE SHARING PROJECTS

A systematic, lifecycle assessment-based is used to identify relevant emissions sources for the baseline, for the project and for leakage sources. Leakage emission sources are thereby those that can be attributed to the baseline or the project but are not under control of latter. Project idem to baseline emission sources are those that are under control of the project. Leakage emission sources are those that are caused indirectly by the project activity but are not under its control. After identifying the potential sources latter are assessed concerning relevance for this methodology.

The graph below details emission sources assessed.

Graph 1: Emission Sources



Upstream Emission Sources Prior Project:	On-Site Emission Sources During Project:	Upstream Emission Sources After Project:
L3: Upstream equipment manufacturing L4: Transport infrastructure construction	B1: Baseline operating vehicle emissions B2: Baseline maintenance vehicle emissions B3: Maintenance of baseline modes facilities P1: Maintenance and operation emissions of bike sharing facilities P2/B4: Maintenance of transport infrastructure	L5: Upstream equipment decommissioning L6: Transport infrastructure ecommissioning

Downstream Emission Sources During Project:

L7: Congestion effect
L8: Change of occupation rate of baseline vehicles
L9: Emissions of vehicles taking project users to/from bike sharing facilities
L10: Emissions of passengers in the baseline mode apart from project trip distance

To assess the relevance for project emission sources, the following criteria were used:

- **No change between project and baseline**: if equivalent emission sources do not change between the project and the baseline then this source is excluded as it would have no influence on emission reductions.
- **Emissions greater for baseline than project**: if estimated baseline emissions are larger than estimated equivalent project emissions then this source can be excluded[1]. This is a conservative approach.

Table 1 presents the project emission sources, table 2 the baseline sources and table 3 the leakage sources and a discusses their relevance. For non-relevant parameters a justification is provided.

Table 1: Project Emission Sources

Emission Source	Description	Relevance	Justification
P1: M&O of bike sharing facilities	Includes bikes plus lending facilities as well as potential movement of bikes to alternate stations by fossil powered vehicles (if any) and/or hybrid and electric vehicles.	Not relevant	B2 +B3 are far larger than P1 and is also excluded, thus conservative. Bike share kiosk stations typically use solar powered technology; considered as standard practice. In areas where solar power use is not feasible, the bike share kiosk may use power from the city's grid. The kiosks use a very minute, negligible amount of electricity by utilizing small monchcrome graphics

[1] Exclusion is e.g. done due to lack of precise data availability or costs involved to collect data being higher than expected benefit from emission reductions associated to this source

			transflective liquid crystal displays (LCD) or transflective (TFT LCD) screens which consume very little power. The typical bike sharing system is designed to minimize the redistribution of bicycles because it is in the operator's best interest to keep overhead costs low and increase customer satisfaction; considered as standard practice. Before a bike sharing system is even implemented, GIS analysis is performed to determine demand and capacity of each bike sharing station using hundreds of data inputs which results in an implementation plan to minimize redistribution. Even after a system is deployed, the typical bike sharing operator uses incentives, such as offering discounts to users who return bicycles at underutilized stations, to encourage users to self-regulate the redistribution process; also considered as standard practice. Refer to applicability condition #6 in Section 4, “Applicability Conditions.” M&O of baseline vehicles (B2) includes oil usage, lubricants, tires and is far more energy intensive (e.g. test driving, transport in case of mishaps, etc.) than bicycles. Facilities of baseline modes such as e.g. bus an metro stations, parking lots, etc. involve far more maintenance than small bike sharing facilities. Metros e.g. use up to 40% of total electricity usage only for facilities not for traction. See B3.
P2: Maintenance of transport infrastructure	Road infrastructure used by bicycles	Not relevant	Bicycles use the same road infrastructure as other road-based vehicles. Baseline vehicles such as cars or buses demand much more road maintenance due to their higher weight

			basically. Baseline emissions of road infrastructure (B4) are thus much higher than project one and the omission of P2 and B4 is thus conservative.

Table 2: Baseline Emission Sources

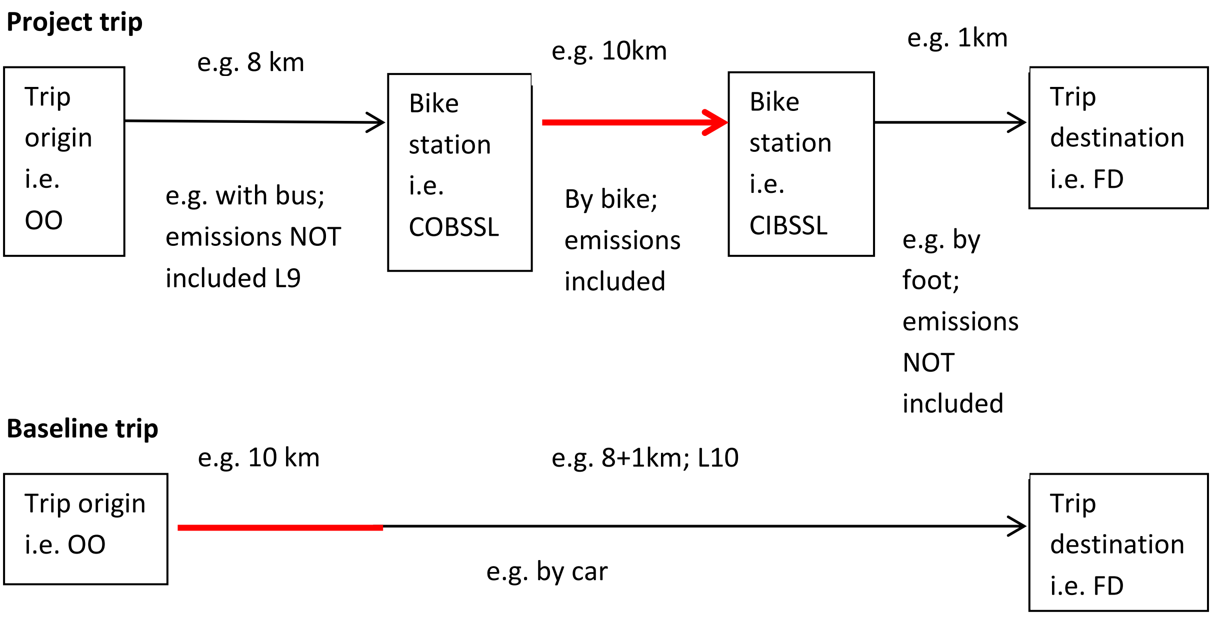
Emission Source	Description	Relevance	Justification
B1: Operation of baseline vehicles	Fossil fuels burned during operations	Relevant	Included
B2: Maintenance of baseline vehicles	e.g. oils, lubricants, tires, driving to/from repair shops, AC gases replacement	Not relevant	Excluded together with P1
B3: Maintenance of baseline facilities	e.g. bus stations, parking lots, metro facilities, ticketing stations, toll stations	Not relevant	Excluded together with P1
B4: Maintenance of transport infrastructure	Road and rail infrastructure	Not relevant	Excluded together with P2

Table 3: Leakage Emission Sources

Emission Source	Description	Relevance	Justification
L1: WTT fossil fuel emissions	Extraction, refinery, transport	Not relevant	Conservative to exclude as these only occur for baseline as only latter consumes fossil fuels
L2: Electricity generation	Production and transmission	Relevant	Included for project and baseline sources
L3: Upstream equipment manufacturing	E.g. bus stations, parking lots, metro facilities, ticketing stations, toll stations, bike stations, bicycles, trains, cars, buses	Not relevant	Material usage for baseline equipment is far higher than for bike sharing projects be it in the vehicles themselves (e.g. material usage car versus bicycle) be it in the associated facilities e.g. car garage or bus depot versus bicycle depot
L4: Transport infrastructure	Road and rail infrastructure	Not relevant	Far higher emissions for constructing of baseline emission modes used only partially by bikes. No additional or very

construction			marginal transport infrastructure required for bikes. Car and taxi space usage on roads is far higher than bikes. Rail infrastructure is not used at all by bikes
L5: Upstream equipment decommissioning	See L2	Not relevant	See L2. Far higher for baseline equipment
L6: Transport infrastructure decommissioning	See L3	Not relevant	See L3. Far higher for baseline equipment
L7: Congestion effect	Rebound and speed effect	Not relevant	See below
L8: Occupation rates	Lower occupation rates of public transit vehicles	Not relevant	See below
L9: To/from bike stations	Usage of fossil powered vehicles	Not relevant	The project only includes for project AS WELL AS for baseline emissions the project trip distance i.e. COBSSL to CIBSSL. Bike users may use other fossil powered transit means from their trip origin i.e. OO to the bike sharing starting station facility i.e. COBSSL and from latter to their final destination i.e. FD thus causing emissions. However in the baseline case they would also realize a similar trip stretch not included (see Graph 1 below). Thus L9 and L10 are both not considered. L10 is probably higher than L9 as car users (highest emission mode next to taxi per PKM) in the baseline could only use for one part of their trip (to or from the bike station sharing facility) their car.
L10: Baseline trip part not included	Usage of fossil powered vehicles	Not relevant	The methodology does not account for the entire baseline trip emissions from OO-FD but only for the distance made by bikes.

Graph 1: L9 and L10



The baseline trip distance considered is only the red marked part commensurate with the bike distance. This can be however much less than the total trip distance and therefore the total baseline emissions.

In the project as well as in the baseline case the same trip distance is included and a comparable trip distance is excluded.

L8: Congestion effect

Congestion leakage is composed of rebound leakage and speed leakage. The background is that potentially with less congestion due to having less vehicles on the road due to the project activity additional trips could occur (positive leakage) while reduced congestion leads at the same time to increased travel speed (negative leakage).

The relevance as well as the impact of this leakage is questioned on theoretical grounds:

- The implementation of a bike sharing system has only a limited impact on congestion. Even large scale public transit projects with millions of passengers per day show only a limited impact on citywide congestion.
- The speed impact and the rebound impact are in opposite directions. If congestion is reduced you have a rebound effect with positive leakage but at the same time a speed impact with negative leakage. As driving speeds in many urban centers are low an improved speed tends to have a larger impact than the rebound impact. Therefore the overall congestion impact would be negative and not including such leakage would be conservative.

The congestion impact of MRTS (Mass Rapid Transit Systems) which in most cases have a much larger impact than a bike sharing project have recently been measured in a number of cities for the development of CDM and VCS projects using AM0031 and/or ACM0016. The following table presents the results and also puts these in relation to the expected annual emission reductions. All data shown is published also in the relevant PDDs. The list includes data of ALL cities where such measurements where performed before/after establishment of a MRTS and is therefore objective and non-selective concerning results.

Table 4: Rebound and Speed Effect of Public Transport CDM Projects[2]

Project	Methodology applied	Annual ø rebound effect (tCO_2)	Annual ø speed effect (tCO_2)	Annual ø total congestion impact (tCO_2)	Annual ø emission reductions (tCO_2)
BRT Bogota, Colombia	AM0031	9,000	-15,000	-6,000	247,000
BRT Cali, Colombia	AM0031	11,000	-23,000	-12,000	258,000
BRT Pereira, Colombia	AM0031	2,000	-1,000	1,000	35,000
BRT Barranquilla, Colombia	AM0031	1,000	-2,000	-1,000	55,000
BRT Medellin, Colombia	AM0031	0	-4,000	-3,000	194,000
BRT Guatemala	AM0031	-3,000	-95,000	-97,000	534,000
BRT Guadalajara, Mexico	AM0031	1,000	0	1,000	51,000
BRT Quito, Ecuador	AM0031	1,000	-19,000	-19,000	155,000
BRT Chongqing, China	AM0031	-2,000	0	-2,000	218,000
BRT Zhengzhou, China	AM0031	-8,000	0	-8,000	205,000
BRT Joburg, South Africa[3]	AM0031	-1,000	0	-1,000	35,000
Metro Seoul, Korea[4]	ACM0016	0	0	0	NA

Note: negative effect means that indirectly the project reduces additionally emissions; positive leakage means that indirectly the project causes additional emissions

The results of a dozen cities in various countries of Latin America and Asia are clear:

1. The congestion impact composed of the speed and the rebound effect is in the large majority of cases negative and in the 2 cases where it is positive it is marginal (1,000 tons in each case) representing 2% of emission reductions.
2. The relative importance of the congestion impact is small with a median value of 2.5% of average emission reductions.

L9: Occupation Rates

The hypothesis of the leakage occupation rate or load factor is, that the public transit system including remaining buses and taxis, does not react to a change of demand and continues to operate at the same supply level thereby leading to lower load factors.

This hypothesis is negated on theoretical grounds as:

- Economically seen organizations in a market economy adjust to supply and demand. If demand for passengers is reduced then less buses are used and the remaining buses are either not replaced or such buses are used in regions where till now the service was

[2] See UNFCCC website; all projects managed by Grütter Consulting.

[3] VCS, started validation 2.2011

[4] VCS, started validation 2.2011

deficient and thus a non-captured demand exists or the buses are used in growth regions as most cities in developing countries grow and due to rising income also the trip demand grows.

In practice in cities which established a MRTS which has a much higher impact due to transporting much more passengers than a bike sharing facility and in which measurements of the load factor of taxis and buses have been made prior and post project NO change of occupation rate could be monitored. Table 5 shows examples of two cities where such measurements have taken place over time including before/after establishment of a MRTS using the procedures of AM0031.

Table 5: Impact of MRTS on Load Factor Buses and Taxis

City	Occupation rate taxis prior project[5]	Occupation rate taxis after project	Occupation rate buses prior project	Occupation rate buses after project
Bogota	0.7 to 0.8	0.9	56% to 66%	61%
Seoul	1.3-1.5	1.4	12.1 passengers	13.5 passengers

Sources:
Bogota: Monitoring report year 2008 of CDM project BRT Transmilenio (project 0672) verified by SQS and with CERs issued by UNFCCC.

Seoul: Bus data: Seoul City Infrastructure Division; Taxi data Seoul City Infrastructure Division and survey realized 2011 by South Pacific Inc. Impact of BRT and metro lines

Above data shows that no statistically significant and discernible impact of the MRTS on the occupation rates could be identified.

Document Major Revision History (high-level)

Version	Date	Author	Revision Nature
01.0	08-20-2007	Jason Meinzer	Initial crude draft outlining key

[5] The range is given in accordance with AM0031 which determines that leakage of load factor has to be included if the monitored value is lower than 10 percentage points below the point value of the baseline

			concept(s)
01.1	04-24-2008	Jason Meinzer	Addition of bike share logistical information
01.2	02-12-2009	Jason Meinzer	Baseline section addressed
01.3	09-26-2009	Jason Meinzer	Additionality section addressed
01.4	02-21-2010	Jason Meinzer	Regulatory topics addressed
01.5	02-27-2010	Jason Meinzer	Other meth's referenced
01.6	05-04-2010	Jason Meinzer	Framework revised
01.7	08-28-2010	Jason Meinzer	All external copy aggregated into .doc
01.8	10-02-2010	Jason Meinzer	Meth elements refined
01.9	10-12-2010	Jason Meinzer	Meth elements refined, particularly baseline
02.0	10-18-2010	Jason Meinzer	Meth baseline elements refined in particular, as well as project emissions
02.1	10-19-2010	Jason Meinzer	Meth baseline elements refined in particular
02.2	10-20-2010	Jason Meinzer	Meth baseline elements refined in particular
02.3	10-21-2010	Jason Meinzer	Meth baseline elements refined, monitoring sections tweaked
02.4	10-22-2010	Jason Meinzer	Monitoring and Section 15 updated
02.5	10-27-2010	Jason Meinzer	Section 15 refined

02.6	11-04-2010	Jason Meinzer	Fine tuning/polishing
02.7	11-08-2010	Jason Meinzer	Applicability conditions abbreviated
02.8	11-23-2010	Jason Meinzer	Supplemental leakage external doc appended, baseline determination polished
02.9	03-02-2011	Jason Meinzer	Updates in accordance w/ validator diligence
03.0	03-14-2011	Jason Meinzer	Updates in accordance w/ validator diligence
03.1	04-07-2011	Jason Meinzer	Updates in accordance w/ validator diligence
03.2	04-26-2011	Jason Meinzer	Updates in accordance w/ validator diligence
03.3	05-25-2011	Jason Meinzer	Updates in accordance w/ validator diligence
03.4	06-03-2011	Jason Meinzer	Updates in accordance w/ validator diligence
03.5	06-09-2011	Jason Meinzer	Updates in accordance w/ validator diligence
03.6	06-19-2011	Jason Meinzer	Updates in accordance w/ validator diligence
03.7	06-24-2011	Jason Meinzer	Updates in accordance w/ validator diligence
03.8	06-25-2011	Jason Meinzer	Updates in accordance w/ validator diligence
03.9	06-27-2011	Jason Meinzer	Updates in accordance w/ validator diligence
04.0	06-29-2011	Jason Meinzer	Updates, in accordance w/ validator diligence
04.1	06-29-2011	Jason Meinzer	Finalized, in accordance w/ validator diligence
04.2	06-29-2011	Jason Meinzer	Finalized, track changes

			accepted in accordance w/ validator diligence
04.3	06-29-2011	Jason Meinzer	Finalized, in accordance w/ validator
04.4	06-30-2011	Jason Meinzer	Completed, delivered to validator