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# CDM

## Validation Report

### RENEWAL OF CREDITING PERIOD

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UNFCCC Registration No.

0672

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UNFCCC Scope:

7 (Transport)

UNFCCC Methodology:

AM0031, Version 4.0.0, "Bus Rapid Transit Projects"

UNFCCC Scale:

Large Scale

Team of auditors/assessors:

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## 1 Introduction

### 1.1 Objective

Corporación Andina de Fomento - CAF has retained SQS to validate the renewal of the crediting period of the project **BRT Bogotá, Colombia: TRANSMILENIO Phase II to IV**, UNFCCC Registration No. 0672 (hereafter called "the project"). The objective of the validation is an independent assessment by a Designated Operational Entity (DOE) of a proposed project activity against the defined set of criteria for registration under the Clean Development Mechanism (CDM). Validation of a registered CDM project is part of the CDM project cycle and will finally result in a conclusion by the DOE whether a project activity should be submitted for renewal of the crediting period to the CDM Executive Board (CDM EB). The ultimate decision on the registration of a proposed project activity rests with the CDM EB.

### 1.2 Scope

The scope of the validation is an independent and objective review of the project design document (PDD) and the DOE uses a risk-based approach focusing on the identification of significant risks for project implementation and the generation of Certified Emission Reductions (CERs) against the criteria stated in

- The Kyoto Protocol, in particular § 12 and Modalities and Procedures for the CDM
- Decision 2/CMP1 and Decision 3/CMP.1 (Marrakech Accords)
- MODALITIES AND PROCEDURES FOR A CLEAN DEVELOPMENT MECHANISM
- CLEAN DEVELOPMENT MECHANISM VALIDATION AND VERIFICATION MANUAL, version 1.2.
- Decisions and specific guidance by the EB published under <http://cdm.unfccc.int>
- A comprehensive list of the normative references is given in the validation protocol (Appendix E).

When contracted to validate a proposed CDM project activity for a second or further crediting period, the DOE shall undertake a thorough reassessment of the validity of the original baseline or any updates thereto proposed by the project participants, and the corresponding estimation of emission reductions for the applicable crediting period, based on the latest version of the procedures for renewing the crediting period (see EB 46 report, Annex 11 "Procedures for renewal of the crediting period of a registered CDM project activity"), the latest applicable version of approved methodology and the means of validation described in this Manual [CDM Validation and Verification Manual, §169].

The DOE's validation opinion shall assess the validity of the original baseline or its update through an assessment of the following issues:

- (a) The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance of the Executive Board with regard to renewal of the crediting period at the time of requesting renewal of crediting period;
- (b) The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period.

[Procedure for Renewal of the Crediting Period of a Registered CDM Project Activity, §7]

### 1.3 Validation methodology

The DOE applies standard auditing techniques to assess the correctness of the information provided by the project participants, including, where appropriate, but not limited to:

- (a) Document review, involving: review of data and information to verify the correctness, credibility and interpretation of presented information and cross checks between information provided in the PDD and infor-

- mation from sources other than that used, if available, and if necessary independent background investigations.
- (b) Follow-up actions (on-site visit, telephone, e-mail interviews), including: interviews with relevant stakeholders in the host country, personnel with knowledge of the project design and implementation and cross-check of information provided by interviewed personnel to ensure that no relevant information has been omitted from the validation.
  - (c) Reference to available information relating to projects or technologies similar to the proposed CDM project activity under validation.
  - (d) Review, based on the approved methodology being applied, of the appropriateness of formulae and correctness of calculations.

If, during the validation of a project activity, the DOE identifies issues that need to be further elaborated upon, researched or added to in order to confirm that the project activity meets the CDM requirements and can achieve credible emission reductions, the DOE shall ensure that these issues are correctly identified, discussed and concluded in the validation report.

The DOE shall raise a corrective action request (CAR) if one of the following occurs:

- (a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- (b) The CDM requirements have not been met;
- (c) There is a risk that emission reductions cannot be monitored or calculated

The DOE shall raise a clarification request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

The DOE shall raise a forward action request (FAR) during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

The project participant shall respond to all requests with sufficient evidence.

The DOE shall resolve or “close out” CARs and CLs only if the project participants modify the project design, rectify the PDD or provide adequate additional explanations or evidence that satisfy the DOE’s expectations. If this is not done, the DOE shall not recommend the project activity for renewal of the crediting period to the CDM Executive Board.

In order to ensure transparency, a validation protocol was customized for the project. The protocol shows, in a transparent manner, criteria (requirements), means of validation and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the DOE will document how a particular requirement has been validated and the result of the validation.
- The validation protocol consists of several tables, as described below.

The completed validation protocol is enclosed in appendix E to this report.

Protocol 1: General CDM and methodological requirements	
<i>N-Ref.</i>	Normative reference
<i>Requirement</i>	The requirements the project must meet.
<i>Ref.</i>	Reference to the PDD or document.
<i>MoV</i> (Means of Validation)	Explains how conformance with the requirements is investigated. DR = Document Review, I = Interview, NA = Not Applicable
<i>Draft Concl. / Final Concl.</i> (Draft and/or Final Conclusion)	OK = Conforming, NOK = Nonconforming, CAR = Corrective action request, CL = Clari-

	fication request, FAR = Forward action request
<i>Comment</i>	The section is used to elaborate and discuss the conformance to the requirement.

**Protocol 2: Summary of requests (included in section 3.7-3.8 of this report)**

<i>No.:</i>	The requests (CAR, CL, FAR) are numbered and listed in this section.
<i>Reference to Checklist:</i>	Reference to the question number in Protocol 1 where the request is explained.
<i>DOE request:</i>	The section is used to elaborate and discuss the request. The DOE may give reference to the PDD or documents.
<i>Project participant response:</i>	The responses given by the project participants during the communications with the DOE is summarised in this section.
<i>DOE conclusion:</i>	This section summarizes the DOE's responses and final conclusions. The result of the conclusions also is then included in Protocol 1 , under "Final Conclusion".
<i>Date:</i>	Date when request was closed.

## 2 Validation Opinion

### 2.1 Summary of the validation conclusions

Based on

- PDD "PDD TM 2nd period vs 6.2 as of 26.6. clean", version 6.2, dated 08/06/2012
- Consulted documents listed in Appendix B
- AM0031 "Bus Rapid Transit Projects", version 4.0.0
- CDM Validation and Verification Manual, version 01.2
- "Procedures for renewal of the crediting period of a registered CDM project activity", version 06.0
- Methodological Tool "Validity of the original/current baseline and to update the baseline at the renewal of a crediting period", version 03.0.0
- Clarifications on procedures and documentation which need to be used for the renewal of a crediting period, EB 20, Annex 7
- Glossary of CDM Terms, version 06.0
- Additional references specified in Section 1.2 and Appendix E; and
- On-site visit 19-20/01/2012

It is SQS's opinion that the project "**BRT Bogotá, Colombia: TRANSMILENIO Phase II to IV**", described in PDD version 6.2, dated 08/06/2012 [1], meets all relevant criteria of the listed references in Appendix F.

SQS confirms that the approved baseline and monitoring methodology AM0031, version 4.0.0, "Bus Rapid Transit Projects" is applicable to the proposed CDM project activity and is correctly applied, and that the criteria are discussed in an exhaustive manner in the PDD and supported by the submitted documents. Therefore, SQS requests the renewal of the crediting period of given CDM project.

### 2.2 Statement on the validation of the expected emission reductions

The calculation of the expected emission reduction is to be found in the file "File 13 CER sheets TM 2nd period version 1.2" (version 08/06/2012) [3]. The formulas and parameters have been crosschecked with other information sources.

SQS confirms that the calculation of the expected emission reductions of 578 918 t CO<sub>2</sub> eq. average per year and 4 052 426 t CO<sub>2</sub> eq. for the second 7 years crediting period is carried out in a transparent and conservative manner, so that the calculated emission reductions are most likely to be achieved, given that the underlying assumptions do not change.

### 2.3 Statement whether the proposed CDM project activity meets the stated criteria

The assessment was performed in accordance with the Procedures for renewal of the crediting period of a registered CDM project activity (version 06.0) and included an assessment of:

- (a) An impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period;
- (b) The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period.

The review of the project design documentation and the subsequent follow-up interviews have provided SQS with sufficient evidence to determine the validity of the original baseline and/or its update through an assessment. The impact of new relevant national and/or sectoral policies has been taken into account and has been checked during the on-site visit. The project correctly applies the baseline and monitoring methodology AM0031 "Bus Rapid Transit Projects", the most recent updated version 4.0.0.

SQS is of the opinion that the project “BRT Bogotá, Colombia: TRANSMILENIO Phase II to IV”, as described in the project design document of version 6.2, dated 08/06/2012, meets the requirements for the renewal of the crediting period stated in the “Procedures for renewal of the crediting period of a registered CDM project activity” (version 06.0). Hence, SQS requests the renewal of the crediting period of project activity (0672) “BRT Bogotá, Colombia: TRANSMILENIO Phase II to IV” (second crediting period starts from 01/01/2013 to 31/12/2019).

### 3 Validation Findings

#### 3.1 Project design

The project **BRT Bogotá, Colombia: TRANSMILENIO Phase II to IV** was registered as a CDM project on 07/12/2006 (UNFCCC Registration No. 0672). The first 7-year crediting period is from 01/01/2006 to 31/12/2012. The PP is applying for a second crediting period starting from 01/01/2013 to 31/12/2019.

A “change from the project activity as described in the registered PDD & revision of registered monitoring plan” was accepted at EB 67. Therefore PDD version 5.4 (10/03/2012) is the registered PDD as basis for the validation.

Some unclear statements in the revised PDD have been communicated to the project participants and have been adjusted:

CL 1 DOE: The situation in case of PP’s is not transparent. The PP shall provide more information about the history and “CAF-Netherlands CDM facility”. If Grütter Consulting is no longer PP, then the MoC change is missing.

PP: Grütter Consulting is PP until the end of the 1<sup>st</sup> crediting period, which goes until 31/12/2012. Therefore the MOC cannot be changed now but will be changed in the future.

Due to above the PPs have been included as presently registered by the UNFCCC

DOE: A.3.: The explanation in brackets for CAF is not consistent with the approved text in the revised PDD from UNFCCC Website, version 5.4 [8]. Also in Annex 1.

PP: Section A3 has been changed to have the same institutions. The prentices is not required. The Annex has the same institutions as in Section A3. It is not required that they have the same persons or address as in the revised PDD as this is a new PDD which is the new registered version which can have updates in persons or directions.

DOE: PDD revised accordingly. Response accepted. OK

CL 2 DOE: The information (countries) in A.3 is not consistent with Annex 1.

PP: Has been made consistent

DOE: Annex 1: The country (Colombia) for CAF is not consistent with the approved country (Venezuela) in the revised PDD from UNFCCC Website, version 5.4 [8].

PP: This is not correct. Venezuela is not listed as an approved country by project 0672. CAF is listed under the Netherlands. This is in accordance with the registration of the project.

See website: <http://cdm.unfccc.int/Projects/DB/DNV-CUK1159192623.07/view>

Host country is: Colombia and other Parties involved are Netherlands and Switzerland. Thus in fact usage of Venezuela is not correct, as this country is not an approved Party. The 2<sup>nd</sup> period PDD takes for CAF Netherlands. CAF is approved under the Netherlands as of today and this remains. The address can be technically seen in Colombia i.e. there is no regulation to our knowledge that this is not allowed and it has been approved by the UNFCCC for the original as well as the revised PDD and thus the current PDD for the 2<sup>nd</sup> period is consistent with the former versions

DOE: PDD revised accordingly. Response accepted. OK

CL 3 DOE: Some of the tables (OC<sub>T</sub>, ROC<sub>Z</sub>) to describe data/parameters were altered and do not comply with the requirements. There is insufficient detail regarding “postcode” in tables PDD Annex 1.

PP: “to be used” has been added to the table. Has been changed from postfix to postcode

DOE: Response accepted. OK

CL 4 DOE: The geo coordinates (PDD A.4.1.4) are missing.

PP: The original PDD did not have any. However we have added latter.

DOE: Response accepted. OK

CL 5 DOE: Some sources have not been adequately (precisely) referenced, so that everyone finds the source. PDD page 7 Table 1, page 8 Table 3, page 10 Footnote 17 Resolutions

PP: Table 1 has been changed with a clear source. Table 3 is from File 25. Footnote 17 is File 11

DOE: Table 1: the referenced link cannot be found the page.



- PP: The link has been changed  
DOE: Response accepted. OK
- CL 6 DOE: The reverved tools in the methodology are used are missing in B.1.  
PP: The original tool used for the registered PDD has been added. This refers to the original tool as this section (B5, additionality) is not revised for a new crediting period.  
DOE: Response accepted. OK
- CL 13 DOE: All Excel and Word files, which are used as a reference shall be in non-changeable format (pdf) and be "officialised" with release date and signature and source. The auditors accept a mail with a release and a correctness statement by the originator. Such as file 9a, 9c, 22a  
PP: This has been made and the DOE has been supplied with this information.  
File 9a and 9c are referred to in File 9b See also letter attached concerning File 9a. File 9c was not used in the PDD as only File 10 was used for bus numbers  
File 22a see letter attached part 1 and part 2  
DOE: Response accepted. OK
- CL 17 DOE: PDD page 78 "Metro Gurgaon" is referenced. For what?  
PP: Typo error has been corrected  
DOE: Response accepted. OK

The clarification requests (CLs) could be successfully resolved and are summarized in section 3.7. and 3.8..

The PDD "PDD TM 2nd period vs. 6.2 as of 26.6. clean", version 6.2, dated 08/06/2012 [1] meets the CDM requirements for completing PDDs and guidance of the CDM EB available on the UNFCCC website. It is compliant with the latest template (CDM Project Design Document Form (CDM-PDD), version 03 - in effect as of: 28/07/2006). It is updated, clearly written, well understandable and references all needed documents.

There are no changes to the project participants and the Letter of Approval has been submitted during the initial validation of the project activity. The situation in case of PP's has been extensively discussed (see CL 1). SQS accepted the response.

The updated description of the project activity contained in the PDD is understandable, unambiguous and provides a good overview of the project. The on-site visit on 19-20/01/2012 and the interviews (see on-site visit program and interviews in Appendix A) have confirmed the revised description. No contradictory information or findings have been unveiled.

It is SQS's opinion that the project description is accurate and complete.

## 3.2 Applicability of selected baseline and monitoring methodology

As per EB 63 "Procedures for renewal of the crediting period of a registered CDM project activity", version 06.0, the latest approved version of a baseline and monitoring methodology, applied in the original CDM-PDD of the registered CDM project activity, shall be used whenever applicable. The project activity has been registered with the approved methodology AM0031 "Baseline Methodology for Bus Rapid Transit Projects", version 3.1.0.

The PDD [1] of the renewal-crediting period has been revised as per the approved methodology AM0031 "Bus Rapid Transit Projects", version 4.0.0. The methodology "Bus Rapid Transit Projects", version 4.0.0 is valid from 25 Nov 11 onwards. Therefore it meets the condition that for renewal of the crediting period, the methodology shall not change.

### 3.2.1 Applicability of the selected methodology to the project activity

Some unclear statements in the PDD has been communicated to the project participants and has been adjusted:

- CAR 1 DOE: The described project situation is not correct. Rail-based transit exists in Bogota. The PP shall explain the situation detailed. Evidence is missing.

PP: No train for urban passenger transport exists. The only rail system operating in Bogota is a tourist train. This has been clarified. <http://www.turistren.com.co/>

DOE: Response accepted. OK

CL 7 DOE: The text Table 4, condition 3 is not consistent with the methodology.

PP: The text Table 4 has been copied literally from the methodology AM0031 version 4 page 3.

DOE: Response accepted. OK

CL 8 DOE: Discussion regarding 10 year crediting period is missing.

PP: The project has been registered and approved by the UNFCCC for a renewable crediting period. This is not changed and not a matter of discussion during the renewing of the crediting period. The new version of AM0031 only allows for a fixed crediting period which affects new projects, not however projects which have been registered previously with a renewable crediting period. EB 65 Annex 20 which is relevant for the renewing of the crediting period identifies the points to be discussed during the renewing of the crediting period and this does clearly not include the crediting time. The newly calculated baseline parameters and the changes in the monitoring parameters based on the new version of AM0031 are not related to the crediting period.

DOE: The condition regarding 10 year crediting period is not part of section "Applicability" of the methodology. Response accepted. OK

The corrective action request (CAR) and clarification requests (CL's) could be successfully resolved and are summarized in Section 3.7. and 3.8.

The methodology AM0031 lists 4 applicability conditions. They are discussed in PDD, Table 4.

Applicability conditions	Project situation	Validation
The methodology is applicable to project activities that reduce emissions through the construction and operation of a BRT system for urban road-based transport. The methodology is also applicable for extensions of existing BRT systems.	The project activities reduce emissions through the construction and operation of a BRT system as described in the tables below.	The information in the tables below has been confirmed during the on-site visit by visual inspection and during interviews. Based on the on-site inspection and the project description, the DOE assessed this condition as applicable and corresponding statement in the PDD as correct.
Any fuels, including (liquefied) gaseous fuels or bio-fuel blends, as well as electricity, can be used in the baseline or project case. The following conditions apply: In the case of bio-fuels, project buses must use the same bio-fuel blend (same percentage of bio-fuel) as commonly used by conventional comparable urban buses in the country, i.e. the methodology is not applicable if project buses use higher or lower blends of bio-fuels than those used by conventional buses. In addition, the project busses shall not use a significantly higher bio-fuel blend than	Resolution 18 1266 of 14/07/2010 [4] of the Ministry of Mines and Energy regulates that diesel sold in Bogota shall have a bio-diesel content of 7% starting August 15, 2010. The biodiesel share can change over time based on Resolutions realized by Government. Therefore the bio-fuel content in diesel is monitored based on official regulations as published by the Ministry of Energy and Mines. The project buses use diesel with this compulsory share of bio-diesel. The same is true for all remaining baseline buses or other vehicles using diesel as the percentage of bio-diesel is defined by the Ministry and identical for any user of diesel in Bogota. No special blend or different diesel is used	The project situation has been confirmed during OSV by interviews of German Dario Alvarez (Secretaria Distrital de Ambiente) and Alejandro Machado (Secretaria Distrital de Movilidad). Based on the on-site inspection and the project description, the DOE assessed this condition as applicable and the corresponding statement in the PDD as correct.

cars and taxis.	by project units. Gasoline vehicles use an 8% bio-fuel blend (ethanol) since 01/01/2010 based on Resolution 18 2368 dated 29 December, 2009 [5]. Project buses thus do not use a higher blend of bio-fuels than cars and taxis.	
The project activity BRT system is road-based. The baseline public transport system and other public transport options are road- or rail-based (the methodology excludes air and water-based systems from analysis). However, the methodology is not applicable if the project activity BRT system replaces an urban rail-based Mass Rapid Transit System (MRTS), i.e. if the MRTS stops operating after project implementation due to the project activity;	The BRT is road based and replaces road-based transport options. No rail-based transit system operates in Bogotá. The only rail-based transport mode is a tourist train in Bogotá, which is however not a mass transit mode and which also only runs 1 trip per day on weekends and public holidays ( <a href="http://www.turistren.com.co/">http://www.turistren.com.co/</a> )	Based on the on-site inspection and the project description, the DOE assessed this condition as applicable and the corresponding statement in the PDD as correct.
The methodology is applicable if the analysis of possible baseline scenario alternatives leads to the result that a continuation of the use of the current modes of transport is the baseline scenario.	Section B.4. of the PDD identifies the baseline as a continuation of the current public transport system	Based on the on-site inspection and the project description, the DOE assessed this condition as applicable and the corresponding statement in the PDD as correct. (Assessed in Section 3.3 of this report).

The following table lists the trunk routes of the CDM project completed. That has been confirmed during on-site visit.

Phase	Trunk route	Distance in km	Completion date
Phase II	Americas	13.0	2003
Phase II	NQS	19.3	2006
Phase II	Suba	10.0	2006

The following table lists the trunk routes of the CDM project planned. That has been confirmed during the on-site visit. New constructions are ongoing.

Phase	Trunk route	Distance in km	Expected Completion date
Phase III	Calle 26	12.2	2012
Phase III	Carrera 10	9.5	2012
Phase III	Carrera 7	13.0	2013
Phase IV	Av. Boyacá	35.0	2017
Phase IV	1° de Mayo	11.0	2019
Phase IV	Carrera 68	20.0	2022
Phase IV	Calle 13- Calle 19	15.0	2024
Phase IV	Av. Ciudad de Cali	11.0	2026

Verified by desk-review, on-site visit and interviews, SQS confirms that all criteria are met (for details see

Validation Protocol, 4(a)).

### 3.2.2 Project boundary

An unclear statement in the PDD has been communicated to the project participants and has been adjusted:

CL 9 DOE: The information Table 6 (page 12) is not limited to the project activity.

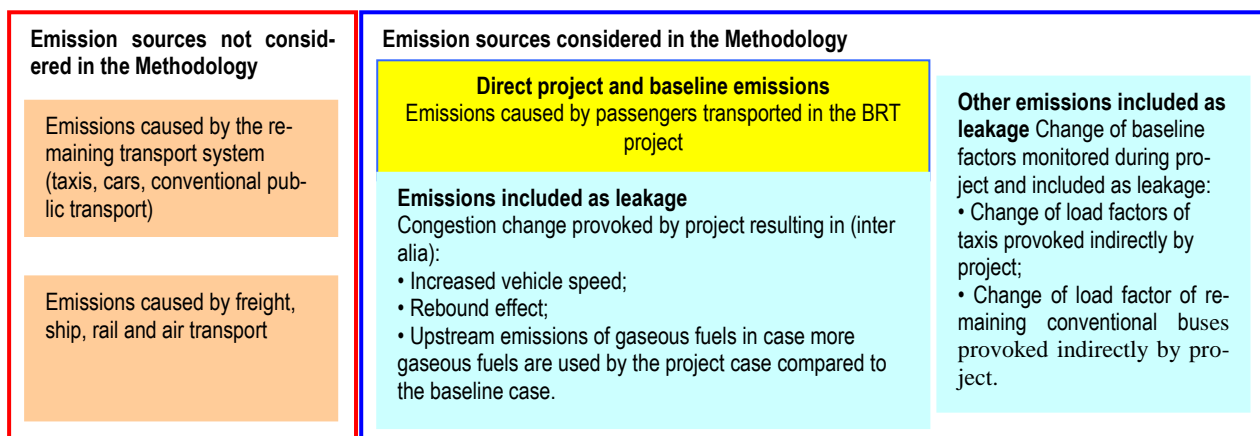
PP: This is correct. This table is copied from the original note and shows the entire TM network thus including Phase I trunk routes. An explanatory note has been added at the end of the table

DOE: Response accepted. OK

The clarification request (CL) could be successfully resolved and is summarized in Section 3.7. and 3.8..

The project location is Colombia, Capital District, Bogota. The project is located within the metropolitan area of the city of Bogotá, Colombia. For a map of the routes of the system see Map 1 (Trunk Routes) and Map 2 (Feeder Routes) PDD. The geographical coordinates of Bogotá are 4°35'53'' North and 74°4'33'' West (equivalent to 4.598 Latitude and -74.076 Longitude).

The conceptual project boundary is shown in the following figure.



It includes all GHG emissions that are present in the baseline and in the project, and is consistent with the methodology. It includes the project and baseline GHG emissions as well as leakage.

The greenhouse gases included in- or excluded from the project boundary are shown in the following table.

	Source	Gas	Included?	Justification / Explanation
Baseline	Mobile source emissions of different modes of road transport for passengers which use BRT system (buses, passenger cars, motorcycles, taxis)	CO <sub>2</sub>	Yes	Major emission source
		CH <sub>4</sub>	Yes	Included only if gaseous fuels are used and excluded for liquid fuels CH <sub>4</sub> emissions are a minor emission source of the total CO <sub>2</sub> e emissions in diesel/gasoline vehicles. Neglecting these emissions in baseline as well as project emissions is conservative as fuel consumption and thus also CH <sub>4</sub> emissions are reduced through the project
		N <sub>2</sub> O	No	N <sub>2</sub> O emissions are a minor source of the total CO <sub>2</sub> e emissions in diesel/gasoline vehicles. Neglecting these emissions in baseline as well as project emissions is conservative as fuel consumption and thus also N <sub>2</sub> O emissions are reduced through the project
Project Activity	BRT bus emissions (feeder and trunk routes)	CO <sub>2</sub>	Yes	Major emission source
		CH <sub>4</sub>	Yes	Included only if gaseous fuels are used. See explanation above
		N <sub>2</sub> O	No	See explanation above

The GHG addressed in the project are CO<sub>2</sub> and CH<sub>4</sub>. No further GHG emissions are to be expected within the project boundary as a result of the project activity. The choice of boundary, sources and gases corresponds to the methodology and was justified by SQS.

SQS confirms that the project activity is applicable to the applied methodology AM0031, version 4.0.0.

### 3.3 Validity of the original baseline or its update

In line with the “Procedures for renewal of the crediting period of a registered CDM project activity”, version 06.0, the validity of the baseline has been assessed as per the Methodological Tool “Validity of the original/current baseline and to update the baseline at the renewal of a crediting period”, version 03.0.0, step by step.

Point 6 of the tool indicates that there are different scenarios that could be identified as the baseline scenario for a CDM project activity. For the purpose of the renewal of the crediting period, it is important to differentiate between four different scenarios. The scenario relevant for the project is that the project participants do not undertake an investment, but an investment to provide comparable outputs or services is undertaken by a third party (or parties). Passengers would use a mix of different transit means in absence of the project including public transit in its traditional form provided by private bus operators.

The tool specifies under point 7 that, at the renewal of the crediting period, the baseline scenario should not be reassessed but there should be an assessment of whether the baseline emissions will be affected. In such case, the baseline emissions should be updated.

An unclear statement in the PDD has been communicated to the project participants and has been adjusted:

CL 10 DOE: Statement regarding original baseline scenario is missing.

PP: Section B.4. step 1.1. a statement has been added

DOE: Response accepted. OK

The clarification request (CL) could be successfully resolved and is summarized in Section 3.7. and 3.8..

#### Step 1: Assess the validity of the current baseline for the next crediting period

##### Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

There is no mandatory national or sectoral policy for establishing a BRT i.e. a continuation of the selected baseline complies with all national and sectoral policies. Private as well as public transit means are allowed to operate as long as they comply with safety and emission regulations (of the individual vehicles). A national urban mass transit policy exists [6] [7]- however latter is not mandatory and has only a promotional character (See Section 1 [6]). The current baseline therefore complies with all relevant mandatory national and/or sectoral policies, which have come into effect after the submission of the project activity for validation and are applicable at the time of requesting renewal of the crediting period. The original baseline is therefore still valid.

Confirmed during OSV by interviews of German Dario Alvarez (Secretaria Distrital de Ambiente) and Alejandro Machado (Secretaria Distrital de Movilidad).

##### Step 1.2: Assess the impact of circumstances

As mentioned above the baseline scenario is an investment of other actors in transit means including cars, taxis, motorcycles and traditional buses to cater for the transit demand. The tool specifies under point 7 that, at the renewal of the crediting period, the baseline scenario should not be reassessed, but there should be an assessment of whether the baseline emissions will be affected. Baseline emissions are re-calculated based on updated baseline emission factors for all baseline modes of transit. The detailed calculation is described in Section B.6.3 of the PDD and Section 3.4 of this report. Therefore, the original baseline scenario is still valid, and the emission that results from this scenario has been aptly reassessed.

On-site visit confirms no changes in market characteristics.

**Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.**

According to the Tool this sub-step is only applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology. This is not the case in the project and therefore Step 1.3. is not applicable to the project.

**Step 1.4: Assessment of the validity of the data and parameters**

Assess whether data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are still valid or whether they should be updated. Baseline data and parameters have been updated. See Section B.6.2 and B.6.3. of the PDD and Section 3.5 of this report.

Step 1.2. and 1.4 showed that the current baseline and the data and parameters needs to be updated.

**Step 2: Update the current baseline and the data and parameters**

**Step 2.1: Update the current baseline**

Update the current baseline emissions for the subsequent crediting period, without reassessing the baseline scenario, based on the latest approved version of the methodology applicable to the project activity. The procedure should be applied in the context of the sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period. See Section B.6.3. PDD for calculations.

**Step 2.2: Update the data and parameters**

If the application of Step 1.4 showed that the data and/or parameter(s) that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, project participants should update all applicable data and parameters, following the guidance in Step 1.4. See for details Section B.6.2. PDD and Section 3.5 of this report.

TransMilenio Phase I was operational prior registration of the project "BRT Bogota, Colombia: TransMilenio Phase II to IV" and is still now under operation. No changes have occurred. TransMilenio Phase I is not included in calculating baseline emissions in the registered nor in the new PDD based on the approved methodology which states that the currently operating system (i.e. TransMilenio Phase I) is not a vehicle category included to determine baseline emissions. TransMilenio Phase I is and continues to be excluded therefore of baseline emissions which are determined in accordance with the methodology only as emissions which would have been caused by passengers using TransMilenio Phase II to IV.

### 3.4 Updated baseline emissions

The desk-review has shown that the calculation of the emission reductions is carried out step by step according to the methodology AM0031, version 4.0.0. as follows:

An unclear statement in the PDD has been communicated to the project participants and has been adjusted:

CL 18 DOE: Some points in <CER sheets TM 2nd period version 1.1> [11.1] are not consistent with the PDD; they have no effect on the calculation.

- "Project": Formula  $EF_{KM,j,y}$  is not consistent with PDD page 78
- "Baseline EF": IF 0.997 is for motorcycles, not for cars, buses, taxis. Text is not correct.
- "Leakage": The value for baseline occupation rate taxis is not correct because the link is not correct.

PP: The formulae in the sheet "Project" of the CER sheet has been adjusted.

The text IR (improvement rate) sheet "Baseline EF" has been changed to motorcycle.

The value occupation rate taxis in the sheet "Leakage" has been updated with the correct link.

DOE: Response accepted. OK

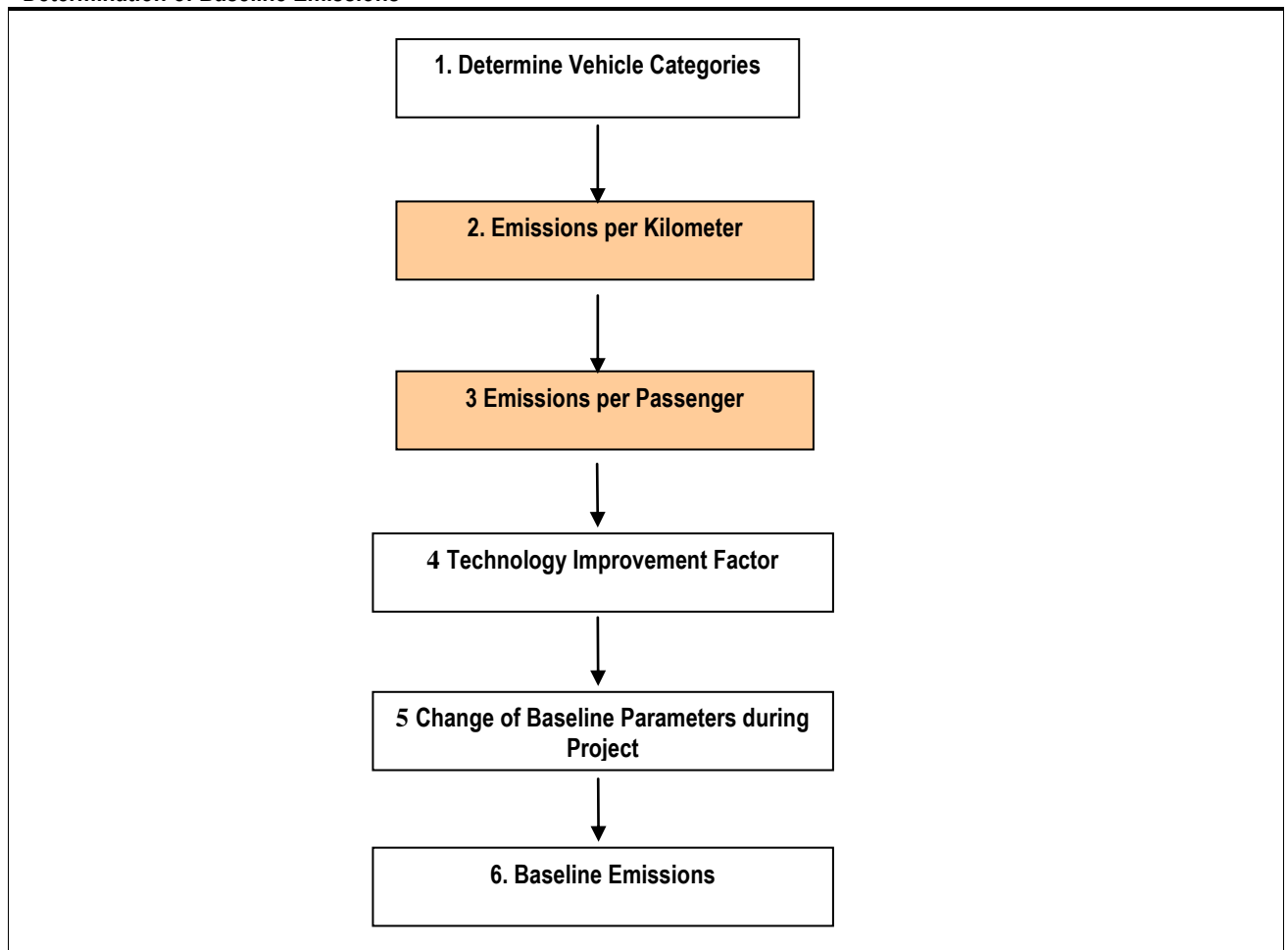
The clarification request (CL) could be successfully resolved and is summarized in Section 3.7. and 3.8.

## BASELINE EMISSIONS

Baseline emissions are estimated using two main steps:

1. Determination of emissions per passenger transported per vehicle category: This is calculated *ex ante*, including the usage of a fixed technology change factor. The baseline emission factor is adapted to potential changes in trip distance and type of fuel used by passenger cars if the surveys indicate that changes in trip distance or fuel type used would lead to lower baseline emission factors;
2. Baseline emissions: are estimated *ex post* based on the passengers transported by the project and their modal split. Core baseline parameters used for calculating the baseline emission factors are reviewed through an annual survey, with changes only being applied if the baseline emissions factors would be lower than the original factor. The system operator records passenger numbers.

### Determination of Baseline Emissions



Baseline emissions are determined through a sequence of the following steps:

#### 1. Determine Vehicle Categories

Identify relevant vehicle categories, which include:

- Buses, differentiating large, medium and small buses, if appropriate;
- Passenger cars;
- Taxis;
- Motorcycles.

Criteria for identifying the categories are as follows:

- At a minimum, public transport, non-motorised transport and induced traffic have to be included;
- Conditions to include categories with reliable data on fuel consumption and load factors;



- Only include categories that are relevant for the BRT project. If the project will only generate credits from public transport without modal shift, then passenger cars, taxis and motorcycles need not be included;
- Differentiate relevant fuel types for each category. Diesel, gasoline and gas (CNG or LPG) are listed separately if a minimum of 10% of vehicles of the respective category use such a fuel, while the threshold for zero-emission fuels is minimum 1%. The 10% threshold is justified, as GHG emission differentials between diesel, gasoline and gaseous fuels are less than 20%;
- In case of a system extension, the currently operating system is not included as a vehicle category.

The project "BRT Bogota, Colombia: TransMilenio Phase II to IV" is an extension of an existing BRT (TransMilenio Phase I). Therefore, TransMilenio Phase I is not a vehicle category to include in baseline emissions and is therefore not part of the baseline emissions neither during the 1<sup>st</sup> nor during the 2<sup>nd</sup> crediting period. The list of vehicles is complete. This has been confirmed during the on-site visit.

## 2. Determine Emissions per Kilometre for Vehicle Categories

CO<sub>2e</sub> emissions per kilometre are calculated, fixed *ex ante* for the project period, based on the consumption of each fuel type, the CO<sub>2e</sub> emissions per litre of fuel and the fraction of vehicles using the specific fuel type

- CO<sub>2</sub> emissions are estimated on the basis of the carbon content of the fuel;
- CH<sub>4</sub> and N<sub>2</sub>O emission factors: CH<sub>4</sub> emissions are a function of the fuel and engine type, and any post-combustion controls. N<sub>2</sub>O emissions are technology based for each fuel type, vehicle category, installed control technologies and local data such as average driving speeds, temperatures, and altitude. The emission factors are transformed into CO<sub>2eq</sub> using GWP factors approved by the Conference of the Parties to the UNFCCC. CH<sub>4</sub> and N<sub>2</sub>O emissions from gaseous fuels shall be accounted for. They can be ignored for liquid fuels, such as diesel and gasoline, as CH<sub>4</sub> and N<sub>2</sub>O emissions constitute a minor emission source for liquid fuels.

Two methods are possible to determine the relevant CH<sub>4</sub> and N<sub>2</sub>O emission factors of gaseous fuels:

- (1) Local measured emission factors based on a reliable data source to be detailed in the PDD;
- (2) The pre-determined default value per vehicle category is used (described later in this section). The default value per vehicle category is the technology with the lowest sum of CO<sub>2e</sub> emissions of N<sub>2</sub>O and CH<sub>4</sub>. This ensures a conservative approach.

Alternative 1 is preferred. However, using the default value is a conservative approach.

If electricity is used by vehicles the emissions are calculated based on the latest approved version of the "Tool to calculate project, baseline and or leakage emissions from electricity consumption". No baseline vehicles in the project case use electricity.

In case bio-fuel blends are used the bio-fuel share is calculated with a CO<sub>2eq</sub> emission factor equal to zero.

This equation calculates emissions per km for vehicles of different vehicle categories.

$$EF_{KM,i} = \sum_x \left[ SEC_{x,i} \times (EF_{CO_2,x} + EF_{CH_4,x} + EF_{N_2O,x}) \times \left( \frac{N_{i,x}}{N_i} \right) \right]$$

Where:

$EF_{KM,i}$	=	Transport emissions factor per distance of vehicle category $i$ (gCO <sub>2e</sub> per kilometre driven)
$SEC_{x,i}$	=	Specific energy consumption of fuel type $x$ in vehicle category $i$ (litre / kilometre, kWh/km, kg/km, m <sup>3</sup> /km)
$EF_{CO_2,x}$	=	CO <sub>2</sub> emission factor for fuel type $x$ (gCO <sub>2</sub> per litre)
$EF_{CH_4,x}$	=	CH <sub>4</sub> emission factor for gaseous fuel type $x$ (gCO <sub>2e</sub> per litre, based on GWP)

$EF_{N_2O,x}$  = N<sub>2</sub>O emission factor for gaseous fuel type  $x$  (gCO<sub>2</sub>e per litre, based on GWP)  
 $N_i$  = Total number of vehicles in category  $i$   
 $N_{i,x}$  = Number of vehicles in vehicle category  $i$  using fuel type  $x$

If less than 10% of vehicles in a specific vehicle category are gasoline, diesel, CNG or LPG powered then this respective fuel can be omitted for simplicity purposes. In alternative vehicles the threshold value is 1%.

Two methodological alternatives are proposed for the fuel consumption data (in order of preference):

- Alternative 1: Measurement of fuel consumption data using a representative sample for the respective category and fuel type. To ensure a conservative approach the lower 95% confidence level of the sample measurement shall be taken;
- 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 and then matching this with the most appropriate IPCC default values. The most important proxy to identify vehicle technologies is the average age of vehicles used in the area of influence of the project. To determine if either US or European default factors apply either local vehicle manufacturer information can be used (in the case of having a substantial domestic vehicle motor industry) or a source of origin of vehicle imports.

A technical improvement factor is thereafter introduced. The technology improvement factor results in dynamic emission factors for the different units. See Step 3.

### 3. Calculate Emissions per Passenger per Vehicle Category

This step calculates emission factors showing the emissions per passenger per average trip for each vehicle category.

This equation is used to determine the emissions per passenger transported for passenger cars, taxis or motorcycles. All data used is determined *ex ante*. A change in the occupancy rate of taxis is registered as leakage of the project.

$$EF_{P,i} = \frac{EF_{KM,i} \times TD_i}{OC_i}$$

Where:

- |             |   |   |
|-------------|---|---|
| $EF_{P,i}$  | = | Emissions factor per passenger before project start, where $i = C$ (passenger cars), $M$ (motorcycles) or $T$ (taxis) (grams per passenger)                                 |
| $EF_{KM,i}$ | = | Emissions factor per distance of category $i$ (gCO <sub>2</sub> e per kilometre driven)   |
| $OC_i$      | = | Average vehicle occupancy rate of vehicle category $i$ (passengers) (In the case of taxis the driver is not counted and only passengers are included in the occupancy rate) |
| $TD_i$      | = | Average trip distance for vehicle category $i$ (kilometres)   |

The formula below shall be used in case fuel consumption data is based on specific fuel consumption (SFC) values obtained through sampling or from literature:

$$EF_{P,i} = \frac{EF_{KM,i,S} \times DD_{i,S} + EF_{KM,i,M} \times DD_{i,M} + EF_{KM,i,L} \times DD_{i,L}}{P_i}$$

Where:

- |               |   |  |
|---------------|---|--|
| $EF_{P,i}$    | = | Emissions factor for buses for before project start (gCO <sub>2</sub> e per passenger) |
| $EF_{KM,i,S}$ | = | Emissions from small buses (gCO <sub>2</sub> e per kilometre)                          |
| $DD_{i,S}$    | = | Total distance driven by small buses (kilometre)                                       |

$EF_{KM,i,M}$	=	Emissions from medium buses (gCO <sub>2</sub> e per kilometre)
$DD_{i,M}$	=	Total distance driven by medium buses (kilometre)
$EF_{KM,i,L}$	=	Emissions from large buses (gCO <sub>2</sub> e per kilometre)
$DD_{i,L}$	=	Total distance driven by large buses (kilometre)
$P_i$	=	Passengers transported by buses in the baseline

The time period for the number of passengers and the distance they travel must be equal (e.g. one year or one month). All data used is determined *ex ante*. A change in the occupancy rate of buses is registered as leakage of the project.

In case the fuel consumption of buses is based on total fuel consumed by the baseline bus system, no differentiation between bus size shall be made and the following formula shall be used:

$$EF_{P,i} = \frac{\sum_x FC_x \times NCV_x \times EF_x \times IR}{P_i}$$

Where:

$EF_{P,i}$	=	Emissions factor for buses for before the project start (gCO <sub>2</sub> e per passenger)
$FC_x$	=	Total fuel type x consumed by the baseline bus system prior to the project start
$NCV_x$	=	Net calorific value of fuel type x consumed by the baseline bus system prior to the project start (J/mass or volume unit)
$EF_x$	=	Emission factor of fuel type x consumed by the baseline bus system prior to the project start
$IR$	=	Technology improvement factor
$P_i$	=	Passengers transported by buses in the baseline

### 3. Technological Change

Under business as usual conditions emission factors per vehicle category per fuel type may change due to:

- Vehicles are replaced with more efficient ones;
- Vehicles in stock tend to increase emissions based on wear and tear.

For simplicity purposes, a constant average improvement rate per annum is established per vehicle category. The improvement rate is applied to each calendar year. The year 0 is the year for which specific fuel consumption data was collected or determined. Emissions per vehicle category are multiplied with the corresponding technology improvement factor. The default technology improvement factors per vehicle category are included in the Appendix A of the methodology.

### 4. Change of Baseline Parameters During the Project Crediting Period

The change of baseline parameters is only necessary if the project includes a modal shift (change from passenger cars, motorcycles or taxis to BRT). In this case, some parameters used for calculating the baseline emission factors could change over time:

- The load factor or the number of passengers per vehicle. The load factor is potentially influenced indirectly by the project. This factor is included in the monitoring of leakage of the project and thus not included in the baseline calculations;
- The distance driven by passengers using the BRT system might change or not be equivalent to the aver-

age distance driven used to calculate the baseline emission parameter. This factor is monitored through the annually conducted survey of passengers using the project system (see corresponding monitoring methodology);

- Type of fuel used by passenger cars. This factor is only relevant for people who have switched from cars to public transport. The annual passenger survey monitors the fuel used by passengers switching from passenger cars to the BRT system and adjusts the corresponding baseline emission factor for passenger cars.

The methodology only takes into account those changes in passenger emission factors that lead to a reduction in baseline emissions.

The baseline emissions per passenger trip for taxis, passenger cars and motorcycles are adjusted annually with a correction factor for changing trip distances.

$$CD_{i,y} = \frac{TD_{i,y}}{TD_i}$$

Where:

$CD_{i,y}$	=	Correction factor for changing trip distance in category $i$ for the year $y$ , where $i = T$ (taxis), $C$ (passenger cars) or $M$ (motorcycles)
$TD_i$	=	Average trip distance in kilometres in category $i$ before the project start
$TD_{i,y}$	=	Average trip distance in kilometres in category $i$ in year $y$

**Note:** The adjustment is only made if  $TD_{i,y} < TD_i$  to ensure a conservative approach (Larger distances would increase baseline emissions per passenger trip. The project emissions resulted from larger trip distances are however fully recorded as project emissions are based on total fuel consumed).

#### 4.1. Change of Fuel Used by Passenger Cars

For passengers that, in absence of the project, would have used a passenger car, the type of fuel used by their cars is determined via a survey (see Monitoring Methodology). Equation (1) is used to re-calculate the new emission factors for passenger cars. The same threshold values for fuel types apply as described in Step 1 (determination of vehicle categories).

The applicability condition for applying this change in fuel type used for passenger cars is:  $EF_{KM,C,y} < EF_{KM,C}$ . In other words, the baseline emission factor is only changed, if the new emission factor is lower than the original emission factor.

#### Determination of Baseline Emissions

The baseline emissions for all passengers transported are calculated. This is differentiated according to the mode of transport, which the person would have used in absence of the project. Passengers transported are determined through the project (activity level of the project). The system operator shall report the total amount of passengers transported by the project.

$$BE_y = \sum_i (EF_{P,i,y} \times P_{i,y}) \times 10^{-6}$$

Where:

$BE_y$	=	Baseline emissions in year $y$ (tCO <sub>2</sub> e)
$EF_{P,i,y}$	=	Emissions factor per passenger in vehicle category $i$ in year $y$ (grams per passenger)
$P_{i,y}$	=	Passengers transported by the project (BRT) in year $y$ that without the project activity would have used category $i$ , where $i = Z$ (buses, public transport), $T$ (taxis), $C$

(passenger cars), rail-based urban mass transit (*R*) or *M* (motorcycles) (NMT and induced transport (IT) are not included as emissions are 0 for this category in the baseline) (millions of passengers)

$$EF_{P,i,y} = EF_{P,i} \times IR_{i,t} \times CD_{i,y}$$

Where:

- $EF_{P,i,y}$  = Emissions factor per passenger in vehicle category *i* in year *y* (gCO<sub>2</sub>e per passenger)
- $EF_{P,i}$  = Emissions factor per passenger before the project start, where *i* = *T* (taxis), *C* (passenger cars) or *M* (motorcycles) (gCO<sub>2</sub>e per passenger)
- $CD_{i,y}$  = Correction factor for changing trip distance in category *i* for the year *y*, where *i* = *T* (taxis), *C* (passenger cars) or *M* (motorcycles)
- $IR_{i,t}$  = Technology improvement factor at year *t* for vehicle category *i*
- t* = Vintage of fuel consumption data (in years) used for calculating the emission factor in year *y* (E.g. "t=7" for the year 2007 if the fuel data is from the year 2000).

See applicability condition for  $CD_{i,y}$  (The adjustment is only made if  $TD_{i,y} < TD_i$ ). For passenger cars,  $EF_{KM,C,y}$  is annually adjusted as described above, considering the applicability condition of reduced emissions per kilometre.

Emissions from passengers who in absence of the project would have used rail-based mass transit systems (*R*) are counted as  $EF_{P,R,y} = 0$  grams per passenger.

$$P_{i,y} = P_y \times S_{i,y}$$

Where:

- $P_{i,y}$  = Passengers transported by the project which in absence of the latter would have used transport type *i*, where *i* = *Z* (buses, public transport), *T* (taxis), *C* (passenger cars), *M* (motorcycles), *NMT* (non-motorized transport), *R* (rail-based urban mass transit) and *IT* (induced transport, i.e., would not have traveled in absence of project) (millions)
- $P_y$  = Total passengers transported by the project monitored in year *y* (millions)
- $S_{i,y}$  = Share of passengers transported by the project who in absence of the latter would have used transport type *i*, where *i* = *Z* (buses, public transport), *T* (taxis), *C* (passenger cars), *M* (motorcycles), *NMT* (non-motorized transport), *R* (rail-based urban mass transit) and *IT* (induced transport, i.e., would not have travelled in absence of the project) (%)

Induced travel is included in leakage calculations (induced travel in passenger cars) as well as in the baseline (induced travel in public transport).

## PROJECT EMISSIONS

The project emissions are only from the new project transport system. All emissions from trips undertaken in the new system need to be included (i.e., both on trunk routes and feeder lines).

Total emissions can be calculated in one of the two ways, depending on data availability. If records exist, the data quality of both alternatives is equal. Reliable data are, e.g. based on electronic measurement of fuel consumption or data monitored by the bus company managing the units. For both alternatives, specific fuel consumption data (i.e., consumption per distance driven) needs to be crosschecked in the QA system. Crosschecks include a comparison over time within the same company, as well as a comparison with, e.g. other companies operating BRT systems using the same type of buses.

**Alternative A: Use of Fuel Consumption Data**

This alternative is based on the total fuel consumed. For BRTs using liquid fossil fuels, the project emissions from fossil fuel consumption shall be estimated using the latest version of the 'Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel consumption.' The following guidance is provided for applying the tool:

- The parameter  $PE_{FC,j,y}$  in the tool corresponds to the project emissions from the project transport system that uses fossil fuels in year  $y$ ; and
- Element process  $j$  corresponds to the combustion of fuel type  $x$  in the project vehicles.

The BRT currently only uses liquid fuels, confirmed during OSV. In case of future usage of gaseous fuels equation 9 of the methodology would be used. In case of future usage of electricity on the latest approved version "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" would be used.

**Alternative B: Use of Specific Fuel Consumption and Distance Data**

This alternative uses as a basis fuel efficiency data (i.e. consumption per kilometre driven).

$$EF_{KM,j,y} = \sum_x [SEC_{j,x,y} \times (EF_{CO_2,x} + EF_{CH_4,x} + EF_{N_2O,x})]$$

Where:

$EF_{KM,j,y}$	=	Emissions factor per distance for project bus category $j$ in year $y$ (gCO <sub>2</sub> e per kilometre)
$SEC_{j,x,y}$	=	Specific energy consumption of fuel type $x$ in project bus category $j$ in year $y$ (litre per kilometre)
$EF_{CO_2,x}$	=	CO <sub>2</sub> emission factor for fuel type $x$ (gCO <sub>2</sub> per litre)
$EF_{CH_4,x}$	=	CH <sub>4</sub> emission factor for gaseous fuel type $x$ (gCO <sub>2</sub> e per litre, based on GWP)
$EF_{N_2O,x}$	=	N <sub>2</sub> O emission factor for gaseous fuel type $x$ (gCO <sub>2</sub> e per litre, based on GWP)

Fuel-efficiency data is derived from annual data reported by the bus companies operating the units either of all units or of a representative sample of comparable units (comparable technology, vintage and size). To ensure a conservative approach, the specific fuel consumption of comparable vehicles, if based on sample measurement, should be taken as the upper 95% confidence level of the sample measurement conducted. This ensures a conservative approach, providing that project emissions are not overstated.

If the CDM project includes only parts of a larger activity, the fuel used for the CDM project is separated from the total fuel used. The separation is done (in order of preference) by the following means:

- By operators: This method is used if certain operators are assigned to certain parts of the project;
- By distance driven: The fuel share for each part of the project is based on the share of kilometres per project part;
- By passengers: The fuel share for each part of the project is based on the share of passengers per part of the project (based on the entry points of passengers).

In the project case Phase I of the BRT is not included in the project. The separation is done by passengers.

Total project emissions are calculated from the following equation.

$$PE_y = [(EF_{KM,TB,y} \times DD_{TB,y}) + (EF_{KM,FB,y} \times DD_{FB,y})] \times 10^{-6}$$

Where:

$PE_y$	=	Project emissions in year $y$ (tCO <sub>2</sub> e)
$EF_{KM,TB,y}$	=	Emissions factor per distance for trunk buses in year $y$ (gCO <sub>2</sub> e per kilometre)
$DD_{TB,y}$	=	Total distance driven by trunk buses in year $y$ (million kilometres)
$EF_{KM,FB,y}$	=	Emissions factor per distance for feeder buses in year $y$ (gCO <sub>2</sub> e per kilometre)
$DD_{FB,y}$	=	Total distance driven by feeder buses in year $y$ (million kilometres)

## LEAKAGE

The following leakage sources are addressed:

- (1) Change in load factor of the baseline transport system due to the project, i.e., the project potentially influences the occupancy rate of the remaining vehicles. This is monitored in the years 1 and 4 of the crediting period;
- (2) Reduced congestion in remaining roads, provoking higher average vehicle speed, plus a rebound effect. The total impact of congestion is monitored in the years 1 and 4 of the crediting period, in case the implementation of the project activity leads to a reduction of road space (e.g. the project utilises an existing road by separating one of its lanes to be exclusively used by the project BRT), and not monitored, in case the implementation of the project activity does not lead to a reduction of road space (e.g. the project provides a new road infrastructure); The project provides additional road space. Therefore this leakage is not monitored.
- (3) In case of more gaseous fuels are used in the project than in the baseline case, the upstream emissions of gaseous fuels should be included. No leakage emissions should be included if in the baseline more or an equal amount of gaseous fuel are used than in the project, as this would lead to negative leakage (conservative approach). The project uses no gaseous fuels and therefore no leakage upstream emissions of gaseous fuels are included.

For the sake of a conservative approach, leakage is only considered if the total annual effect is to reduce estimated emission reductions.

### 1. Change in Load Factor

The project could have a negative impact on the load factor of taxis or the remaining conventional bus fleet. Load factor changes of taxis and buses are thus monitored in the years 1 and 4 of the crediting period. Leakage is only included if the load factor changes by more than 10 percentage points, as certain variations in the load factor caused by external circumstances are normal. The methodology also considers load factor changes in taxis if they are included as vehicle category by the project, thus claiming credits from a modal shift from taxis to the BRT system. In the case of lower load factors, it is assumed that this change has occurred immediately after the last measurement, and the leakage calculation for this year includes the sum of load-factor leakage of all years since the last monitoring. This ensures a conservative approach. To avoid the risk of having to include *ex post* leakage from former years, the project proponent can monitor the load factor annually.

$$ROC_{i,y} = \frac{OC_{i,y}}{CV_{i,y}}$$

Where:

$ROC_{i,y}$	=	Average occupancy rate relative to capacity in category $i$ in year $y$ , where $i = Z$ (buses) or $T$ (taxis)
$OC_{i,y}$	=	Average occupancy of vehicle in category $i$ in year $y$ (persons)
$CV_{i,y}$	=	Average capacity of vehicle $i$ in year $y$ (persons)



In the case of public transport, the occupancy rate is measured in relation to the bus capacity, as bus sizes may change over time or before/after project.  $ROC_{i,y}$  shall be monitored directly through visual surveys. This equation determines leakage emissions from change of load factors in buses.

$$LE_{LF,Z,y} = EF_{KM,Z} \times VD_Z \times N_{Z,y} \times \left( 1 - \frac{ROC_{Z,y}}{ROC_{Z,0}} \right) \times 10^{-6}$$

Where:

$LE_{LF,Z,y}$	=	Leakage emissions from change of load factor in buses in year $y$ (tCO <sub>2</sub> e)
$EF_{KM,Z}$	=	Baseline transport emissions factor per distance for buses (gCO <sub>2</sub> e per kilometre)
$VD_Z$	=	Annual distance driven per vehicle for buses before the project start, determined <i>ex-ante</i> (kilometres)
$N_{Z,y}$	=	Number of buses in the conventional transport system operating in year $y$
$ROC_{Z,y}$	=	Average occupancy rate relative to capacity of conventional buses in year $y$ , based on the most recent study of occupancy rates
$ROC_{Z,0}$	=	Average occupancy rate relative to capacity of buses before start of project

$$VD_Z = \frac{\sum_{k=S,Md,L} DD_{Z,k}}{\sum_{k=S,Md,L} N_{Z,k}}$$

Where:

$VD_Z$	=	Distance driven per bus before the project start (kilometres)
$DD_{Z,k}$	=	Total distance driven by buses of size $k$ (kilometres)
$N_{Z,k}$	=	Number of buses in the conventional transport system of size $k$ , where $S$ , $Md$ and $L$ stands for small, medium and large buses, respectively

**Note:** If  $ROC_{Z,0} - ROC_{Z,y} \leq 0.1$  then  $LE_{LF,Z,y} = 0$ , i.e., if the occupancy rate of buses is not reduced by more than 0.1 then the project has had no negative effect (leakage).

This equation determines leakage emissions from a change in load factors of taxis.

$$LE_{LF,T,y} = EF_{KM,T} \times VD_T \times N_{T,y} \times \left( 1 - \frac{OC_{T,y}}{OC_{T,0}} \right)$$

Where:

$LE_{LF,T,y}$	=	Leakage emissions from change of load factor in taxis in year $y$ (tCO <sub>2</sub> e)
$EF_{KM,T}$	=	Emissions factor per kilometre for taxi baseline (gCO <sub>2</sub> e per kilometre)
$VD_T$	=	Average distance driven by taxi on before the project starts (kilometres)
$N_{T,y}$	=	Number of taxis operating in year $y$
$OC_{T,y}$	=	Average occupancy rate of taxi in year $y$ (passengers only: Driver not counted)
$OC_{T,0}$	=	Average occupancy rate of taxi before the project start (passengers only: Driver not counted)

**Note:** If  $OC_{T,0} - OC_{T,y} \leq 0.1$  then  $LE_{LF,T,y} = 0$ , i.e. if the occupancy rate of taxis is not reduced by more than 0.1 then the project has had no negative effect (leakage).

The measurement of the occupancy rate is based on representative surveys, which register all taxis passing the survey points. Taxis without passengers are counted as “0” occupancy rate. Only circulating taxis are counted.

## 2. Impact of Reduced Congestion on Remaining Roads

An implementation of a BRT project may have differing overall impacts on congestion. On the one hand, a project BRT system may be implemented on an existing road by dedicating one or more of the lanes of the road to be exclusively used by the project BRT (with an exception of emergency vehicles). This will result in a reduced road capacity available to the vehicles operating on that road prior to the project activity, which, in turn, may increase the congestion on that reduced road capacity and, therefore, lead to higher emissions. On the other hand, an implementation of the project BRT may provide a new road infrastructure. In this case, the project BRT will likely attract passengers from conventional modes of transport and reduce the number of vehicles on the affected roads and, therefore reduce congestion. In this case, reduced congestion may have the following impacts relevant for GHG emissions:

- “Rebound effect” leading to additional trips and thus higher emissions;
- Higher average speeds and less stop-and-go traffic leading to lower emissions.

In the case that the implementation of the project activity leads to a reduction of road capacity available for individual motorised transport modes, the impact of changes in congestion shall be monitored in the year 1 and 4 of the crediting period. In other cases (e.g. the project provides a new road infrastructure not taken from the existing road space in the city), monitoring of these changes is not required (Emission reductions due to the speed increase of the traffic flow generally outweighs the increase in emissions resulting from the traffic induction of passenger cars as a result of reduced congestion). This change in road capacity available for individual motorised transport modes may result from the reduction of road space due to the implementation of MRTS and/or a potential reduction of traffic flow due to the withdrawal of conventional public transport units as a result of the project activity.

The project does not reduce road space and does not take away road space. This is based on the Decree 190 of 2004, which includes the POT (Plan de Ordenamiento Territorial) of each trunk lane, which indicates that lines are added and not taken away from mixed traffic roads [8]. Therefore equations 16 to 22 of the methodology are not used.

## 3. Upstream Emissions of Gaseous Fuels

Upstream leakage of gaseous fuels is only included if project vehicles consume more gaseous fuels than baseline vehicles. As the project does not use gaseous fuels this section is not included.

### Total Leakage

$$LE_y = LE_{UP,y} + LE_{LF,Z,y} + LE_{LF,T,y} + LE_{CONG,y}$$

Where:

$LE_y$	=	Leakage emissions in year y (tCO <sub>2</sub> e)
$LE_{UP,y}$	=	Leakage upstream emissions of gaseous fuels during the year y (tCO <sub>2</sub> e)
$LE_{LF,Z,y}$	=	Leakage emissions from change of load factor in buses in year y (tCO <sub>2</sub> e)
$LE_{LF,T,y}$	=	Leakage emissions from change of load factor in taxis in year y (tCO <sub>2</sub> e)
$LE_{CONG,y}$	=	Leakage emissions from reduced congestion in year y (tCO <sub>2</sub> e)

If  $LE_y < 0$ , then leakage is not included;

If  $LE_y > 0$ , then leakage is included.

The impact of induced traffic (additional trips) provoked through the new transport system is addressed directly in the project emissions and is not part of the leakage. This is addressed by including as project emissions the trips of passengers, who, in absence of the BRT project, would not have realized the trip.

## EMISSION REDUCTIONS

$$ER_y = BE_y - PE_y - LE_y$$

Where:

$ER_y$	=	Emission reductions in year $y$ (tCO <sub>2</sub> e)
$BE_y$	=	Baseline emissions in year $y$ (tCO <sub>2</sub> e)
$PE_y$	=	Project emissions in year $y$ (tCO <sub>2</sub> e)
$LE_y$	=	Leakage emissions in year $y$ (tCO <sub>2</sub> e)

The validation team controlled all formulas for baseline emissions, project emissions and leakage and confirms that all are in accordance with the approved methodology. All data was inserted appropriately and all calculations were performed correctly. This was controlled by the validation team through the file "CER sheets TM 2nd period version 1.2" [3] provided by the PP including all parameters, all values, all formulas and all calculations. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.

In summary, the validation team concludes that the Excel file "CER sheets TM 2nd period version 1.2" [3] was checked extensively for correct input values, formulas, and crosschecked for consistency with the referenced documents (see Validation Protocol 4(c) 13). No errors were found after the corrections were made. The parameters for baseline, project and leakage emissions are defined by the methodology. All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. The data sources are referenced. The applied values were crosschecked by the validation team and found to be complete, plausible and conservative. The parameters are assessed in Chapter 3.5.

SQS concludes that the parameters and the mathematical operations used for the ex-ante estimation of the project's emission reductions are correct, reasonable and conservative. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.

### 3.5 Updated data, parameters and monitoring plan

Some unclear statements in the PDD have been communicated to the project participants and have been adjusted:

CAR 2	DOE: The monitoring plan is not transparent. There is no information in Annex 4. An updated Monitoring Manual is missing. PP: The monitoring is not part of the plan to be checked during renewal of the crediting period. The project is already successfully issuing CERs since various years and therefore monitoring is fully implemented. However we have added some more reference and the latest version of the MM for the DOE. See MM for Phase II attached. DOE: That's correct; the monitoring plan is not part of the DOE's validation opinion but the PP shall update those sections of the PDD relating to the monitoring plan. The Monitoring Manual <Manual_Marzo_14_de_2012_final (1)> is in Spanish. The key elements (e.g. table with parameters monitored, calibration) should be integrated in the PDD in English for transparency.
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Figure 5: Organization Structure (PDD page 59) is not consistent with Figura 1: Organigrama MM V 1.0 (14/03/2012).

PP: The MM has been updated and has already been sent to the DOE. Section B.7.2. has all information which is required, is detailed enough and contains all relevant issues. EB 20 Annex 7 is relevant.

The organizational chart of the PDD Figure 5 has been updated. Reference to the MR 2011 has also been made.

DOE: Response accepted. OK

CL 11 DOE: A statement regarding equations, BRT gaseous fuel and electricity in Alternative A (page 40) is missing.

PP: A statement has been added.

DOE: Response accepted. OK

CL 12 DOE: Some of the titles do not comply with the requirements. The abbreviation (SEC) for fuel type and vehicle type permutes. The abbreviation for diesel D is not consistent.

PP: Section B.6.2. has been reviewed and checked with the methodology. All titles are identical to the methodology. SEC has simply been separated into vehicle categories and fuels for simplicity of reading using the abbreviations as also in the methodology equations

DOE: Response accepted. OK

CL 14 DOE: The calculation and source of the parameter  $P_z$ ,  $FC_{PJ,x,y}$  and  $S_{i,y}$  is not transparent.

PP:  $P_z$  has been updated and clarified also in the new spreadsheet.  $FC_{PJ}$  has been clarified.  $S_i$  has been clarified.

DOE: Parameter  $S_i$  has been re-calculated by validator; values used are correct. OK

CL 15 DOE: For the statement "drops below 52%" (page 55) the source is not referenced.

PP: This is a calculation based on the methodology. The source has been added.

DOE: Response accepted. OK

CL 16 DOE: For parameter  $N_i$  and  $N_{i,x}$  values used are missing in a box (B.6.2).

PP: These parameters are not listed in the methodology under B.6.2. and thus need not be listed in the PDD.  $N_T$ ,  $N_Z$  and  $N_C$  are listed in B.7.1 in accordance with the methodologies as monitored parameters.

DOE: Response accepted. OK

The corrective action request (CAR) and clarification requests (CL's) could be successfully resolved and are summarized in section 3.7. and 3.8.

The following tables give an overview of the parameters fixed ex-ante and the monitored parameters and how the validation was performed:

### 3.5.1 Parameters fixed ex-ante

Parameter / Data	Value applied	Source of used data/ SQS assessment opinion
<b>SEC<sub>g,c</sub></b> Specific energy consumption gasoline cars	0.097 litre/km	Grütter Consulting, 2011 [9] Based on sample of vehicles in Bogota. Lower 95% confidence level is taken. The sample size is checked based on the "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities" version 02.0 point 10 which indicates for large scale projects a confidence interval of 95% with a 10% error boundary. The required sample size in the specific case is 10 units while the actual sample size taken is 39 units and thus much more than required. The recorded value is compared to the IPCC values for passenger cars reported. Values reported by IPCC range from 11.8 l/100km to 22.2 l/100km for US vehicles (Table 1.27) and from 8.1 l/100km to 11.2 l/100km for European vehicles (Table 1.36). The recorded value is thereby with 9.7 l/100km at the lower end and this although it is based on urban driving (higher fuel consumption than the average value reported which is a mix of driving conditions). The registered PDD had a SEC of cars of 11.7 l/100km i.e. significantly

		<p>higher than the new value even taking into account an annual improvement factor of 1% (default value of the methodology). Above listed aspects all indicate that the value taken is conservative.</p> <p>Bio-fuel blend of 8% based on Resolution 18 2368 dated 29 December, 2009 of the Ministry of Mines and Energy [5]. Emissions are only calculated on the fossil share of the blend.</p> <p>100% of vehicles gasoline based on [10] (the registration statistic shows 2% diesel cars but based on AM0031 p. 13 if less than 10% of vehicles in a specific vehicle category are gasoline, diesel, CNG or LPG powered then this respective fuel can be omitted for simplicity purposes).</p> <p>Data sources reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as conservative.</p>
<b>SEC<sub>G,T</sub></b> Specific energy consumption gasoline taxis	0.069 litre/km	<p>Grütter Consulting, 2011 [11]</p> <p>Based on sample of vehicles in Bogota. Lower 95% confidence level is taken. The sample size is checked based on the "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities" version 02.0 point 10 which indicates for large scale projects a confidence interval of 95% with a 10% error boundary. The required sample size in the specific case is 10 units while the actual sample size taken is 33 units and thus much more than required.</p> <p>The recorded value is also compared to the IPCC values for passenger cars reported. Values reported by IPCC range from 11.8 l/100km to 22.2 l/100km for US vehicles (Table 1.27) and from 8.1 l/100km to 11.2 l/100km for European vehicles (Table 1.36). The recorded value is thereby with 6.9 l/100km lower than any recorded value although it is based on urban driving (higher fuel consumption than the average value reported which is a mix of driving conditions).</p> <p>The registered PDD had a SEC of taxis of 11.7 l/100km i.e. significantly higher than the new value even taking into account an annual improvement factor of 1% (default value of the methodology). Above listed aspects all indicate that the value taken is conservative.</p> <p>Bio-fuel blend of 8% based on Resolution 18 2368 dated 29 December, 2009 of the Ministry of Mines and Energy [5]. Emissions are only calculated on the fossil share of the blend.</p> <p>100% of taxis gasoline based on [10] (the registration statistic shows 6% diesel taxis and 2% gaseous taxis but based on AM0031 p. 13 if less than 10% of vehicles in a specific vehicle category are gasoline, diesel, CNG or LPG powered then this respective fuel can be omitted for simplicity purposes).</p> <p>Data sources reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as conservative.</p>
<b>SEC<sub>G,M</sub></b> Specific energy consumption gasoline motorcycles	0.038 litre/km	<p>Grütter Consulting, 2011 [12]</p> <p>Based on sample of vehicles in Bogota. Lower 95% confidence level is taken. The sample size is checked based on the "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities" version 02.0 point 10 which indicates for large scale projects a confidence interval of 95% with a 10% error boundary. The required sample size in the specific case is 14 units while the actual sample size taken is 30 units and thus much more than required.</p> <p>The recorded value is also compared to the IPCC values for motorcycles reported. Values reported by IPCC range from 9.3 l/100km to 11.2 l/100km for US vehicles (Table 1.33) and from 4.0 l/100km to 5.1 l/100km for European motorcycles &gt;50cc (Table 1.42) (All motorcycles recorded had a cc &gt; 50cc). The recorded value is thereby with 3.8 l/100km lower than the lowest recorded IPCC value. The registered PDD had no motorcycles included. Above listed aspects all indicate that the value taken is conservative.</p> <p>Bio-fuel blend of 8% based on Resolution 18 2368 dated 29th December 2009 of the Ministry of Mines and Energy [5]. Emissions are only calculated on the fossil share of the blend.</p>

		<p>100% of motorcycles gasoline based on [10].</p> <p>Data sources reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as conservative.</p>
<b>SEC<sub>D,Z,L/M/S</sub></b> Specific energy consumption diesel large, medium and small buses	Large: 0.307 litre/km Medium: 0.292 litre/km Small: 0.208 litre/km	<p>Grütter Consulting, 2011 [13]</p> <p>Based on sample of vehicles in Bogota. Lower 95% confidence level is taken. The sample size is checked based on the "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities" Version 02.0 point 10 which indicates for large scale projects a 95% confidence interval with a 10% error boundary. The required sample size for large buses is 10 units while the actual sample size taken is 61 units, for medium buses 9 units and the actual sample size is 54 units and for small buses 5 units and the actual sample size is 51 units and thus for all cases the sample size taken is much more than required.</p> <p>The recorded value of large buses is compared to the IPCC values for heavy duty vehicles (HDVs) reported. This includes buses and trucks. Values reported by IPCC for HDVs range from 41.7 l/100km to 45.5 l/100km for US vehicles (Table 1.32) and 29.9 l/100km for European vehicles (Table 1.39). The recorded value is thereby with 30.7 l/100km near to the lowest value reported. The registered PDD had a SEC of large buses of 45.5 l/100km i.e. significantly higher than the new value even taking into account an annual improvement factor of 1% (default value of the methodology).</p> <p>IPCC has no value for medium sized buses. The registered PDD had a SEC of medium buses of 31.5 l/100km i.e. higher than the new value even taking into account an annual improvement factor of 1% (default value of the methodology).</p> <p>IPCC has no value for small buses. The registered PDD had a SEC of small buses of 17.5 l/100km. This value is lower than the recorded value. However the original value was not based on measurements or on local data but on relating the vehicle technology with default IPCC values for Light Duty Vehicles which include not only small buses but also small trucks and therefore the value taken in the registered PDD is only a very gross estimate. Above listed aspects all indicate that the values taken for buses are conservative.</p> <p>Bio-fuel blend of 7% based on Resolution 18 1266 of 14/07/2010 of the Ministry of Mines and Energy [4]. Emissions are only calculated on the fossil share of the blend.</p> <p>100% of vehicles diesel based on [14]. (The registration statistic shows 1% large gasoline buses, 3% medium sized gasoline buses, 1% medium-sized gaseous buses and 6% small gasoline buses but, based on AM0031 p. 13 if less than 10% of vehicles in a specific vehicle category are gasoline, diesel, CNG or LPG powered then this respective fuel can be omitted for simplicity purposes).</p> <p>Data sources reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as conservative.</p>
<b>DD<sub>Z,L/M/S</sub></b> Distance driven of large, medium and small buses baseline per day	Large: 173 km Medium: 171 km Small: 225 km	<p>Secretaría de Movilidad, 2011 [14]</p> <p>Daily distance driven. Monthly distance based on 23 days (see [14])</p> <p>Data source reviewed by the validation team. The value reported can thus be confirmed as conservative.</p>
<b>DD<sub>T</sub></b> Distance driven of taxis per day	235 km	<p>Grütter Consulting, 2011 [15]</p> <p>Daily distance driven. Annual distance taken for leakage calculation is 85,775 km (based on 365 days) which is conservative as the taxi is unlikely to operate 365 days per annum.</p> <p>Data source reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as conservative.</p>
<b>OC<sub>c</sub></b> Average occupation	1.55 Passengers	<p>Grütter Consulting, 2011 [16] [17]</p> <p>Upper 95% confidence interval taken</p>

rate of cars		<p>The sample size is checked based on the “Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities” Version 02.0 point 10 which indicates for large scale projects a 95% confidence interval with a 10% error boundary. The required sample size is 86 units while the actual sample size taken is 42,578 units and thus the sample size taken is much more than required.</p> <p>The occupation rate of the registered PDD was 1.37 and thus lowers than the new value, which indicates also the conservativeness of the new value (baseline emissions are lower if the occupation rate is higher).</p> <p>Data source reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as conservative.</p>
<b>OC<sub>T</sub></b> Average occupation rate of taxis	1.09 Passengers	<p>Grütter Consulting, 2011 [16] [17] Excludes driver Upper 95% confidence interval taken</p> <p>The sample size is checked based on the “Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities” Version 02.0 point 10 which indicates for large scale projects a 95% confidence interval with a 10% error boundary. The required sample size is 298 units while the actual sample size taken is 28,201 units and thus the sample size taken is much more than required.</p> <p>The occupation rate of the registered PDD was 0.81 and thus lowers than the new value, which indicates also the conservativeness of the new value (baseline emissions are lower if the occupation rate is higher).</p> <p>The same study is performed again year 1 and 4 of the crediting period for leakage monitoring.</p> <p>Data sources reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as conservative.</p>
<b>OC<sub>M</sub></b> Average occupation rate of motorcycles	1.14 Passengers	<p>Grütter Consulting, 2011 [16] [17] Upper 95% confidence interval taken</p> <p>The sample size is checked based on the “Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities” Version 02.0 point 10 which indicates for large scale projects a 95% confidence interval with a 10% error boundary. The required sample size is 35 units while the actual sample size taken is 15,020 units and thus the sample size taken is much more than required.</p> <p>The registered PDD did not include motorcycles.</p> <p>Data sources reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as conservative.</p>
<b>P<sub>z</sub></b> Passengers trips in the baseline per day	4,092,185 Passengers	<p>Secretaría de Movilidad, 2011, Table 2, p. 8 [18] for passengers Grütter Consulting, 2011 [19] for number of buses per trip Secretaría de Movilidad, 2011 [14] for number of buses per size Same data source as for daily distance driven of buses and for number of buses and therefore consistency in data used for emissions per passenger.</p> <p>Calculated based on number of passengers per bus size per day multiplied with number of buses per size divided by number of buses used per trip.</p> <p>Number of large buses: 7,491 [14] Number of medium buses: 4,009 [14] Number of small buses: 4,977 [14] Number of passengers per day large buses: <math>(306+293)/2 = 299.5</math> (average of two ages of buses) [18] Number of passengers per day medium buses: 229 [18] Number of passengers per day small buses: 198 [18] Number of buses used per trip: 1.01 [19] Calculation: <math>P_z = (299.5 \cdot 7,491 + 229 \cdot 4,009 + 198 \cdot 4,977) / 1.01 = 4,092,185</math></p> <p>Official data sources [18] [14] reviewed by the validation team. Data</p>

		source [19] reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as conservative.
<b>TD<sub>C,T,M</sub></b> Average trip distance of users of passenger cars, taxis and motorcycles	Passenger cars: 12 km Taxis: 10 km Motorcycles: 14 km	Market Team, 2010 [20] Survey monitors the trip distance and latter is adjusted in case the monitored trip distance is lower than the baseline trip distance. Based on average value of the 6 BRT surveys realized in the year 2010 for cars, taxis and motorcycles.  Data source reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as conservative.

Default factors used from the methodology are not listed again in the PDD. Default factors used are:

- Technology improvement factor for buses, cars and taxis (AM0031 Table A.2).
- Emission factor per litre of fuel for various vehicle types (AM0031 Table A.1.).

Parameters listed in the methodology but not used for calculations are:

- SRS: SRS is not required as the project adds road space (AM0031 p.21; the calculation of ARS (formula 16) of the methodology will always show a positive value if  $RS_{PJ} > RS_{BL}$  which is the case in the project [8])
- $RS_{BL}$  and  $RS_{PJ}$  are not required as the project adds road space (AM0031 p.21; the calculation of ARS (formula 16) of the methodology will always show a positive value if  $RS_{PJ} > RS_{BL}$  which is the case in the project [8])
- $V_B$  is not required as the project adds road space and therefore congestion leakage is not included (AM0031 p.21)
- $EF_{CO2,upstream,CH4}$  is not included as the project uses no gaseous fuels.
- $EF_{CO2,upstream,LNG}$  is not included as the project uses no gaseous fuels.
- $FC_X$  fuel used by baseline buses is not included as the calculations are based on  $SEC_z$ .

SQS concludes that all parameters available at time of validation are listed in the PDD and are clearly described. They are complete, reasonable and conservative.



## 3.5.2 Parameters monitored

Parameter / Data	Value applied	Source of used data/ SQS assessment opinion														
<b>P</b> Passengers transported by project	Passengers (millions) <table><tr><td>2013</td><td>1,974</td></tr><tr><td>2014</td><td>2,141</td></tr><tr><td>2015</td><td>2,175</td></tr><tr><td>2016</td><td>2,182</td></tr><tr><td>2017</td><td>2,393</td></tr><tr><td>2018</td><td>2,409</td></tr><tr><td>2019</td><td>2,494</td></tr></table>	2013	1,974	2014	2,141	2015	2,175	2016	2,182	2017	2,393	2018	2,409	2019	2,494	TRANSMILENIO S.A., projections based on [21] Data on passenger numbers is generated from Card Users. The flow data of the passenger system is generated when the passengers cross the turnstiles located in the trunk bus stations or at the entry of the feeder buses. Equipment used for passenger records is not calibrated. Frequency: daily collection aggregated monthly. Operations department crosschecks data with fares paid. Project passengers are calculated as total passengers minus Phase I passengers. Phase I passengers are such that enter stations of trunk routes of phase I. All other passengers are project passengers. Passengers entering stations, which cater to trunk routes of more than 1 phase, are separated proportionally to the number of trunk routes serving that station.  Data source reviewed by the validation team and checked at the on-site visit and found to be accurate.
2013	1,974															
2014	2,141															
2015	2,175															
2016	2,182															
2017	2,393															
2018	2,409															
2019	2,494															
<b>S<sub>i</sub></b> Share of passengers which in absence of the project would have used mode <i>i</i>	Modal distribution of BRT users: <ul style="list-style-type: none"><li>➤ Buses: 90%</li><li>➤ Passenger cars: 3%</li><li>➤ Taxis: 5%</li><li>➤ Motorcycles: 1%</li><li>➤ Non-Motorized Transport and Induced Traffic: 1%</li></ul>	Survey realized by independent 3 <sup>rd</sup> Party Projections based on average of all 6 surveys realized in the year 2010; Market Team, 2010 [20] Survey based on AM0031 with details in Annex 3 Frequency: The years 1 and 4 and the test-retesting survey in year 1 only of the crediting period The mode distribution is based on a survey. The percentage is calculated as number of respondents using mode <i>x</i> / total valid respondents. The percentages used for the projections are the simple average of the 6 surveys made in the year 2010.  Data source reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as accurate.														
<b>FC<sub>P,J,D</sub></b> Total diesel fuel consumed by the project (trunk and feeder buses)	Projected Fuel Consumption Project (million litres) <table><tr><td>2013</td><td>253</td></tr><tr><td>2014</td><td>258</td></tr><tr><td>2015</td><td>264</td></tr><tr><td>2016</td><td>268</td></tr><tr><td>2017</td><td>267</td></tr><tr><td>2018</td><td>270</td></tr><tr><td>2019</td><td>280</td></tr></table>	2013	253	2014	258	2015	264	2016	268	2017	267	2018	270	2019	280	TRANSMILENIO S.A. For projections trunk buses (articulated and bi-articulated) based on SFC performance of such buses in TransMilenio System in the year 2010 [3], large feeder buses based on TransMilenio records of 2010 [3] and medium and small feeder buses based on SFC of baseline buses of same size year 2011 [3]. The SFC is multiplied with the projected distance driven for each bus size category [21] Based on reports of operators with records of fuel consumption or on distance driven and SFC based on samples. Monthly record if total fuel consumption and one annual sample if based on SFC. Variations are possible due to different bus models used, variations resulting from routes and frequency, load factor variances and driver variances. Trunk bus and most feeder bus operators have their own filling station. All filling stations are certified under the requirements of the Decree 1521 issued by the Ministry of Mining and Energy on 04/08/1998 [22]. Art. 30 of this decree states how the calibration is performed. Art 31 of the same decree describes in detail the measurement procedure including the required precision level. Frequency: monthly for total fuel consumption and annual if SFC. The bio-fuel content of fuels is based on the regulations of the Ministry of Mines and Energy and recorded annually. It must be shown that conventional comparable urban buses use the same bio-fuel blend as project buses. Project fuel consumption is based on the relation project passengers / total passengers multiplied with the total fuel consumption of TransMilenio
2013	253															
2014	258															
2015	264															
2016	268															
2017	267															
2018	270															
2019	280															

		<p>In case of total fuel consumption values the QA is made with control of the specific fuel consumption. Distance driven is therefore recorded. If deviations of specific fuel consumption are above normal fluctuations, (due e.g. to changing load factors, ambient conditions and driver) then data is checked for consistency and potential errors. In case of deviations further controls are performed e.g. with fuel invoices.</p> <p>In case of SFC control with previous years. In case of SFC based on a sample the upper 95% confidence level is taken.</p> <p>Bio-fuel blend of 7% based on Resolution 18 1266 of 14/07/2010 of the Ministry of Mines and Energy [4]. Emissions are only calculated on the fossil share of the blend.</p> <p>Actual values are monitored. Projections are calculated based on:</p> <p>Specific fuel consumption</p> <ul style="list-style-type: none"> <li>- Bi-articulated trunk buses: 72 l/100km [21]</li> <li>- Articulated trunk buses: 61 l/100km [3]</li> <li>- Large feeder buses: 39 l/100km [3]</li> <li>- Medium feeder buses: 29 l/100km [13]</li> <li>- Small feeder buses: 21 l/100km [13]</li> </ul> <p>Distance driven per year per bus category based on [21]</p> <p>FC = SFC*DD summarized over all categories. See detail in Annex 3 PDD</p> <p>Data sources reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as accurate.</p>
<b>TD<sub>C/T/M</sub></b> Trip distance of project passengers which in absence of the BRT would have used passenger cars, taxis or motorcycles	No change to baseline projected; Baseline values used: TD <sub>C</sub> : 12 Kilometres TD <sub>T</sub> : 10 Kilometres TD <sub>M</sub> : 14 Kilometres	<p>Survey realized by independent 3<sup>rd</sup> Party [20]</p> <p>The annual survey is based on a questionnaire, which is representative. Data from the annual survey is however only used if this results in lower baseline emissions (i.e. lower trip distances are monitored than the original baseline data).</p> <p>The trip distance is based on the bus entry station and the bus exit station including distances driven with feeder units.</p> <p>Frequency: The years 1 and 4 and the test-retest survey in the year 1 only of the crediting period</p> <p>Data source reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as accurate.</p>
<b>OC<sub>T</sub></b> Average occupation rate of taxis	No change to baseline projected.	<p>Specific studies realized by third party [16] [17]</p> <p>Baseline value reported: 1.09 passengers (excludes driver)</p> <p>This assumption is also based on no change after project implementation monitored in Bogota. See verification report TRANSMILENIO 2009 (published on <a href="http://www.unfccc.int">www.unfccc.int</a>).</p> <p>Monitoring realized in the years 1 and 4 of the crediting period.</p> <p>Same methodology is used as for baseline study.</p> <p>Leakage change of occupation rate of taxis is only included if changes &gt;10 percentage points of OC<sub>T</sub> are registered. If results show negative changes &gt; 10 percentage points of the occupancy rate, this change is included in the leakage calculation for all years since the last monitoring of the occupation rate.</p> <p>Upper 95% confidence level is taken idem to baseline study.</p> <p>Used for calculating leakage load factor of taxis.</p> <p>Leakage load factor change taxis has to be included if the occupation rate of taxis drops below 0.98 (1.09=100%; 90% = 0.98)</p> <p>Data sources reviewed by the validation team and checked at the on-site visit. The value reported can thus be confirmed as accurate.</p>
<b>ROC<sub>Z</sub></b> Average occupation rate of buses relative to capacity	No change to baseline projected.	<p>Secretaria Distrital de Movilidad de Bogotá or 3<sup>rd</sup> party study</p> <p>Baseline value reported: 62% (Secretaria Distrital de Movilidad de Bogotá, 2011 [23])</p> <p>This assumption is also based on no change after project implementation monitored in Bogota. See Verification Report TRANSMILENIO</p>

		<p>2009 (published on <a href="http://www.unfccc.int">www.unfccc.int</a>).</p> <p>Monitoring realized in the years 1 and 4 of the crediting period. Same methodology is used as for baseline study.</p> <p>Leakage change of occupation rate of taxis is only included if changes &gt;10 percentage points of ROCz are registered. If results show negative changes &gt; 10 percentage points of the occupancy rate, this change is included in the leakage calculation for all years since the last monitoring of the occupation rate.</p> <p>Used for calculating leakage load factor of buses.</p> <p>Leakage load factor change buses has to be included if the occupation rate of buses drops below 52% (62%-10%). 62% is the baseline value. 10% is deducted based on AM0031 p.19</p> <p>Information checked by validation team and discussed at the on-site visit and found to be accurate.</p>
<p><b>N<sub>T</sub> / N<sub>Z</sub> / N<sub>c</sub></b> Number of taxis/buses/cars in Bogota</p>	No change to baseline projected	<p>Secretaría de Movilidad</p> <p>No projection available and no change of occupation rate are pre-viewed. If no change of occupation rate occurs the parameter needs not be monitored.</p> <p>Frequency: years 1 and 4 of crediting period.</p> <p>Data for taxis and buses is only required if the load factor of taxis and/or buses is more than 10% lower than the baseline value.</p> <p>Data for cars is only required if the survey of BRT passengers has shown a change of fuel used which results in higher baseline emissions.</p> <p>Used to calculate leakage load factor.</p> <p>Procedure and values controlled by validation team and found to be accurate.</p>

Parameters listed in the methodology but not used for calculations are:

- NCV is not required as the project uses the default emission factors per litre of fuel as provided in the methodology Appendix A Table A1.
- EF<sub>CO2</sub> is not required as the project uses the default emission factors per litre of fuel as provided in the methodology Appendix A Table A1.
- EF<sub>CH4</sub> is not required as no gaseous fuels are used.
- EF<sub>N2O</sub> is not required as no gaseous fuels are used.
- V<sub>P</sub> is not required as the project adds road space and therefore congestion leakage is not included (AM0031 p.21)

SQS concludes that all parameters monitored are listed in the PDD and are clearly described all assumptions and data used by the project participants are listed in the PDD, including their references and sources. Information checked by validation team and found accurate, all documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD.

### 3.5.3 Monitoring plan

The monitoring manual, version 1.1, dated 26/06/2012, developed by Grütter Consulting AG was submitted to the validation team [2]. The manual defines responsibilities for monitoring, quality assurance, record retention, procedures and all data variables to be monitored and includes monitoring report formats. The design of the passenger survey, a core element of monitoring, is explained in detail. All data must be filed electronically. Hard copy reports and mails are to be scanned so there is an electronic copy. All data will be kept for two years after the end of the last crediting period.

The responsibility for managing all data in relation to the CDM project including responsibility for data collection, quality assurance, reports and data storage is by TRANSMILENIO S.A., Environmental Area unit. The staff in charge of monitoring receives back-up support and quality control services by Grütter Consulting AG.

The selected monitoring plan is in line with the methodology AM0031, version 4.0.0, "Bus Rapid Transit Projects" and monitors the following parameters:

Parameter	Description	Frequency	Data source
P	Passengers transported by project	Monthly	TRANSMILENIO S.A
FC <sub>PJ</sub>	Total fuel consumed by project buses (Trunk and feeder buses)	Monthly	TRANSMILENIO S.A Based on reports by operators
OC <sub>T</sub>	Average occupation rate of taxis	Year 2013 and 2016	External company or institution
ROC <sub>Z</sub>	Average occupation rate of baseline buses relative to capacity	Year 2013 and 2016	Secretaría Distrital de Movilidad de Bogotá or 3rd party study
N <sub>T/Z/C</sub>	Number of taxis/buses/cars in Bogota	Year 2013 and 2016	Secretaría de Movilidad
S <sub>i</sub>	Share of passengers which in absence of the project would have used mode <i>i</i>	Year 2013 and 2016	External survey company
TD <sub>C/T/M</sub>	Trip distance of project passengers which in absence of the BRT would have used passenger cars, taxis or motorcycles	Year 2013 and 2016	External survey company
DD <sub>PJ</sub>	Total distance driven by project buses (Trunk and feeder units)	Monthly	TRANSMILENIO S.A Based on reports by operators
	Type of fuel used by conventional buses (Biofuel contents)	Annual	Ministerio de Minas y Energía or fuel distributor

SQS confirms that the monitoring plan contains all necessary parameters, that they are clearly described and that the means of monitoring described in the plan comply with the requirements of the methodology. The staff has successfully done the monitoring in the previous crediting period.

SQS concludes that the monitoring plan is compliant with the methodology and staff has been familiarized with this manual; verified at the on-site visit.

### 3.6 Validation protocol

In order to ensure transparency and organize the corrective or additional information and measures a validation protocol was established for the project (see Appendix E). The protocol shows in a transparent manner the criteria (requirements), the means of validation and the results from validating the identified criteria. CARs, FARs and CLs are listed below.

### 3.7 Corrective action requests

No.:	CAR 1	Reference to Checklist: 4 (a) 2.3
DOE request:	The described project situation is not correct. Rail-based transit exists in Bogota. The PP shall explain the situation more in detail. Evidence is missing.	
Project participant response:	No train for urban passenger transport exists. The only rail system operating in Bogota is a tourist train. This has been clarified <a href="http://www.turistren.com.co/">http://www.turistren.com.co/</a>	
DOE conclusion:	Response accepted. OK CAR 1 is closed	
		Date: 06/06/2012

No.:	CAR 2	Reference to Checklist: 5
DOE request:	The monitoring plan is not transparent. There is no information in Annex 4. An updated Monitoring Manual is missing.	
Project participant response:	The monitoring is not part of the plan to be checked during renewal of the crediting period. The project is already successfully issuing CERs since various years and therefore monitoring is fully implemented. However we have added some more reference and the latest version of the MM for the DOE. See MM for Phase II attached.	
DOE request:	That's correct; the monitoring plan is not part of the DOE's validation opinion but the PP shall update those sections of the PDD relating to the monitoring plan. The Monitoring Manual <Manual_Marzo_14_de_2012_final (1)> is in Spanish. The key elements (e.g. table with parameters monitored, calibration) should be integrated in the PDD in English for transparency. Figure 5: Organization Structure (PDD page 59) is not consistent with Figura 1: Organogram MM V 1.0 (14/03/2012).	
Project participant response:	The MM has been updated and has already been sent to the DOE. Section B.7.2. has all information which is required, is detailed enough and contains all relevant issues. EB 20 Annex 7 is relevant. The organizational chart of the PDD Figure 5 has been updated. Reference to the MR 2011 has also been made.	
DOE conclusion:	Response accepted. OK CAR 2 is closed	Date: 27/06/2012

### 3.8 Clarification requests

No.:	CL 1	Reference to Checklist: 2
DOE request:	The situation in case of PP's is not transparent. The PP shall provide more information about the history and "CAF-Netherlands CDM facility". If Grütter Consulting is no longer PP, then the MoC change is missing.	
Project participant response:	Grütter Consulting is PP until the end of the 1 <sup>st</sup> crediting period which goes until 31.12.2012. Therefore the MOC cannot be changed now, but will be changed in the future. Due to above the PPs have been included as presently registered by the UNFCCC	
DOE request:	A.3.: The explanation in brackets for CAF is not consistent with the approved text in the revised PDD from UNFCCC Website, version 5.4 [8]. Also in Annex 1.	
Project participant response:	Section A3 has been changed to have the same institutions. The prentices is not required. The Annex has the same institutions as in Section A3. It is not required that they have the same persons or address as in the revised PDD, as this is a new PDD which is the newly registered version which can have updates in persons or directions.	
DOE conclusion:	PDD revised accordingly. Response accepted. OK CL 1 is closed	Date: 19/06/2012

No.:	CL 2	Reference to Checklist: 2
DOE request:	The information (countries) in A.3 is not consistent with Annex 1.	
Project participant response:	Has been made consistent	
DOE request:	Annex 1: The country (Colombia) for CAF is not consistent with the approved country (Venezuela) in the revised PDD from UNFCCC Website, version 5.4 [8].	
Project participant response:	<p>This is not correct. Venezuela is not listed as an approved country by project 0672. CAF is listed under the Netherlands. This is in accordance with the registration of the project.</p> <p>See website: <a href="http://cdm.unfccc.int/Projects/DB/DNV-CUK1159192623.07/view">http://cdm.unfccc.int/Projects/DB/DNV-CUK1159192623.07/view</a></p> <p>Host country is: Colombia and other Parties involved are Netherlands and Switzerland. Thus in fact usage of Venezuela is not correct as this country is not an approved Party. The 2<sup>nd</sup> period PDD takes for CAF Netherlands. CAF is approved under the Netherlands as of today and this will remain so. The address can be technically seen in Colombia i.e. there is no regulation to our knowledge that this is not allowed and it has been approved by the UNFCCC for the original as well as the revised PDD, and thus the current PDD for the 2<sup>nd</sup> period is consistent with the former versions</p>	
DOE conclusion:	PDD revised accordingly. Response accepted. OK CL 2 is closed Date: 19/06/2012	

No.:	CL 3	Reference to Checklist: 3
DOE request:	Some of the tables (OC <sub>T</sub> , ROC <sub>Z</sub> ) to describe data/parameters were altered and do not comply with the requirements. There is insufficient detail regarding "postcode" in tables PDD Annex 1.	
Project participant response:	"to be used" has been added to the table Has been changed from postfix to postcode	
DOE conclusion:	Response accepted. OK CL 3 is closed Date: 06/06/2012	

No.:	CL 4	Reference to Checklist: 3
DOE request:	The geo coordinates (PDD A.4.1.4) are missing.	
Project participant response:	The original PDD did not have any. However we have added latter.	
DOE conclusion:	Response accepted. OK CL 4 is closed Date: 06/06/2012	

No.:	CL 5	Reference to Checklist: 3
DOE request:	Some sources have not been adequately (precisely) referenced, so that everyone finds the source. PDD page 7 Table 1, page 8 Table 3, page 10 Footnote 17 Resolutions	
Project participant response:	Table 1 has been changed with a clear source Table 3 is from File 25 Footnote 17 is File 11	
DOE request:	Table 1: the referenced link cannot be found the page.	
Project participant response:	The link has been changed	
DOE conclusion:	Response accepted. OK CL 5 is closed Date: 19/06/2012	

No.:	CL 6	Reference to Checklist:	3.2
DOE request:	The revered tools in the methodology used are missing in B.1.		
Project participant response:	The original tool used for the registered PDD has been added. This refers to the original tool as this section (B5, additionality) is not revised for a new crediting period.		
DOE conclusion:	Response accepted. OK CL 6 is closed Date: 06/06/2012		

No.:	CL 7	Reference to Checklist:	4 (a) 1
DOE request:	The text in Table 4, condition 3 is not consistent with the methodology.		
Project participant response:	The text in Table 4 has been copied literally from the methodology AM0031 version 4 page 3.		
DOE conclusion:	Response accepted. OK CL 7 is closed Date: 06/06/2012		

No.:	CL 8	Reference to Checklist:	4 (a) 2.5
DOE request:	Discussion regarding 10 year crediting period is missing.		
Project participant response:	The project has been registered and approved by the UNFCCC for a renewable crediting period. This has not changed and is not a matter of discussion during the renewing of the crediting period. The new version of AM0031 only allows for a fixed crediting period which affects new projects, however not projects which have been registered previously with a renewable crediting period. EB 65 Annex 20 which is relevant for the renewing of the crediting period identifies the points to be discussed during the renewing of the crediting period, and this does clearly not include the crediting time. The newly calculated baseline parameters and the changes in the monitoring parameters based on the new version of AM0031 are not related to the crediting period.		
DOE conclusion:	The condition regarding a 10 year crediting period is not part of section "Applicability" of the methodology. Response accepted. OK CL 8 is closed Date: 06/06/2012		

No.:	CL 9	Reference to Checklist:	4 (b)
DOE request:	The information Table 6 (page 12) is not limited to the project activity.		
Project participant response:	This is correct. This table is copied from the original note and shows the entire TM network thus including Phase I trunk routes. An explanatory note has been added at the end of the table		
DOE conclusion:	Response accepted. OK CL 9 is closed Date: 06/06/2012		

No.:	CL 10	Reference to Checklist:	4 (c) 10
DOE request:	Statement regarding original baseline scenario is missing.		
Project participant response:	Section B.4. step 1.1. a statement has been added		
DOE conclusion:	Response accepted. OK CL 10 is closed Date: 07/06/2012		

No.:	CL 11	Reference to Checklist:	4 (c) 12
DOE request:	A statement regarding equations, BRT gaseous fuel and electricity in Alternative A (page 40) is missing.		
Project participant response:	A statement has been added.		
DOE conclusion:	Response accepted. OK CL 11 is closed		Date: 07/06/2012

No.:	CL 12	Reference to Checklist:	4 (c) 13
DOE request:	Some of the titles do not comply with the requirements. The abbreviation (SEC) for fuel type and vehicle type permutes. The abbreviation for diesel D is not consistent.		
Project participant response:	Section B.6.2. has been reviewed and checked with the methodology. All titles are identical to the methodology SEC has simply been separated into vehicle categories and fuels for simplicity of reading using the abbreviations as also in the methodology equations		
DOE conclusion:	Response accepted. OK CL 12 is closed		Date: 07/06/2012

No.:	CL 13	Reference to Checklist:	3
DOE request:	All Excel and Word files, which are used as a reference shall be in non-changeable format (pdf) and be "officialised" with release date and signature and source. The auditors accept a mail with a release and a correctness statement by the originator. Such as File 9a, 9c, 22a		
Project participant response:	This has been made and the DOE has been supplied with this information. File 9a and 9c are referred to in File 9b See also letter attached concerning File 9a. File 9c which was not used in the PDD as only File 10 was used for bus numbers File 22a see letter attached part 1 and part 2		
DOE conclusion:	Response accepted. OK CL 13 is closed		Date: 07/06/2012

No.:	CL 14	Reference to Checklist:	4 (c) 13
DOE request:	The calculation and source of the parameter $P_z$ , $FC_{PJ,x,y}$ and $S_{i,y}$ is not transparent.		
Project participant response:	$P_z$ has been updated and clarified also in the new spreadsheet $FC_{PJ}$ has been clarified $S_i$ has been clarified		
DOE conclusion:	Parameter $S_i$ has been re-calculated by validator; values used are correct. OK CL 14 is closed		Date: 07/06/2012

No.:	CL 15	Reference to Checklist:	4 (c) 13
DOE request:	For the statement "drops below 52%" (page 55) the source is not referenced.		
Project participant response:	This is a calculation based on the methodology. The source has been added.		
DOE conclusion:	Response accepted. OK CL 15 is closed		Date: 07/06/2012



No.:	CL 16	Reference to Checklist:	4 (c) 13
DOE request:	For parameter $N_i$ and $N_{i,x}$ values used are missing in a box (B.6.2).		
Project participant response:	These parameters are not listed in the methodology under B.6.2. and thus need not be listed in the PDD. $N_T, N_Z$ and $N_C$ are listed in B.7.1 in accordance with the methodologies as monitored parameters.		
DOE conclusion:	Response accepted. OK CL 16 is closed Date: 07/06/2012		

No.:	CL 17	Reference to Checklist:	3
DOE request:	PDD page 78 "Metro Gurgaon" is referenced. For what?		
Project participant response:	Typo error has been corrected		
DOE conclusion:	Response accepted. OK CL 17 is closed Date: 07/06/2012		

No.:	CL 18	Reference to Checklist:	4 (c) 13
DOE request:	Some points in <CER sheets TM 2nd period version 1.1> [11.1] are not consistent with the PDD; they have no effect on the calculation. <ul style="list-style-type: none"> <li>- "Project": Formula <math>EF_{KM,j,y}</math> is not consistent with PDD page 78</li> <li>- "Baseline EF": IF 0.997 is for motorcycles, not for cars, buses, taxis. Text is not correct.</li> <li>- "Leakage": The value for baseline occupation rate taxis is not correct because the link is not correct.</li> </ul>		
Project participant response:	The formulae in the sheet "Project" of the CER sheet has been adjusted. The text IR (improvement rate) sheet "Baseline EF" has been changed to motorcycle. The value occupation rate taxis in the sheet "Leakage" has been updated with the correct link.		
DOE conclusion:	Response accepted. OK CL 18 is closed Date: 19/06/2012		

## 4 List of interviewees and Documents Reviewed

The on-site audit and interviews were done according to the on-site visit program (see Appendix A), which was communicated, to the project owner in advance of the audit.

The following stakeholders have been interviewed during the validation (see Appendix A).

The following documents have been assessed during the validation (see Appendix B).

## 5 Validation Team and Reviewer

The following matrix shows the names and roles of the members of the validation team and the technical reviewer. The reviewer is not a member of the validation team. Certificates of Competence for each validation team member and of the reviewer are included in Appendix C to this report. Local support was provided by Yanira Vargas, Venezuela.

Name	Role (1)	Country	Duties				
			Desk review	On-site audit	Resolution of CAR & CL	Report	Technical review
Mr Rudolf Brodbeck	LA	Switzerland	X	X	X	X	
Mr David Gazdag	TR	Switzerland					X
Mr Oliver Stankiewicz	TR lead	Switzerland					X

(1) LA = Lead auditor/assessor; TM = Team member; TE = Technical expert (if any); TR = Technical reviewer,

## 6 Quality Control

Cross checks and/or other plausibility checks undertaken during validation are mentioned in the report or in the protocol. The draft validation report, including the initial validation findings, is checked by an internal reviewer (a member of the validation team) before being sent to the project participants. The final validation report undergoes a technical review before requesting registration of the project activity. The technical reviewer (not a member of the validation team) is qualified in accordance with SQS qualification scheme for CDM validation and verification.

## 7 Appendix A: On-site Visit Program

Time		Subject / Agenda	Person-In Charge	Person(s) concerned
from	to			
<b>19/01/2012</b>		<b>TRANSMILENIO S.A.</b> Av. Dorado No. 66-63 Bogotá, D.C. Colombia		
08:00	09:10	<b>Opening meeting / briefing</b>	Camilo Rojas Corporación Andina de Fomento (CAF) Mario Valbuena Transmilenio S.A. (TM)	Fernando Rojas (TM) Javier Hernandez (TM) Sandra Angel (TM) Constanza García (TM) Deysi Rodriguez (TM) Yanira Vargas (TM) Susana M. Ricaurte F. (GC) Rudolf Brodbeck (SQS)
09:10	09:30	Visit <b>Control Centre</b>	Mario Alberto Valbuena Transmilenio S.A. (TM)	Deysi Rodriguez (TM) Yanira Vargas (TM) Susana M. Ricaurte F. (GC) Rudolf Brodbeck (SQS)
09:30	10:00	Discussions PDD section A.3, Annex 1, A.2, A.4: <b>Approval, Participation, Project Design Document</b>	Susana M. Ricaurte F. Grütter Consulting AG (GC)	Deysi Rodriguez (TM) Yanira Vargas (TM) Rudolf Brodbeck (SQS)
10:00	12:00	Discussions PDD section B.1, B.2, B.3, B.4: <b>Baseline, Methodology, Boundary</b>	Susana M. Ricaurte F. Grütter Consulting AG (GC)	Deysi Rodriguez (TM) Yanira Vargas (TM) Rudolf Brodbeck (SQS)
12:00	13:30	Lunch		
13:00	14:30	Discussions PDD section B.6: <b>Emission reductions</b>	Susana M. Ricaurte F. Grütter Consulting AG (GC)	Deysi Rodriguez (TM) Yanira Vargas (TM) Rudolf Brodbeck (SQS)
14:30	15:30	Discussions PDD section B.7: <b>Monitoring plan</b>	Susana M. Ricaurte F. Grütter Consulting AG (GC)	Deysi Rodriguez (TM) Yanira Vargas (TM) Rudolf Brodbeck (SQS)
15:30	16:00	<b>Interview:</b> compliance project with current law transport	Alejandro Machado Secretaria Distrital de Movilidad	Deysi Rodriguez (TM) Yanira Vargas (TM) Susana M. Ricaurte F. (GC) Rudolf Brodbeck (SQS)
16:00	16:30	<b>Interview:</b> compliance project with current law environment	German Dario Alvarez Secretaria Distrital de Ambiente	Deysi Rodriguez (TM) Yanira Vargas (TM) Susana M. Ricaurte F. (GC) Rudolf Brodbeck (SQS)
17:30	19:30	<b>CAF Offices</b> Carrera 9a, No 76-49, Edificio ING, piso 7, Bogotá Check survey original documents	Camilo Rojas Corporación Andina de Fomento (CAF)	Deysi Rodriguez (TM) Yanira Vargas (TM) Susana M. Ricaurte F. (GC) Rudolf Brodbeck (SQS)

20/01/2012		Site visit		
08:30	12:30	Site visit <b>Baseline Bogota</b> Buses, Terminals, Taxis, Garages	Deysi Rodriguez Transmilenio S.A. (TM) Diana Reyes Connexion Movil	Yanira Vargas (TM) Susana M. Ricaurte F. (GC) Rudolf Brodbeck (SQS)
12:30	13:30	Lunch		
13:30	17:30	Site visit <b>Project</b> <b>TRANSMILENIO Phase II to IV</b> Existing bus routes (trunk lines) Existing bus routes (feeder lines) Existing bus garages Existing filling stations Existing fare system/collection	Deysi Rodriguez Transmilenio S.A. (TM)	Yanira Vargas (TM) Susana M. Ricaurte F. (GC) Rudolf Brodbeck (SQS)
		<b>TRANSMILENIO S.A.</b> Av. Dorado No. 66-63 Bogotá, D.C. Colombia		
17:30	18:00	<b>Closing meeting</b>	Rudolf Brodbeck (SQS)	Deysi Rodriguez (TM) Fernando Rojas (TM) Yanira Vargas (TM) Camilo Rojas (CAF) Susana M. Ricaurte F. (GC)

**Translator:** Yanira Vargas, Transmilenio S.A.

## 8 Appendix B: Documents Reviewed

Nr.	Title	Version
[1]	PDD TM 2nd period vs 6.2 as of 26.6. clean	08/06/2012
[2]	Monitoring Manual_June_26_2012	26/06/2012
[3]	File 13 CER sheets TM 2nd period version 1.2	08/06/2012
[4]	File 11 RESOLUCI#N 18 1266 DE 2010	14/07/2010
[5]	File 12 Resolucion 182368	29/12/2009
[6]	File 1 CONPES 3260	15/12/2003
[7]	File 2 CONPES 3368	01/08/2005
[8]	File 24 trunk roads and decree 190	22/06/2004
[9]	File 7 SFC cars	05/12/2011
[10]	File 9 vehicle registration stats	22/03/2012
[11]	File 5 SFC taxis	05/12/2011
[12]	File 4 SFC motorcycles	05/12/2011
[13]	File 6 SFC buses	05/12/2011
[14]	File 10 baseline bus numbers	10/08/2011
[15]	File 14 DD taxis	05/12/2011
[16]	File 3a occupation rate studies ([16] and [17] belongs to the same study and the main document [17] is dated 05/12/2011)	without
[17]	File 3b occupation rate documents	05/12/2011
[18]	File 20 Estudio de Tarifa SDM	06/2011
[19]	File 21 TM 2nd period buses	05/12/2011
[20]	File 8 surveys 2010	11/04/2011
[21]	File 25 projections TM	20/12/2011
[22]	File 15 Decreto-1521-1998	06/08/1998
[23]	File 22 TM 2nd period	12/01/2012
[24]	PDD version 6-09-06	06/09/2006
[25]	LOA CH	01/02/2008
[26]	LOA Colombia	07/04/2008
[27]	LoA NL	13/05/2011
[28]	MOC	08/06/2011
[29]	DNV_Transmilenio_Validation Report_24-09-06ETEL	21/09/2006
[30]	Monitoring report CERS 2006 rev 21.03.2007	06/03/2007
[31]	Verification Report 2006	17/05/2007
[32]	Monitoring report V 1.2	20/06/2008
[33]	Combined Verification and Certification report 2007	27/07/2008
[34]	Revised Monitoring Report V1.1 MP3	29/04/2009
[35]	Revised Combined Verification and Certification Report 2008	12/05/2009
[36]	Monitoring Report 4	28/02/2010
[37]	Ref.3f - Monitoring report 2009 vs 1.5	10/08/2010
[38]	SGS Report CDM.VER0218 MP4 23.08.201	10/08/2010
[39]	Monitoring Report 5 version 1	08/07/2011
[40]	MoC change 08-06-2011	08/06/2011
[41]	PDD revised version 5.4 clean dated 10.3.2012	10/03/2012
[42]	Revised PDD calculations from UNFCCC Website	11/03/2012
[43]	Validation Opinion 2012	11/03/2012
[44]	eb67_report	11/05/2012

"without" means no date on the document

## 9 Appendix C: Certificates of Competence

**Name: Mr Rudolf Brodbeck**

<b>Scopes of expertise:</b>		
1	Energy industries (renewable/non-renewable sources) TA 1.1: Thermal energy generation from fossil fuels as well as thermal energy from solar TA 1.2: Energy generation from renewable energy sources	X <input type="checkbox"/> X
2	Energy distribution TA 2.1: Electricity distribution TA 2.2: Heat distribution	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3	Energy demand TA 3.1 Energy demand	<input type="checkbox"/> <input type="checkbox"/>
4	Manufacturing industries TA 4.1: Cement sector TA 4.2: Aluminium TA 4.3: Iron and steel TA 4.4: Refinery	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5	Chemical industry TA 5.1: Chemical process industries	X X
6	Construction TA 6.1: Construction	<input type="checkbox"/> <input type="checkbox"/>
7	Transport TA 7.1: Transport	X X
8	Mining/mineral production TA 8.1: Mining and mineral processes, excluding those included in TA 8.2 below TA 8.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
9	Metal production TA 9.1: Metal production	<input type="checkbox"/> <input type="checkbox"/>
10	Fugitive emissions from fuels TA 10.1: Mining and mineral processes, excluding those included in TA 10.2 below TA 10.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride TA 11.1: Chemical process industries TA 11.2: GHG capture and destruction	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
12	Solvents use TA 12.1: Chemical process industries	X X
13	Waste handling and disposal TA 13.1: Waste handling and disposal TA 13.2: Animal waste management	X X X
14	Afforestation and reforestation TA 14.1: Forestry	<input type="checkbox"/> <input type="checkbox"/>
15	Agriculture TA 15.1: Agriculture TA 15.2: Animal waste management	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

**Name: Mr David Gazdag**

<b>Scopes of expertise:</b>		
1	Energy industries (renewable/non-renewable sources) TA 1.1: Thermal energy generation from fossil fuels as well as thermal energy from solar TA 1.2: Energy generation from renewable energy sources	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2	Energy distribution TA 2.1: Electricity distribution TA 2.2: Heat distribution	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3	Energy demand TA 3.1 Energy demand	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
4	Manufacturing industries TA 4.1: Cement sector TA 4.2: Aluminium TA 4.3: Iron and steel TA 4.4: Refinery	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5	Chemical industry TA 5.1: Chemical process industries	<input type="checkbox"/> <input type="checkbox"/>
6	Construction TA 6.1: Construction	<input type="checkbox"/> <input type="checkbox"/>
7	Transport TA 7.1: Transport	<input type="checkbox"/> <input type="checkbox"/>
8	Mining/mineral production TA 8.1: Mining and mineral processes, excluding those included in TA 8.2 below TA 8.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
9	Metal production TA 9.1: Metal production	<input type="checkbox"/> <input type="checkbox"/>
10	Fugitive emissions from fuels TA 10.1: Mining and mineral processes, excluding those included in TA 10.2 below TA 10.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride TA 11.1: Chemical process industries TA 11.2: GHG capture and destruction	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
12	Solvents use TA 12.1: Chemical process industries	<input type="checkbox"/> <input type="checkbox"/>
13	Waste handling and disposal TA 13.1: Waste handling and disposal TA 13.2: Animal waste management	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
14	Afforestation and reforestation TA 14.1: Forestry	<input type="checkbox"/> <input type="checkbox"/>
15	Agriculture TA 15.1: Agriculture TA 15.2: Animal waste management	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

**Name: Mr Oliver Stankiewicz**

<b>Scopes of expertise:</b>		
1	Energy industries (renewable/non-renewable sources) TA 1.1: Thermal energy generation from fossil fuels as well as thermal energy from solar TA 1.2: Energy generation from renewable energy sources	X <input type="checkbox"/> X
2	Energy distribution TA 2.1: Electricity distribution TA 2.2: Heat distribution	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3	Energy demand TA 3.1 Energy demand	<input type="checkbox"/> <input type="checkbox"/>
4	Manufacturing industries TA 4.1: Cement sector TA 4.2: Aluminium TA 4.3: Iron and steel TA 4.4: Refinery	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5	Chemical industry TA 5.1: Chemical process industries	<input type="checkbox"/> <input type="checkbox"/>
6	Construction TA 6.1: Construction	X X
7	Transport TA 7.1: Transport	X X
8	Mining/mineral production TA 8.1: Mining and mineral processes, excluding those included in TA 8.2 below TA 8.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
9	Metal production TA 9.1: Metal production	<input type="checkbox"/> <input type="checkbox"/>
10	Fugitive emissions from fuels TA 10.1: Mining and mineral processes, excluding those included in TA 10.2 below TA 10.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride TA 11.1: Chemical process industries TA 11.2: GHG capture and destruction	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
12	Solvents use TA 12.1: Chemical process industries	<input type="checkbox"/> <input type="checkbox"/>
13	Waste handling and disposal TA 13.1: Waste handling and disposal TA 13.2: Animal waste management	X X X
14	Afforestation and reforestation TA 14.1: Forestry	X X
15	Agriculture TA 15.1: Agriculture TA 15.2: Animal waste management	X X X



## 10 Appendix D: Abbreviations

BRT	Bus Rapid Transit
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH <sub>4</sub>	Methane
CL	Clarification Request
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
DNA	Designated National Authority
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IEE	Initial Environmental Examination
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MRTS	Mass Rapid Transit System
MVP	Monitoring and Verification Plan
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OSV	On-site visit
PDD	Project Design Document
SQS	Swiss Association for Quality and Management Systems
UNFCCC	United Nations Framework Convention on Climate Change
VER	Verified Emission Reductions

**Swiss Association for Quality and  
Management Systems (SQS)**

B e r n s t r a s s e 1 0 3  
P . O . B o x 6 8 6  
C H - 3 0 5 2 Z o l l i k o f e n  
T e l . + 4 1 3 1 9 1 0 3 5 3 5  
F a x . + 4 1 3 1 9 1 0 3 5 4 5  
h e a d o f f i c e @ s q s . c h  
w w w . s q s . c h

# CDM

## Validation Protocol

### Renewal of Crediting Period

**Enterprise**

Business account:

320752

Company:

Corporación Andina de Fomento CAF

Address:

Av. Luis Roche, Altamira

Torre CAF

Distrito Federal

VE-69011 Caracas

Phone:

+57 1 743 73 42

E-Mail:

[CROJAS@CAF.com](mailto:CROJAS@CAF.com)

Contact person:

Mr Camilo Rojas

**Service**

Audit/Assessment:

CDM Validation for renewal of crediting period

Audit/Assessment beginning/end:

30/12/2011 – 19/09/2012

Project name:

BRT Bogotá, Colombia: TRANSMILENIO Phase II to IV

Report-No.:

323774 / P31968.33

UNFCCC Scope:

7 (Transport)

UNFCCC Methodology:

AM0031, Version 4.0.0

"Bus Rapid Transit Projects"

UNFCCC Scale:

Large scale

**Team of auditors/assessors**

Lead auditor:

Mr Rudolf Brodbeck

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PROTOCOL 1: GENERAL CDM AND METHODOLOGICAL REQUIREMENTS .....	3
PROTOCOL 2: SUMMARY OF REQUESTS .....	13

## Introduction

### Objective of CDM Re-Validation ([1] 169)

When contracted to validate a proposed CDM project activity for a second or further crediting period, the DOE shall undertake a thorough reassessment of the validity of the original baseline or any updates thereto proposed by the project participants, and the corresponding estimation of emission reductions for the applicable crediting period, based on the latest version of the procedures for renewing the crediting period, the latest applicable version of approved methodology and the means of validation described in this Manual.

### Requests ([1] 35-37)

- The DOE shall raise a corrective action request (CAR) if one of the following occurs:
  - (a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
  - (b) The CDM requirements have not been met;
  - (c) There is a risk that emission reductions cannot be monitored or calculated.
- The DOE shall raise a clarification request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.
- The DOE shall raise a forward action request (FAR) during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

## Normative References

No.	Title	Version
[1]	CLEAN DEVELOPMENT MECHANISM VALIDATION AND VERIFICATION MANUAL	01.2
[2]	PROCEDURE FOR RENEWAL OF THE CREDITING PERIOD OF A REGISTERED CDM PROJECT ACTIVITY	06.0
[3]	METHODOLOGICAL TOOL „VALIDITY OF THE ORIGINAL/CURRENT BASELINE AND TO UPDATE THE BASELINE AT THE RENEWAL OF A CREDITING PERIOD“	03.0.0
[4]	GLOSSARY OF CDM TERMS	06.0
[5]	AM0031 "Bus Rapid Transit Projects"	4.0.0
[8]	Revised PDD from UNFCCC Website, version 5.4	10/03/2012
[9]	Revised PDD calculations from UNFCCC Website	11/03/2011
[10]	PDD TM 2nd period vs. 6.0 lenM PP	24/12/2011
[10.1]	PDD TM 2nd period vs. 6.1	26/02/2012
[10.2]	PDD TM 2nd period vs. 6.2 PPs updated Clean	08/06/2012
[11]	CER sheets TM 2nd period version 1.0	15/12/2011
[11.1]	CER sheets TM 2nd period version 1.1	26/02/2012
[11.2]	CER sheets TM 2nd period version 1.2	08/06/2012
[12]	Manual_Marzo_14_de_2012_final (1)	14/03/2012

\*MoV = Means of Validation; DR = Document Review; I = Interview; N/A = Not Applicable

\*\*CAR = Corrective Action Request, CL = Clarification Request, FAR = Forward Action Request

## Protocol 1: General CDM and methodological requirements

N-Ref.	Requirement	Ref.	MoV*	Draft Concl**	Final Concl**
<b>1</b>	<b>APPROVAL</b>				
[1] 44	All Parties involved have approved the project activity.	[10] A.3	DR I		OK
	Comment: Colombia, The Netherlands, Switzerland				
1.1 [2] 5	For the purpose of renewal of the crediting period it is not necessary to obtain a new letter of approval from Parties involved.	[10] A.3	DR I		OK
	Comment: PP's not changed.				
<b>2</b>	<b>PARTICIPATION (PDD section A.3. and Annex 1)</b>				
[1] 51	All project participants have been listed in a consistent manner in the project documentation, and their participation in the project activity has been approved by a Party to the Kyoto Protocol.	[10] A.3 Annex 1	DR I	CL 1 CL 2	OK
	Comment: <b>CL 1:</b> The situation in case of PP's is not transparent. The PP shall provide more information about the history and "CAF-Netherlands CDM facility". If Grütter Consulting is no longer PP, then the MoC change is missing. <b>CL 2:</b> the information (countries) in A.3 is not consistent with Annex 1.				
<b>3</b>	<b>PROJECT DESIGN DOCUMENT</b>				
[1] 55	The PDD used as a basis for validation shall be prepared in accordance with the latest template and guidance from the CDM Executive Board available on the UNFCCC CDM website.	[10]	DR	CL 3 CL 4 CL 5 CL 13 CL 17	OK
	Comment: PDD form version 3 as of 28 July, 2010 is used. The description of the project activity is in accordance with the "Guidelines for completing the project design document (CDM-PDD) and the proposed new baseline and monitoring methodologies (CDM-NM)", i.e. it covers all relevant elements. Moreover, the project description is accurate and detailed. <b>CL 3:</b> Some of the tables (OC <sub>T</sub> , ROC <sub>Z</sub> ) to describe data/parameters were altered and do not comply with the requirements. There is insufficient detail regarding "postcode" in tables PDD Annex 1. <b>CL 4:</b> The geo coordinates (PDD A.4.1.4) are missing. <b>CL 5:</b> Some sources have not been adequately (precisely) referenced, so that everyone finds the source. PDD page 7 Table 1, page 8 Table 3, page 10 Footnote 17 Resolutions <b>CL 13:</b> All Excel and Word files, which are used as a reference shall be in non-changeable format (pdf) and be "officialised" with release date and signature and source. The auditors accept a mail with a release and a correctness statement by the originator. Such as File 9a, 9c, 22a <b>CL 17:</b> PDD page 78 "Metro Gurgaon" is referenced. For what?				
3.1 [2] 2	Project participants shall update those sections of the project design document (CDM-PDD) relating to the <b>baseline, estimated emission reductions</b> and the <b>monitoring plan</b> using an approved baseline and monitoring methodology as follows:	[10] B	DR I		OK
	Comment: All chapter included/updated				
3.2 [2] 2(a)	The latest approved version of a baseline and monitoring methodology, applied in the original CDM-PDD of the registered CDM project activity, shall be used whenever applicable;	[10] B.1	DR I	CL 6	OK

\*MoV = Means of Validation; DR = Document Review; I = Interview; N/A = Not Applicable

\*\*CAR = Corrective Action Request, CL = Clarification Request, FAR = Forward Action Request

	Comment: AM0031 "Bus Rapid Transit Projects", Version 4.0.0. CL 6: The reverred tools in the methodology are used are missing in B.1.					
3.3 [2] 2(b)	If a baseline and monitoring methodology, applied in the original CDM-PDD, was withdrawn after the registration of the CDM project activity and replaced by a consolidated methodology, the latest approved version of the respective consolidated methodology shall be used;		N/A			
	Comment:					
3.4 [2] 2(c)	If the registered CDM project activity does not meet the applicability criteria of the options provided for by (a) or (b), due to their revision or due to the update of the baseline, the project participants shall either select another applicable approved methodology or request, through the DOE, a deviation from an approved methodology for the purpose of renewal of the crediting period.		N/A			
	Comment:					
4	BASELINE AND MONITORING METHODOLOGY					
4 (a)	Applicability of the selected methodology to the project activity (PDD section B.2.)					
[1] 68	The DOE shall validate that the selected baseline and monitoring methodology previously approved by the CDM Executive Board is applicable to the project activity, including that the used version is valid.	[10] B.2	DR		OK	
	Comment: Monitoring methodology AM0031 has been approved. version 4.0.0 has been valid from 25 Nov 2011 onwards. At the time of validation the method is the most recent and still valid.					
[1] 69	The DOE shall apply specific guidance provided by the CDM Executive Board in respect to any approved methodology.	[10] B.2	DR		OK	
	Comment:					
4 (a) 1 [1] 70	The DOE shall determine whether the methodology is correctly quoted and applied by comparing it with the actual text of the applicable version of the methodology available on the UNFCCC CDM website.	[10] B.2 B.6 B.7	DR I	CL 7	OK	
	Comment: CL 7: The text Table 4, condition 3 is not consistent with the methodology.					
4 (a) 2	Methodological requirements (incl. tools) AM0031 "Bus Rapid Transit Projects", version 04.0.0					
4 (a) 2.1 [5] I Page 2	The methodology is applicable to project activities that reduce emissions through the construction and operation of a BRT system for urban road based transport. The methodology is also applicable for extensions of existing BRT systems.	[10] B.2	DR I		OK	
	Applicability checklist					Yes / No/ NA
	Criterion discussed in the PDD?					Yes
	Compliance provable?					Yes
	Evidences provided in the PDD?					Yes
	Compliance verified?	Yes				
	Comment:					

4 (a) 2.2 [5] I Page 2	<p>Any fuels, including (liquefied) gaseous fuels or bio-fuel blends, as well as electricity, can be used in the baseline or project case. The following conditions apply:</p> <p>In the case of bio-fuels, project buses must use the same bio-fuel blend (same percentage of biofuel) as commonly used by conventional comparable urban buses in the country, i.e. the methodology is not applicable if project buses use higher or lower blends of bio-fuels than those used by conventional buses. In addition, the project buses shall not use a significantly higher biofuel blend than cars and taxis.</p> <table><tr><th>Applicability checklist</th><th>Yes / No/ NA</th></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Evidences provided in the PDD?</td><td>File 11+12</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> <p>Comment:</p>	Applicability checklist	Yes / No/ NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Evidences provided in the PDD?	File 11+12	Compliance verified?	Yes	[10] B.2	DR I		OK
Applicability checklist	Yes / No/ NA														
Criterion discussed in the PDD?	Yes														
Compliance provable?	Yes														
Evidences provided in the PDD?	File 11+12														
Compliance verified?	Yes														
4 (a) 2.3 [5] I Page 3	<p>The project activity BRT system is road-based. The baseline public transport system and other public transport options are road- or rail-based (the methodology excludes air- and water-based systems from analysis). However, the methodology is not applicable if the project activity BRT system replaces an urban rail-based Mass Rapid Transit System (MRTS), i.e. if the MRTS stops operating after project implementation due to the project activity;</p> <table><tr><th>Applicability checklist</th><th>Yes / No/ NA</th></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Evidences provided in the PDD?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> <p>Comment: <b>CAR 1:</b> The described project situation is not correct. Rail-based transit exists in Bogota. The PP shall explain the situation detailed. Evidence is missing.</p>	Applicability checklist	Yes / No/ NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Evidences provided in the PDD?	Yes	Compliance verified?	Yes	[10] B.2	DR I	CAR 1	OK
Applicability checklist	Yes / No/ NA														
Criterion discussed in the PDD?	Yes														
Compliance provable?	Yes														
Evidences provided in the PDD?	Yes														
Compliance verified?	Yes														
4 (a) 2.4 [5] I Page 3	<p>The methodology is applicable if the analysis of possible baseline scenario alternatives leads to the result that a continuation of the use of the current modes of transport is the baseline scenario.</p> <table><tr><th>Applicability checklist</th><th>Yes / No/ NA</th></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Evidences provided in the PDD?</td><td>PDD B.4</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> <p>Comment:</p>	Applicability checklist	Yes / No/ NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Evidences provided in the PDD?	PDD B.4	Compliance verified?	Yes	[10] B.2	DR I		OK
Applicability checklist	Yes / No/ NA														
Criterion discussed in the PDD?	Yes														
Compliance provable?	Yes														
Evidences provided in the PDD?	PDD B.4														
Compliance verified?	Yes														
4 (a) 2.5 [5] II Page 26	<p>The implementation of the methodology is limited to a 10-year crediting period.</p> <table><tr><th>Applicability checklist</th><th>Yes / No/ NA</th></tr><tr><td>Criterion discussed in the PDD?</td><td></td></tr><tr><td>Compliance provable?</td><td></td></tr><tr><td>Evidences provided in the PDD?</td><td></td></tr><tr><td>Compliance verified?</td><td></td></tr></table> <p>Comment: <b>CL 8:</b> Discussion is missing The condition regarding 10 year crediting period is not part of section "Applicability" of the methodology.</p>	Applicability checklist	Yes / No/ NA	Criterion discussed in the PDD?		Compliance provable?		Evidences provided in the PDD?		Compliance verified?		[10] B.2	DR I	CL 8	N/A
Applicability checklist	Yes / No/ NA														
Criterion discussed in the PDD?															
Compliance provable?															
Evidences provided in the PDD?															
Compliance verified?															
4 (a) 3 [1] 72	<p>If the DOE cannot make a determination regarding the applicability of the selected methodology to the proposed CDM project activity then the DOE shall request clarification of the methodology in accordance with the guidance provided by the CDM Executive Board.</p> <p>Comment: No request of clarification of the methodology</p>				N/A										

\*MoV = Means of Validation; DR = Document Review; I = Interview; N/A = Not Applicable

\*\*CAR = Corrective Action Request, CL = Clarification Request, FAR = Forward Action Request

4 (a) 4 [1] 73	If the DOE determines that the proposed CDM project activity does not comply with the applicability conditions of the methodology the DOE may proceed by means of requesting revision to or deviation from the methodology in accordance with the guidance provided by the CDM Executive Board. Comment: No request of revision or deviation of the methodology				N/A										
4 (a) 5 [1] 74	If the DOE has requested clarification of, revision to or deviation from a methodology, the DOE shall not submit a request for registration until the CDM Executive Board has approved the proposed deviation or revision. Comment: No request of clarification or revision or deviation of the methodology				N/A										
4 (a) 6 [1] 75	Under no circumstance shall the DOE consider the submission of a request for registration as a means of seeking clarification from the CDM Executive Board on the applicability of a methodology. Comment:				N/A										
4 (b)	Project boundary (PDD section B.3.)														
[1] 78	The PDD shall correctly describe the project boundary, including the physical delineation of the proposed CDM project activity included within the project boundary for the purpose of calculating project and baseline emissions for the proposed CDM project activity. Comment: The project boundary was determined according to the methodology. Table 2 and 3 shows the updated project activity. CL 9: The information table 6 (page 12) is not limited to the project activity.	[10] A.4.1.4 B.3	DR I	CL 9	OK										
Methodological requirements (incl. tools) AM0031 "Bus Rapid Transit Projects", version 04.0.0															
4 (b) 1 [5] II Page 4	Emissions sources included in or excluded from the project boundary CO <sub>2</sub> : Major emission source CH <sub>4</sub> : Included only if gaseous fuels are used N <sub>2</sub> O: No <table><tr><td>Boundary checklist</td><td>Yes / No</td></tr><tr><td>Source and gas(es) discussed in the PDD?</td><td>Yes</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Yes</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Yes</td></tr><tr><td>Consistency with monitoring plan?</td><td>Yes</td></tr></table> Comment: Gases included: CO <sub>2</sub> , CH <sub>4</sub> (in accordance with the methodology).	Boundary checklist	Yes / No	Source and gas(es) discussed in the PDD?	Yes	Inclusion / exclusion justified?	Yes	Explanation / Justification sufficient?	Yes	Consistency with monitoring plan?	Yes	[10] B.3	DR I		OK
Boundary checklist	Yes / No														
Source and gas(es) discussed in the PDD?	Yes														
Inclusion / exclusion justified?	Yes														
Explanation / Justification sufficient?	Yes														
Consistency with monitoring plan?	Yes														
4 (c)	Baseline identification (PDD section B.4.)														
[2] 7	The DOE's validation opinion shall assess the validity of the original baseline or its update through an assessment of the following issues: (a) The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance of the Executive Board with regard to renewal of the crediting period at the time of requesting renewal of crediting period; (b) The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period. Comment: The analysis follows step by step the METHODOLOGICAL TOOL „VALIDITY OF THE ORIGINAL/CURRENT BASELINE AND TO UPDATE THE BASELINE AT THE RENEWAL OF A CREDITING PERIOD“.	[10] B.4	DR I		OK										

4 (c) 1 [3] 6	<p>There are different scenarios that could be identified as the baseline scenario for a CDM project activity. For the purpose of the renewal of the crediting period, it is important to differentiate between the following scenarios:</p> <p>(a) The project participants would undertake in the baseline scenario an alternative investment to provide comparable outputs or services. For example, this may apply to a project activity which involves the construction of a new off-grid captive power plant that serves the electricity demand of an industrial facility;</p> <p>(b) The project participants do not undertake an investment. However, an investment to providing comparable outputs or services is undertaken by a third party (or parties). For example, this may apply to a project activity constructing a greenfield renewable power plant where in the baseline scenario third parties may construct new power plants in the grid to satisfy the electricity demand;</p> <p>(c) Neither the project participants nor a third party undertakes an investment. This situation is commonly referred to as the "continuation of the current practice" in baseline methodologies. It occurs only for types of project that do not lead to an increase of production of output. For example, this may apply to a fuel switch project, where in the baseline the same fuel would continue to be used;</p> <p>(d) At the start of the project activity, no investment would be undertaken in the baseline scenario, as in (c) above. However, at a later point in time during the crediting periods, either the project participants - the situation in (a) - or a third party may undertake an investment - the situation in (b). A typical example is a situation where a currently used boiler would continue to be used up to the end of its technical lifetime that will occur before the end of the crediting period. After the end of its technical lifetime, the project participants would undertake an investment.</p>	[10] B.4	DR I		OK
	<p>Comment: Option (b) is used.</p>				
<b>Step 1.1</b>	<b>Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies</b>				
4 (c) 2 [3] B	<p>The current baseline complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the project activity for validation or the submission of the previous request for renewal of the crediting period and are applicable at the time of requesting renewal of the crediting period</p>	[10] B.4	DR I		OK
	<p>Comment: Interviews German Dario Alvarez and Alejandro Machado to confirm the compliance.</p>				
<b>Step 1.2</b>	<b>Assess the impact of circumstances</b>				
4 (c) 3 [3] B	<p>Assess the impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions, without reassessing the baseline scenario.</p>	[10] B.4	DR I		OK
	<p>Comment:</p>				
4 (c) 4 [3] B	<p>In the situation where the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment, an assessment of the changes in market characteristics is required for the renewal of the crediting period.</p>	[10] B.4	DR I		OK
	<p>Comment: On-site visits confirm no changes in market characteristics</p>				
4 (c) 5 [3] B	<p>Evaluate whether the conditions used to determine the baseline emissions in the previous crediting period are still valid.</p>	[10] B.4	DR I		OK
	<p>Comment: Baseline emissions are re-calculated. See step 2.1 and 2.2</p>				

\*MoV = Means of Validation; DR = Document Review; I = Interview; N/A = Not Applicable

\*\*CAR = Corrective Action Request, CL = Clarification Request, FAR = Forward Action Request



4 (c) 6 [3] B	Assess the availability of new fuels or raw materials and the impact of electricity or fuel prices in the identification of the current practice for the baseline emissions; Comment: The fuels are updated	[10] B.5	DR I		OK
<b>Step 1.3</b>	<b>Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.</b>				
4 (c) 7 [3] B	Assess whether the remaining technical lifetime of the equipment that would have continued to be used in the absence of the project activity, as determined in the CDM-PDD or CDM-PDD-REN, exceeds the crediting period for which renewal is requested. Comment:	[10] B.5	N/A		
4 (c) 8 [3] B	Take into consideration the market penetration of different technologies. Evaluate the penetration rate of different technologies that are available in the market and evaluate how they could affect the baseline. Comment:	[10] B.5	N/A		
<b>Step 1.4</b>	<b>Assessment of the validity of the data and parameters</b>				
4 (c) 9 [3] B	Assess whether data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are still valid or whether they should be updated. Comment: Baseline data and parameters have been updated. See step 2.2	[10] B.5	DR I		OK
<b>Step 2.1</b>	<b>Update the current baseline</b>				
4 (c) 10 [3] B	Update the current baseline emissions for the subsequent crediting period, without reassessing the baseline scenario, based on the latest approved version of the methodology applicable to the project activity. The procedure should be applied in the context of the sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period. Comment: The original baseline scenario is still valid. <b>CL 10:</b> Statement is missing.	[10] B.5	DR	CL 10	OK
<b>Step 2.2</b>	<b>Update the data and parameters (PDD section B.6.)</b>				
4 (c) 11 [3] B	If the application of Step 1.4 showed that the data and/or parameter(s) that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, project participants should update all applicable data and parameters, following the guidance in Step 1.4. Comment:	[10] B.5			OK
4 (c) 12 [1] 89	The steps taken and equations applied to calculate project emissions, baseline emissions, leakage and emission reductions shall comply with the requirements of the selected baseline and monitoring methodology. Comment: <b>CL 11:</b> A statement regarding equations, BRT gaseous fuel and electricity in Alternative A (page 40) is missing.	[10] B.5 B.6.1	DR I	CL 11	OK

4 (c) 13 [1] 91	The DOE shall verify the justification given in the PDD for the choice of data and parameters used in the equations. If data and parameters will not be monitored throughout the crediting period of the proposed CDM project activity but have already been determined and will remain fixed throughout the crediting period, the DOE shall assess that all data sources and assumptions are appropriate and calculations are correct, applicable to the proposed CDM project activity and will result in a conservative estimate of the emission reductions. If data and parameters will be monitored on implementation and hence become available only after validation of the project activity, the DOE shall confirm that the estimates provided in the PDD for these data and parameters are reasonable.	[10] B.6.2. [10] B.7.1	DR I	CL 12 CL 14 CL 15 CL 16 CL 18	OK			
	Comment: <b>CL 12:</b> Some of the titles do not comply with the requirements. The abbreviation (SEC) for fuel type and vehicle type permutes. The abbreviation for diesel D is not consistent. <b>CL 14:</b> The calculation and source of the parameter $P_z$ , $FC_{PJ,x,y}$ and $S_{i,y}$ is not transparent. <b>CL 15:</b> For the statement “drops below 52%” (page 55) the source is not referenced. <b>CL 16:</b> For parameter $N_i$ and $N_{i,x}$ values used are missing in a box (B.6.2). <b>CL 18:</b> Some points in <CER sheets TM 2nd period version 1.1> [11.1] are not consistent with the PDD; they have no effect on the calculation.							
	Data Checklist: Baseline emissions AM0031 “Bus Rapid Transit Projects”, version 4.0.0  □ = YES                      X = NO                      - = N/A	Title in line with methodology	Data unit correctly expressed	Appropriate description of parameter/r	Source clearly referenced?	Correct value provided?	Has this value been verified?	Choice of data correctly justified?
$CD_{i,y}$	Correction factor for changing trip distance in category $i$ for the year $y$ , where $i = T$ (taxis), $C$ (passenger cars) or $M$ (motorcycles)	✓	✓	✓	✓	✓	✓	✓
$DD_{Z,L}$	Total distance driven by large buses (kilometre)	✓	✓	✓	✓	✓	✓	✓
$DD_{Z,M}$	Total distance driven by medium buses (kilometre)	✓	✓	✓	✓	✓	✓	✓
$DD_{Z,S}$	Total distance driven by small buses (kilometre)	✓	✓	✓	✓	✓	✓	✓
$EF_{CH_4,x}$	CH4 emission factor for gaseous fuel type $x$ (gCO2e per litre, based on GWP)	-	-					
$EF_{CO_2,x}$	CO2 emission factor for fuel type $x$ (gCO2 per litre)	-	-					
$EF_{N_2O,x}$	N2O emission factor for gaseous fuel type $x$ (gCO2e per litre, based on GWP)	-	-					
$EF_{KM,i}$	Transport emissions factor per distance of vehicle category $i$ (gCO2e per kilometre driven)	✓	Calculated					
$EF_{P,i}$	Emissions factor per passenger before project start, where $i = C$ (passenger cars), $M$ (motorcycles) or $T$ (taxis) (grams per passenger)	✓	Calculated					
$EF_{P,i,y}$	Emissions factor per passenger in vehicle category $i$ in year $y$ (grams per passenger)	✓	Calculated					
$EF_x$	Emission factor of fuel type $x$ consumed by the baseline bus system prior to the project start	✓	Methodology AM0031 page 43					
$FC_x$	Total fuel type $x$ consumed by the baseline bus system prior to the project start	-	-	-	-	-	-	-
$IR_{i,t}$	Technology improvement factor at year $t$ for vehicle category $i$	✓	Methodology AM0031 page 43					
$N_i$	Total number of vehicles in category $i$	✓	✓	✓	✓	✓	✓	✓
$N_{i,x}$	Number of vehicles in vehicle category $i$ using fuel type $x$	✓	✓	✓	✓	✓	✓	✓
$NCV_x$	Net calorific value of fuel type $x$ consumed by the baseline bus system prior to the project start (J/mass or volume unit)	-	-	-	-	-	-	-
$OC_i$	Average vehicle occupancy rate of vehicle category $i$ (passengers)	✓	✓	✓	✓	✓	✓	✓
$P_i$	Passengers transported by buses in the baseline	✓	✓	✓	✓	✓	✓	✓
$P_{i,y}$	Passengers transported by the project (BRT) in year $y$ that without the project activity would have used category $i$ , where $i = Z$ (buses, public transport), $T$ (taxis), $C$ (passenger cars), rail-based urban mass transit ( $R$ ) or $M$ (motorcycles) (millions of passengers)	✓	✓	✓	✓	✓	✓	✓
$P_y$	Total passengers transported by the project monitored in year $y$ (millions)	✓	✓	✓	✓	✓	✓	✓
$S_{i,y}$	Share of passengers transported by the project who in absence of the latter would have used transport type $i$ , where $i = Z$ (buses, public transport), $T$ (taxis), $C$ (passenger cars), $M$ (motorcycles), $NMT$ (non-motorized transport), $R$ (rail-based urban mass transit) and $IT$ (induced transport, i.e., would not have travelled in absence of project) (%)	✓	✓	✓	✓	✓	✓	✓
$SEC_{x,i}$	Specific energy consumption of fuel type $x$ in vehicle category $i$ (litre / kilometre, kWh/km, kg/km, m3/km)	✓	✓	✓	✓	✓	✓	✓
$TD_i$	Average trip distance in kilometres in category $i$ before the project start	✓	✓	✓	✓	✓	✓	✓
$TD_{i,y}$	Average trip distance in kilometres in category $i$ in year $y$	✓	✓	✓	✓	✓	✓	✓

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	Data Checklist: Project emissions AM0031 "Bus Rapid Transit Projects", version 4.0.0	Title in line with methodology?	Data unit correctly expressed?	Appropriate description of parameter?	Source clearly referenced?	Correct value provided?	Has this value been verified?	Choice of data correctly justified?
	□ = YES                      X = NO                      - = N/A							
DD <sub>FB,y</sub>	Total distance driven by feeder buses in year <i>y</i> (million kilometres)	√	√	√	√	√	√	√
DD <sub>TB,y</sub>	Total distance driven by trunk buses in year <i>y</i> (million kilometres)	√	√	√	√	√	√	√
EF <sub>CH<sub>4</sub>,x</sub>	CH4 emission factor for gaseous fuel type <i>x</i> (gCO <sub>2</sub> e per litre, based on GWP)	See baseline emissions						
EF <sub>CO<sub>2</sub>,x</sub>	CO2 emission factor for fuel type <i>x</i> (gCO <sub>2</sub> per litre)	See baseline emissions						
EF <sub>KM,j,y</sub>	Emissions factor per distance for project bus category <i>j</i> in year <i>y</i> (gCO <sub>2</sub> e per kilometre)	-	-	-	-	Calculation		
EF <sub>KM,FB,y</sub>	Emissions factor per distance for feeder buses in year <i>y</i> (gCO <sub>2</sub> e per kilometre)	-	-	-	-	Calculation		
EF <sub>KM,TB,y</sub>	Emissions factor per distance for trunk buses in year <i>y</i> (gCO <sub>2</sub> e per kilometre)	-	-	-	-	Calculation		
EF <sub>N<sub>2</sub>O,x</sub>	N2O emission factor for gaseous fuel type <i>x</i> (gCO <sub>2</sub> e per litre, based on GWP)	See baseline emissions						
FC <sub>PJ,x,y</sub>	Total consumption of fuel type <i>x</i> in year <i>y</i> by the project (million litres)	√	√	√	√	√	√	√
GWP <sub>CH<sub>4</sub></sub>	Global warming potential of methane valid for the relevant commitment period	-	-	-	-	-	-	-
GWP <sub>N<sub>2</sub>O</sub>	Global warming potential of N <sub>2</sub> O valid for the relevant commitment period	-	-	-	-	-	-	-
SEC <sub>i,x,y</sub>	Specific energy consumption of fuel type <i>x</i> in project bus category <i>j</i> in year <i>y</i> (litre per kilometre)	√	√	√	√	√	√	√

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Data Checklist: Leakage emissions AM0031 "Bus Rapid Transit Projects", version 4.0.0		Title in line with methodology?	Data unit correctly expressed?	Appropriate description of parameter?	Source clearly referenced?	Correct value provided?	Has this value been verified?	Choice of data correctly justified?
□ = YES      X = NO      - = N/A								
BSCR <sub>y</sub>	Bus units retired as a result of the project in year <i>y</i>	-	-	-	-	-	-	-
CV <sub>i,y</sub>	Average capacity of vehicle <i>i</i> in year <i>y</i> (persons)	✓	✓	✓	✓	✓	✓	✓
DD <sub>C</sub>	Total distance driven in by passenger cars baseline (kilometres)	-	-	-	-	-	-	-
DD <sub>T</sub>	Total distance driven in kilometres by taxis baseline (kilometres)	✓	✓	✓	✓	✓	✓	✓
DD <sub>Z</sub>	Total distance driven by public transport buses baseline (kilometres)	-	-	-	-	-	-	-
DD <sub>Z,k</sub>	Total distance driven by buses of size <i>k</i> (kilometers)	-	-	-	-	-	-	-
EF <sub>CO<sub>2</sub>,upstream,LNG</sub>	Emission factor for upstream CO <sub>2</sub> emissions due to fossil fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system in t CO <sub>2</sub> /TJ	-	-	-	-	-	-	-
EF <sub>CO<sub>2</sub>,upstream,CH<sub>4</sub></sub>	Emission factor for upstream fugitive methane emissions of natural gas from production, transportation, distribution, and, in the case of LNG, liquefaction, transportation, re-gasification and compression into a transmission or distribution system	-	-	-	-	-	-	-
EF <sub>KM,i,y</sub>	Emission factor per kilometre for cars and taxis in year <i>y</i> (gCO <sub>2</sub> /km)	See project emissions						
EF <sub>KM,T</sub>	Emissions factor per kilometre for taxi baseline (gCO <sub>2</sub> e per kilometre)	-	-	-	-	-	-	-
EF <sub>KM,VB,i</sub>	Emission factor per kilometre for cars/taxis at the baseline speed (gCO <sub>2</sub> /km)	-	-	-	-	-	-	-
EF <sub>KM,VP,i,y</sub>	Emission factor per kilometre for cars/taxis at the project speed in year <i>y</i> (gCO <sub>2</sub> /km)	-	-	-	-	-	-	-
EF <sub>KM,Z</sub>	Baseline transport emissions factor per distance for buses (gCO <sub>2</sub> e per kilometre) Baseline transport emissions factor per distance for buses (gCO <sub>2</sub> e per kilometre)	-	-	-	-	-	-	-
EF <sub>NG,upstream,CH<sub>4</sub></sub>	Emission factor for upstream fugitive methane emissions from production, transportation and distribution of natural gas in tCH <sub>4</sub> /GJ	-	-	-	-	-	-	-
GWP <sub>CH<sub>4</sub></sub>	Global warming potential of methane valid for the relevant commitment period	See project emissions						
N <sub>B</sub>	Number of buses in use in the baseline (units)	-	-	-	-	-	-	-
N <sub>i,y</sub>	Number of cars/taxis per annum using in the project boundary in year <i>y</i> (cars, taxis)	See baseline emissions						
N <sub>i,BL</sub>	Number of cars/taxis per annum using in the project boundary in the baseline (cars, taxis)	-	-	-	-	-	-	-
N <sub>Z,k</sub>	Number of buses in the conventional transport system of size <i>k</i> , where <i>S</i> , <i>M</i> and <i>L</i> stands for small, medium and large buses, respectively	✓	✓	✓	✓	✓	✓	✓
N <sub>T,y</sub>	Number of taxis operating in year <i>y</i>	-	-	-	-	-	-	-
N <sub>Z,y</sub>	Number of buses in the conventional transport system operating in year <i>y</i>							
NCV <sub>NG,y</sub>	Net calorific value of the natural gas used by the project during the year <i>y</i> in GJ/m <sup>3</sup>	-	-	-	-	-	-	-
OC <sub>i</sub>	Average occupancy rate of vehicle category <i>i</i> prior to the project start (passengers)	See baseline emissions						
OC <sub>i,y</sub>	Average occupancy of vehicle in category <i>i</i> in year <i>y</i> (persons)	✓	✓	✓	✓	✓	✓	✓
OC <sub>T,y</sub>	Average occupancy rate of taxi in year <i>y</i> (passengers only: Driver not counted)	✓	✓	✓	✓	✓	✓	✓
OC <sub>T,0</sub>	Average occupancy rate of taxi before the project start (passengers only: Driver not counted)	✓	✓	✓	✓	✓	✓	✓
P <sub>y</sub>	Passengers transported by the project in year <i>y</i> (passengers)	See baseline emissions						
ROC <sub>i,y</sub>	Occupancy rate of vehicle category <i>i</i> relative to its capacity; occupancy of vehicle category <i>i</i> in year <i>y</i>	✓	✓	✓	✓	✓	✓	✓
ROC <sub>Z,0</sub>	Average occupancy rate relative to capacity of buses before start of project	✓	✓	✓	✓	Calculated		
ROC <sub>Z,y</sub>	Average occupancy rate relative to capacity of conventional buses in year <i>y</i> , based on the most recent study of occupancy rates	-	-	-	-	-	-	-
RS <sub>BL</sub>	Total road space available in the baseline (lane-kilometres)	-	-	-	-	-	-	-
RS <sub>PJ</sub>	Total available road space in the project (= RSB minus kilometre of lanes that where reduced due to dedicated bus lanes) (lane-kilometers)	-	-	-	-	-	-	-
S <sub>i,y</sub>	Net share of passengers using the BRT which would have used mode <i>i</i> in year <i>y</i> (%)	See baseline emissions						
SRS	Share of road space used by public transport in the baseline (in percentage)	-	-	-	-	-	-	-
TC <sub>PJ,NG,y</sub>	Quantity of natural gas used by project units in the year <i>y</i> in m <sup>3</sup>	-	-	-	-	-	-	-
TD <sub>i,y</sub>	Average trip distance driven by cars/taxis in year <i>y</i> (km)	See baseline emissions						
V <sub>B</sub>	Average speed of cars/taxis prior to the project start (km/h)	-	-	-	-	-	-	-
V <sub>P,y</sub>	Average speed of cars/taxis in year <i>y</i> (km/h)	-	-	-	-	-	-	-
VD <sub>T</sub>	Average distance driven by taxi on before the project starts (kilometres)	-	-	-	-	-	-	-
<b>5</b>	<b>MONITORING PLAN</b>	<b>(PDD Section B.7.)</b>						
5.1 [1] 122	The PDD shall include a monitoring plan. This monitoring plan shall be based on the approved monitoring methodology applied to the proposed CDM project activity.	[10] B.7.2	DR I	CAR 2	OK			

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	Comment: <b>CAR 2:</b> The monitoring plan is not transparent. There is no information in Annex 4. An updated Monitoring Manual is missing.				
	<b>Methodological requirements (incl. tools)</b> AM0031 "Bus Rapid Transit Projects", version 04.0.0				
5.2 [5] III	QA and QC is assured by having a monitoring manual containing <i>inter alia</i> how to proceed with key measurements and survey, how to screen data for quality and potential errors and by training the staff in charge of monitoring.	[10] B.7.2 Annex 4	DR I	CAR 2	OK
	Comment:				
5.3 [5] III	For the periodic survey of passengers and the surveys monitoring the load factor, the core outline shall be included in this methodology and the PDD shall contains a detailed design of both instruments. The PDD must contain an elaborated version of such a survey.	[10] B.7.2 Annex 4	DR I	CAR 2	OK
	Comment:				
5.4 [5] III	Describe and specify in the CDM-PDD all monitoring procedures, including the type of measurement instrumentation used, the responsibilities for monitoring and QA/QC procedures that will be applied.	[10] B.7.2 Annex 4	DR I	CAR 2	OK
	Comment:				
5.5 [5] III	Where the methodology provides different options (e.g. use of default values or on-site measurements), specify which option will be used.	[10] B.7.2 Annex 4	DR I	CAR 2	OK
	Comment:				
5.6 [5] III	All meters and instruments should be calibrated regularly as per industry practices.	[10] B.7.2 Annex 4	DR I	CAR 2	OK
	Comment:				
5.7 [5] III	All data collected as part of monitoring should be archived electronically and be kept at least for two years after the end of the last crediting period.	[10] B.7.2 Annex 4	DR I	CAR 2	OK
	Comment:				

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## Protocol 2: Summary of Requests

No.:	CL 1	Reference to Checklist: 2
DOE request:	The situation in case of PP's is not transparent. The PP shall provide more information about the history and "CAF-Netherlands CDM facility". If Grütter Consulting is no longer PP, then the MoC change is missing.	
Project participant response:	Grütter Consulting is PP until the end of the 1 <sup>st</sup> crediting period which goes until 31.12.2012. Therefore the MOC cannot be changed now but will be changed in the future. Due to above the PPs have been included as presently registered by the UNFCCC	
DOE request:	A.3.: The explanation in brackets for CAF is not consistent with the approved text in the revised PDD from UNFCCC Website, version 5.4 [8]. Also in Annex 1.	
Project participant response:	Section A3 has been changed to have the same institutions. The prentices is not required. The Annex has the same institutions as in Section A3. It is not required that they have the same persons or address as in the revised PDD as this is a new PDD which is the new registered version which can have updates in persons or directions.	
DOE conclusion:	PDD revised accordingly. Response accepted. CL 1 is closed Date: 19/06/2012	

No.:	CL 2	Reference to Checklist: 2
DOE request:	The information (countries) in A.3 is not consistent with Annex 1.	
Project participant response:	Has been made consistent	
DOE request:	Annex 1: The country (Colombia) for CAF is not consistent with the approved country (Venezuela) in the revised PDD from UNFCCC Website, version 5.4 [8].	
Project participant response:	This is not correct. Venezuela is not listed as an approved country by project 0672. CAF is listed under the Netherlands. This is in accordance with the registration of the project. See website: <a href="http://cdm.unfccc.int/Projects/DB/DNV-CUK1159192623.07/view">http://cdm.unfccc.int/Projects/DB/DNV-CUK1159192623.07/view</a> Host country is: Colombia and other Parties involved are Netherlands and Switzerland. Thus in fact usage of Venezuela is not correct as this country is not an approved Party. The 2 <sup>nd</sup> period PDD takes for CAF Netherlands. CAF is approved under the Netherlands as of today and this remains. The address can be technically seen in Colombia i.e. there is no regulation to our knowledge that this is not allowed and it has been approved by the UNFCCC for the original as well as the revised PDD and thus the current PDD for the 2 <sup>nd</sup> period is consistent with the former versions	
DOE conclusion:	PDD revised accordingly. Response accepted. CL 2 is closed Date: 19/06/2012	

No.:	CL 3	Reference to Checklist: 3
DOE request:	Some of the tables (OC <sub>T</sub> , ROC <sub>Z</sub> ) to describe data/parameters were altered and do not comply with the requirements. There is insufficient detail regarding "postcode" in tables PDD Annex 1.	
Project participant re-	"to be used" has been added to the table	

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sponse:	Has been changed from postfix to postcode	
DOE conclusion:	CL 3 is closed	Date: 06/06/2012

No.:	CL 4	Reference to Checklist: 3
DOE request:	The geo coordinates (PDD A.4.1.4) are missing.	
Project participant response:	The original PDD did not have any. However we have added latter.	
DOE conclusion:	CL 4 is closed	Date: 06/06/2012

No.:	CL 5	Reference to Checklist: 3
DOE request:	Some sources have not been adequately (precisely) referenced, so that everyone finds the source. PDD page 7 Table 1, page 8 Table 3, page 10 Footnote 17 Resolutions	
Project participant response:	Table 1 has been changed with a clear source Table 3 is from File 25 Footnote 17 is File 11	
DOE request:	Table 1: the referenced link cannot be found the page.	
Project participant response:	The link has been changed	
DOE conclusion:	CL 5 is closed	Date: 19/06/2012

No.:	CL 6	Reference to Checklist: 3.2
DOE request:	The reverred tools in the methodology used are missing in B.1.	
Project participant response:	The original tool used for the registered PDD has been added. This refers to the original tool as this section (B5, additionality) is not revised for a new crediting period.	
DOE conclusion:	CL 6 is closed	Date: 06/06/2012

No.:	CL 7	Reference to Checklist: 4 (a) 1
DOE request:	The text in Table 4, condition 3 is not consistent with the methodology.	
Project participant response:	The text in Table 4 has been copied literally from the methodology AM0031 Version 4 page 3.	
DOE conclusion:	CL 7 is closed	Date: 06/06/2012

No.:	CL 8	Reference to Checklist: 4 (a) 2.5
DOE request:	Discussion regarding 10-year crediting period is missing.	
Project participant response:	The project has been registered and approved by the UNFCCC for a renewable crediting period. This is not changed and not a matter of discussion during the renewing of the crediting period. The new version of AM0031 only allows for a fixed crediting period which affects new projects, however not projects which have been	

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registered previously with a renewable crediting period. EB 65 Annex 20 which is relevant for the renewing of the crediting period identifies the points to be discussed during the renewing of the crediting period and this does clearly not include the crediting time. The newly calculated baseline parameters and the changes in the monitoring parameters based on the new version of AM0031 are not related to the crediting period.

DOE conclusion: The condition regarding 10-year crediting period is not part of section "Applicability" of the methodology. Response accepted.  
CL 8 is closed Date: 06/06/2012

No.:	CL 9	Reference to Checklist: 4 (b)
DOE request:	The information Table 6 (page 12) is not limited to the project activity.	
Project participant response:	This is correct. This table is copied from the original note and shows the entire TM network thus including Phase I trunk routes. An explanatory note has been added at the end of the table	
DOE conclusion:	CL 9 is closed Date: 06/06/2012	

No.:	CL 10	Reference to Checklist: 4 (c) 10
DOE request:	Statement regarding original baseline scenario is missing.	
Project participant response:	Section B.4. step 1.1. a statement has been added	
DOE conclusion:	CL 10 is closed Date: 07/06/2012	

No.:	CL 11	Reference to Checklist: 4 (c) 12
DOE request:	A statement regarding equations, BRT gaseous fuel and electricity in Alternative A (page 40) is missing.	
Project participant response:	A statement has been added.	
DOE conclusion:	CL 11 is closed Date: 07/06/2012	

No.:	CL 12	Reference to Checklist: 4 (c) 13
DOE request:	Some of the titles do not comply with the requirements. The abbreviation (SEC) for fuel type and vehicle type permutes. The abbreviation for diesel D is not consistent.	
Project participant response:	Section B.6.2. has been reviewed and checked with the methodology. All titles are identical to the methodology SEC has simply been separated into vehicle categories and fuels for simplicity of reading using the abbreviations as also in the methodology equations	
DOE conclusion:	CL 12 is closed Date: 07/06/2012	

No.:	CL 13	Reference to Checklist: 3
DOE request:	All Excel and Word files, which are used as a reference shall be in non-changeable	

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	format (pdf) and be "officialised" with release date and signature and source. The auditors accept a mail with a release and a correctness statement by the originator. Such as File 9a, 9c, 22a
Project participant response:	This has been made and the DOE has been supplied with this information. File 9a and 9c are referred to in File 9b. See also letter attached concerning File 9a. File 9c was not used in the PDD as only File 10 was used for bus numbers File 22a see letter attached part 1 and part 2
DOE conclusion:	CL 13 is closed Date: 07/06/2012

No.:	CL 14	Reference to Checklist: 4 (c) 13
DOE request:	The calculation and source of the parameter $P_z$ , $FC_{PJ,x,y}$ and $S_{i,y}$ is not transparent.	
Project participant response:	$P_z$ has been updated and clarified also in the new spreadsheet $FC_{PJ}$ has been clarified $S_i$ has been clarified	
DOE conclusion:	Parameter $S_i$ has been re-calculated by validator; values used are correct. CL 14 is closed Date: 07/06/2012	

No.:	CL 15	Reference to Checklist: 4 (c) 13
DOE request:	For the statement "drops below 52%" (page 55) the source is not referenced.	
Project participant response:	This is a calculation based on the methodology. The source has been added.	
DOE conclusion:	CL 15 is closed Date: 07/06/2012	

No.:	CL 16	Reference to Checklist: 4 (c) 13
DOE request:	For parameter $N_i$ and $N_{i,x}$ values used are missing in a box (B.6.2).	
Project participant response:	These parameters are not listed in the methodology under B.6.2. and thus need not be listed in the PDD. $N_T, N_z$ and $N_c$ are listed in B.7.1 in accordance with the methodologies as monitored parameters.	
DOE conclusion:	CL 16 is closed Date: 07/06/2012	

No.:	CL 17	Reference to Checklist: 3
DOE request:	PDD page 78 "Metro Gurgaon" is referenced. For what?	
Project participant response:	Typo error has been corrected	
DOE conclusion:	CL17 is closed Date: 07/06/2012	

No.:	CL 18	Reference to Checklist: 4 (c) 13
DOE request:	Some points in <CER sheets TM 2nd period version 1.1> [11.1] are not consistent with the PDD; they have no effect of the calculation. - "Project": Formula $EF_{KM,j,y}$ is not consistent with PDD page 78	

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	<ul style="list-style-type: none"> <li>- "Baseline EF": IF 0.997 is for motorcycles, not for cars, buses, taxis. Text is not correct.</li> <li>- "Leakage": The value for baseline occupation rate taxis is not correct because the link is not correct.</li> </ul>
Project participant response:	<p>The formulae in the sheet "Project" of the CER sheet has been adjusted.</p> <p>The text IR (improvement rate) sheet "Baseline EF" has been changed to motorcycle.</p> <p>The value occupation rate taxis in the sheet "Leakage" has been updated with the correct link.</p>
DOE conclusion:	<p>CL 18 is closed</p> <p>Date: 19/06/2012</p>

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No.:	CAR 1	Reference to Checklist:	4 (a) 2.3
DOE request:	The described project situation is not correct. Rail-based transit exists in Bogota. The PP shall explain the situation in more detail. Evidence is missing.		
Project participant response:	No train for urban passenger transport exists. The only rail system operating in Bogota is a tourist train. This has been clarified <a href="http://www.turistren.com.co/">http://www.turistren.com.co/</a>		
DOE conclusion:	CAR 1 is closed		Date: 06/06/2012

No.:	CAR 2	Reference to Checklist:	5
DOE request:	The monitoring plan is not transparent. There is no information in Annex 4. An updated Monitoring Manual is missing.		
Project participant response:	The monitoring is not part of the plan to be checked during renewal of the crediting period. The project is already successfully issuing CERs since various years and therefore monitoring is fully implemented. However we have added some more reference and the latest version of the MM for the DOE. See MM for Phase II attached.		
DOE request:	That's correct; the monitoring plan is not part of the DOE's validation opinion but the PP shall update those sections of the PDD relating to the monitoring plan. The Monitoring Manual <Manual_Marzo_14_de_2012_final (1)> is in Spanish. The key elements (e.g. table with parameters monitored, calibration) should be integrated in the PDD in English for transparency. Figure 5: Organization Structure (PDD page 59) is not consistent with Figura 1: Organigrama MM V 1.0 (14/03/2012).		
Project participant response:	The MM has been updated and has already been sent to the DOE. Section B.7.2. has all information which is required, is detailed enough and contains all relevant issues. EB 20 Annex 7 is relevant. The organizational chart in the PDD Figure 5 has been updated. Reference to the MR 2011 has also been made.		
DOE conclusion:	CAR 2 is closed		Date: 27/06/2012

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