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CDM Validation Report

Enterprise

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Service

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Date

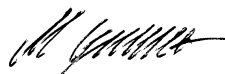
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Signature



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29/06/2011



Executive board:
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29/06/2011

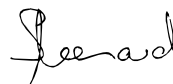


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1 Introduction

1.1 Objective

Grütter Consulting AG has commissioned SQS to perform a validation of the Metro Delhi, India (hereafter called "the project"). The validation objective is an independent assessment by a Designated Operational Entity (DOE) of a proposed project activity against all defined criteria set for the registration under the Clean Development Mechanism (CDM). Validation is part of the CDM project cycle and will finally result in a conclusion by the executing DOE whether a project activity is valid and should be submitted for registration to the CDM Executive Board (CDM-EB). The ultimate decision on the registration of a proposed project activity rests at the CDM-EB and the Parties involved.

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed 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
- 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).

The validation team has used a risk-based approach focusing on the identification of significant risks for project implementation and the generation of CERs.

1.3 Project description

The objective of the project is to establish and operate an efficient, safe, rapid and convenient modern mass transit system ensuring high ridership levels in the city of Delhi, India. The city has a total of around 14 million inhabitants thus being the 2nd largest city in India. The Mass Rapid Transit System (MRTS) proposed is a partially elevated, partially underground and partially at-grade heavy duty metro with a length of 102 km expecting to transport on average in 2011 around 1.1 million passengers daily. The project involves the installation of

- a new infrastructure consisting of 102 kilometers of state-of-the art metro with new trains, and pre-board ticketing using rechargeable electronic cards,
- equipment and turnstiles at the entrance to each station which will deduct the corresponding fare from electronic tickets,
- centralized coordinated train control providing monitoring and communication to schedule services and real-time response to contingencies.

The estimated emission reductions of 529'043 t CO₂ per year are achieved by passengers using the metro instead of buses, cars, rickshaws etc. Thus reducing GHG emissions of the conventional transportation means.

The project starting date is 10/11/2005. The first 7 year crediting period starts 01/05/2011 or after registration whichever is later.

1.4 Validation methodology

The SQS auditors apply 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 information from sources other than that used, if available, and if necessary independent background investigations
- (b) Follow-up actions (on-site visit, telephone, email 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 auditor 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 auditor shall ensure that these issues are correctly identified, discussed and concluded in the validation report.

The auditor 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 auditor 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 auditor 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 auditor 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 meet SQS’ expectations. If this is not done, the SQS shall not recommend the project activity for registration to the CDM Executive Board.

In order to ensure transparency, a validation protocol (Checklist CDM Validation) 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 validator will document how a particular requirement has been validated and the result of the validation.
- The validation protocol consists of two tables. The different columns in these tables are described in below Figure.

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

Validation Protocol 1-2: Requirements	
<i>Requirement</i>	The requirements the project must meet.
<i>Ref.</i>	Reference to the PDD or documents.
<i>MoV (Means of Validation)</i>	Explains how conformance with the requirements is investigated. DR = Document Review, I = Interview, N/A = Not Applicable
<i>Comment / Cross Reference</i>	The section is used to elaborate and discuss the conformance to the requirement. May give reference to the PDD or documents.
<i>Draft Concl. / Final Concl. (Draft and/or Final Conclusion)</i>	OK = Conform, CAR = Corrective Action Request, CL = Clarification Request, FAR = Forward Action Request

Validation Protocol 3: Summary of Requests (below in section 3.12)	
<i>No.:</i>	The requests (CAR, CL, FAR) are numbered and listed in this section.
<i>Reference:</i>	Reference to the checklist question number in Protocol 1-2 where the Request is explained.
<i>Validator findings / request:</i>	The section is used to elaborate and discuss the request. May give reference to the PDD or documents.
<i>Project proponent response:</i>	The responses given by the client or other project participants during the communications with the validation team is summarized in this section.
<i>Validator conclusion:</i>	This section summarizes the validation team's responses and final conclusions. The result of the conclusions also is then included in Protocol 1-2, under "Final Conclusion".
<i>Date:</i>	Date when request was closed.

2 Validation Opinion

2.1 Summary of the validation conclusions

From the evidence gathered during the validation process, SQS concludes that the project meets all relevant criteria of the listed references in appendix B and correctly applies the approved methodology. Therefore, SQS requests the registration of the project.

2.2 Summary of the validation methodology and process used and the validation criteria applied

The validation process has been carried out using the methodology described in paragraph 1.4. This has included a desk review of the PDD including the annexes and the additional documents listed in the PDD annex 3 [1], an on-site visit on 05-06/08/2010 including interviews.

21 CARs, 11 CLs and 1 FAR have been raised; all CARs and CLs are closed. As a consequence of these requests the PDD has been modified from the original version 1.0 (03/05/2010) to the current version 1.3 (20/01/2011).

2.3 Description of project components or issues not covered by the validation process

All project components have been covered by the validation process.

2.4 Statement on the validation of the expected emission reductions

The calculation of the expected emission reduction is to be found in the file "PDD tables Phase II" (version 1.1, 20/08/2010) [5]. The formulas and parameters have been crosschecked with other information sources. The emission reduction figures are approximately 85% of the figures published in the first version of the PDD. This is due to several modifications which have been made to the PDD as a result of CARs and CLs.

The expected emission reduction of 529,043 tCO₂ per year and 3,703,305 tCO₂ for the whole crediting period of 7 years is correctly calculated.

The expected emission reductions are calculated based on the projected passenger numbers. As will be shown later in this report (see 3.6.3. Investment Analysis) the PP does not expect these projected numbers to materialize. The validators accept this procedure because the methodology ACM0016 does not state that the same passenger numbers must be used for the expected emission reduction calculations as for the investment analysis. The actual emission reductions will eventually be identified upon verification based on the actual passenger numbers.

2.5 Statement whether the proposed CDM project activity meets the stated criteria

Based on the observations made during the validation process SQS concludes that the proposed project is accurate, conservative, relevant, complete, credible and reliable.

3 Validation Findings

3.1 Approval

Both parties, India and Switzerland have ratified the Kyoto Protocol on 26 August 2002 and 9 July 2003, respectively (verified on the UNFCCC internet site).

A letter of approval [2] issued by the host country's DNA (Government of India, Ministry of Environment & Forests) has been submitted to SQS by the project participant Grütter Consulting AG. The letter (No. 4/2/2010-CCC) is dated 06 August 2010. It contains the required information and statements with regard to confirmation of ratification of the Kyoto Protocol, voluntary participation, sustainable development, and precise project title.

Switzerland as the second party involved has issued a correct letter of approval [3], dated 25 November 2010.

3.2 Participation

The names of the two project participants Delhi Metro Rail Corporation Ltd. and Grütter Consulting AG are used consistently in the PDD. The letter of approval of the host country India [2], dated 6 August 2010 mentions the name of the first participant. The letter of approval of Switzerland [3], dated 25 November 2010 mentions the name of the second participant.

3.3 Project design document

The PDD Metro Delhi, India version 1.3, 20/01/2011 [1] meets the CDM requirements for completing PDDs. It is clearly written, well understandable and references all needed documents. Besides some minor formal adaptations (CAR #4, CAR #10, CAR #13, CAR #14, CL#09 which all could be closed), the original PDD version 1.0, 03/05/2010 has been modified in order to clarify the demonstration of additionality (CAR #3, CAR #11, CAR #12, all closed).

From the PP's answers to CAR #3 and CAR #12, it became evident to the validators that the first PDD version was not consistent with regard to the information, which was available at the time of the project start. On the one hand, the investment analysis was based on the numbers of six lines only (PDD table 2 [20]) but the construction of two other lines (Noida and Gurgaon corridors) [31, 32] had already been decided (information, which was available at project start had not been included in the PDD). On the other hand, reduced revenues were calculated using the experience of the Kolkata Metro Railway [22] as well as that of Metro Delhi Phase I. The latter numbers, however, were not available on the project start date. The validators could not accept the results of the investment analysis because of these inconsistencies. CAR #3, CAR #11, and CAR #12 were raised. Subsequently, the PP has modified the PDD [1]. The investment analysis is now strictly based on the information, which was available at the time of the project start, i.e. including the numbers for the Noida [31] and Gurgaon [32] corridors.

CAR #06 was raised to get further explanation and breakdown of how the various public sources finance the phase II extension of the Delhi Metro. The PP adapted the PDD by including the extensions to Noida and Gurgaon (see also 3.6.3. Investment Analysis) with its respective financing structures, which resulted in a new finance analysis but which did not change the original relationship of JBIC funding (see answer to CAR #06). SQS considered this explanation and adaption by the PP as satisfactory. CAR #06 could be closed and the appropriate project description is now accurate and complete.

An earlier version of the PDD with a slightly different project boundary had been submitted to TÜV Nord as a DOE. This was not mentioned in the first PDD of this project. The project chronology was adapted and CL #2 could be closed.

3.4 Project description

The project description (see 1.3 above) in the PDD is understandable and gives a good overall picture of the activities. The on-site visit on 5 -6 August 2010 and the interviews (see on-site visit program and interviews in Appendix A) have confirmed this description. No contradictory information or findings have been unveiled.

However, it was not sufficiently clear from the PDD how the project progress and the implementation stages have developed. Therefore CAR #2 was raised. The PDD was then amended in section A.4.3. table 2 and 3 (new) where the sequence of corridors and decision taking is explained [20, 31, 32]. CAR #2 could be closed.

A web based application "Map my India" has been used to calculate distances during the initial survey. CL #3 was raised to further clarify this application. "MapmyIndia" has responded to this query satisfactorily and the clarification request could be closed. It is SQS's opinion that the project description is accurate and complete.

3.5 Baseline and monitoring methodology

3.5.1 General requirement

The project applies the methodology ACM0016 "Baseline Methodology for Mass Rapid Transit Projects", version 01.

The project applies the following tools which are referenced in ACM0016:

"Tool for the demonstration and assessment of additionality", version 05.2

"Tool to calculate baseline, project and/or leakage emissions from electricity consumption", version 01.

The latest available version is used for the methodology as well as for the tools.

3.5.2 Applicability of the selected methodology to the project activity

The methodology ACM0016 lists eight applicability conditions. They are discussed one by one in PDD table 4. SQS has verified by desk review, on-site visit and interviews that all eight criteria are met (for details see Validation Protocol B.2.2. – B.2.9)

Table 4: Applicability Conditions and MoV

Applicability condition	Project situation	Validation
The project constructs a new rail-based infrastructure or segregated bus lanes. In the case of rail systems the project needs to provide new infrastructure (new rail lines). The segregated bus lanes or the rail-based MRTS replace existing bus routes operating under mixed traffic conditions.	The MRTS is new rail-based mass transit system and replaces partially bus operations operating under mixed traffic conditions. The rail infrastructure is new. Bus routes and schedules are adapted to metro. Evidence of this is the listing of bus routes to be eliminated along Delhi Metro ¹ as well as urban planning documents for multi-mode transport schemes coordinating bus and metro services ² .	New rail lines, OK
The methodology is not applicable for operational improvements (e.g. new or larger buses) of an already existing and operating bus lane or rail-based MRTS.	The MRTS is a new metro with new infrastructure.	New metro, OK
The methodology is not applicable for bus lanes replacing an existing rail-based system.	The MRTS is rail-based.	Extension of rail based MRTS, OK
The methodology is applicable for passenger transport only.	The MRTS is a passenger transport system	Only used for pass. OK
Any fuels including electricity, (liquefied) natural gas and biofuel blends can be used in the baseline or project case. To keep the	The project is rail-based only and uses electricity. Baseline transport fuels are diesel, gasoline and gaseous fuels. No bio-fuels are used in the baseline or	The project equipment uses only electricity.

¹ File 45

² File 46

<p>methodology a bit less complex, no provisions to calculate upstream emissions are provided. However, in order that resulting emission reduction estimates are conservative, this lack of provisions necessitates certain restrictions in the applicability for fuel switch situations where CDM methodologies usually require the consideration of upstream emissions or where the treatment of upstream emissions has not yet been solved methodologically:</p> <ul style="list-style-type: none"> • In case of natural gas, the methodology is applicable if equal or more natural gas is used in the baseline than in the project case. The methodology is not applicable in its current form if more natural gas is used in the project compared to the baseline case. • In the case of biofuels, project buses must use the same biofuel blend (same percentage of biofuel) as commonly used by conventional comparable urban buses in the country. 	<p>project case. Baseline buses use CNG while the project uses electricity. Thus more natural gas is used in the baseline than in the project case as passengers switch partially from buses to metro.</p>	<p>the baseline fuels for internal combustion vehicles are discussed in the PDD OK</p>
<p>The methodology is not applicable for the implementation of air and water-based transport systems.</p>	<p>No air or water-based transport is included. The MRTS is rail based.</p>	<p>OK</p>
<p>The project system partially replaces a traditional public transport system in a given city. The methodology cannot be used in areas where currently no public transport is available.</p>	<p>The MRTS replaces partially traditional bus trips. Public transport is currently available in the project area.</p>	<p>Delhi has an extensive network of bus-based public transport system that is supported by taxis and auto rickshaws. They are partially replaced by the project. OK</p>
<p>The methodology is applicable for urban or suburban trips. It is not applicable for inter-urban transport.</p>	<p>The MRTS is purely urban transport.</p>	<p>OK</p>

The methodology includes the direct and indirect project GHG emissions as well as leakage. No further GHG emissions are to be expected within the project boundary as a result of the project activity.

3.5.3 Project boundary

The document review and the observations and discussions during the on-site visit have shown that the project has been expanded step by step from originally 53 km [20] to 102 km [1]. No detailed information was given in the PDD about this expansion (CAR #3). The chronology and the spatial project boundaries were subsequently clarified with two new tables (Table 2 and 3) and explanatory text in the revised PDD and with supporting documents [31, 32,33,34] and CAR #3 could be closed. The description is now congruent with the observations made during the validation process.

The GHG included in the project boundary are CO₂ and CH₄ while N₂O is not included in the baseline as a conservative approach. Table 5 gives the details. This table (originally table 3) has been corrected in re-

sponse to CAR #7 (CH4 was excluded in the project activity however indicated in the table as included) and CAR #8 (no statement about leakage gases). Both CARs are closed.

A clarification request was raised (CL #1) since there is another CDM project going on at Metro Delhi with a risk of double counting. The PP could show that the other project covers rolling stocks just for Phase I. Double counting of emission reductions can thus be excluded.

The choice of boundary, sources and gases corresponds to the methodology and is rated justified by SQS.

3.5.4 Baseline identification

The PDD describes the baseline identification by following precisely the methodology ACM0016: Step 1 "identification of alternative scenarios" (described in this section of the report); Step 2 "Investment analysis for all alternatives that are remaining after Step 1 (page 6 of methodology)." (see 3.6.3 below); Step 3 "Common practice analysis" (see 3.6.5 below).

Alternatives assessed are public transport systems which are complemented with other modes of transport such as passenger cars, taxis, motorcycles, motorized rickshaws and non-motorized transport:

- The establishment of a BRT (Bus Rapid Transit);
- The establishment of a LRT (Light Rail Transit);
- The continuation of the current public and individual transport systems, including (future) investments in road based infrastructure if applicable;
- The proposed project activity being implemented at a later date in the future, without being registered as a CDM project activity;
- The project proposal not implemented as a CDM project activity i.e. the continuous construction of metro after Phase I.

It was not clear why Metro Phase I lines were not included as a mode of transportation in the baseline situation; a CL #7 was raised. The explanation by the PP was clear and CL #7 could be closed: Metro Lines Phase I are not a baseline mode of transport as the lines of Phase I are not substituted by the project lines of Phase II i.e. the passenger cannot, in absence of the project, use metro lines Phase I to make the trip as these do not operate in the area of metro lines Phase II (see Figure 1). Passengers will require for this purpose transit modes which actually perform this trip segment such as buses, cars, taxis etc. Metro lines Phase II i.e. the project metro do not replace the metro lines Phase I nor can the passenger use in absence of metro lines Phase II the metro lines Phase I. Therefore, metro lines Phase I are not a baseline mode of transport.

The validation has not come up with another alternative than those identified in the project, also by internet search [44].

Step 2: Assessment of Options

The analysis of options identified in Step 1 is based on the "Tool for the demonstration and assessment of additionality" Version 05.2

ALTERNATIVE 1: ESTABLISHMENT OF A BRT

A BRT is being designed and implemented for parts of Delhi and will complement the metro plus other mass transit options in the city. However, for the areas on which the metro is planned, a BRT system was considered as non-feasible basically due to the required passenger per hour capacity. BRT or bus lane systems have typical carrying capacities of 15,000-35,000 passengers per hour per direction (phd) while metros have around 60,000 phd [66]. Also the GTZ sourcebook on sustainable transport modes confirms that capacities of more than 35,000 phd are only achieved by metro, with capacities of metros reaching up to 81,000 phd by the metro of Hong Kong [67]. The ultimate capacity of Delhi Metro is 75-80,000 passengers phd. Metro Delhi will have on various routes of Phase II more than 35,000 phd thus a BRT based system not being feasible

technically [68]. Based on the above consideration, a BRT is not considered as a technically viable solution due to the passenger demand on the corridors on which the metro is built.

The validators with international public literature the viability of the alternative of a BRT. BRT or bus lane systems have typical carrying capacities of less than 10,000 passengers per hour per direction (phd) – see following table for the carrying capacity of numerous BRTs. The median value for all included BRTs is 7,000 phd which gives an indication that BRT are basically used for secondary lines in large metropolitan cities and as main lines in smaller and medium sized cities.

BRT Capacity Passenger-Hour Direction (Rounded to thousands; based on the BRT line with the highest phd if various lines operate)

BRT Project	Phd
Ahmedabad, India	1,000
Amsterdam, Netherlands	1,000
Bangkok, Thailand	1,000
Beijing, China	4,000
Bogota, Colombia	42,000
Brisbane, Australia	7,000
Bucaramanga, Colombia	10,000
Cali, Colombia	12,000
Cartagena, Colombia	14,000
Changzhou, China	7,000
Dalian, China	6,000
Guadalajara, Mexico	9,000
Guatemala City, Guatemala	12,000
Guangzhou, China	27,000
Hangzhou, China	7,000
Hefei, China	3,000
Jakarta, Indonesia	4,000
Jinan, China	3,000
Kunming, China	4,000
Medellin, Colombia	7,000
Mexico City, Insurgentes	10,000
Mexico City, Eje 4	6,000
Nagoya, Japan	1,000
Nantes, France	1,000
Pereira, Colombia	7,000
Quito, Ecuador	6,000
Seoul, Korea	7,000
Xiamen, China	8,000
Zaozhuang, China	1,000
Zhengzhou, China	6,000
Median	7,000
Range all	1,000 – 42,000

Source: Colombian BRTs based on File « DNP, En que invierte el Gobierno Colombiano, 2009 », charts 3.78 (p. 224); 3.80 (p. 230); 3.92 (p. 237); 3.99 (p. 244); 3.105 (p. 249); 3.112 (p. 258); 3.121 (p. 265); BRT Guadalajara based on File Macrobus, BRT data Guadalajara, 2010; BRT Guatemala based on File Municipalidad de Guatemala, BRT Data Guatemala, 2010; For BRT Insurgentes and Eje 4: Metrobus 2009 based on O-D matrix Metrobus, phd, 2009; all others based on ITDP, 2011, see <http://www.chinabrt.org/>

For the areas on which the metro is planned, a BRT system is considered as non-feasible basically due to the required passenger per hour capacity. This alternative is thus not further considered and is not included in the investment analysis in accordance with ACM0016 Step 2 page 5: "Conduct an investment comparison analysis for all alternatives that are remaining after Step 1".

ALTERNATIVE 2: ESTABLISHMENT OF A LRT

Light rail transit (LRT) includes also trams and monorails. LRTs operate as a single rail car or as a short train of cars typically on exclusive right-of-way lanes at surface levels. If elevated or underground, the carrying capacities of LRTs can be increased e.g. the proposed monorail for Delhi could have a carrying capacity of up to 25,000 phd (see <http://www.dimts.in/rail.html>). However, investment costs will also increase strongly. The LRT thereafter resembles basically a metro. This alternative faces similar if not more severe constraints than a BRT. LRTs typically have a capacity of 10-25,000 phd or far less than the required capacity for the corridors of Delhi Metro [66]. Also, they reach only about half the average speed of metro (this is also true of normal BRT systems) thus not offering the same level of convenience as metro. Based on above consideration, a LRT is not considered as a technically viable solution due to the passenger demand on the corridors on which the metro is built.

The following table shows differences between BRTs/Bus Lane systems, LRTs and metros. BRT and LRT are not adequate for the expected passenger demand along the metro lines of Delhi and that metro is the only viable alternative option to the current transport system based on mixed traffic conditions along a variety of roads offering users a wide spectrum of transport options and routes. LRTs and BRTs can however play an important role on segments with lower passenger demand and Delhi is assessing these alternatives for other routes, embarking already on a comprehensive BRT program as well as planning Light-Train Systems for other routes (see Delhi Integrated Multi Modal Transit System Ltd. (DIMTS) on <http://www.dimts.in/default.aspx>

Comparison BRTs, LRTs and Metros

Characteristic	BRT / Bus lane	LRT / Tram /Monorail	Metro
Passenger carrying capacity (phd)	15-35,000	10-25,000	up to 80,000
Average operating speed (km/h)	15-25	15-25	30-40
Space requirement	2-4 lanes taken away from existing road space	2-4 lanes taken away from existing road space	Separate from roadway corridors

Sources: IEA, Bus Systems for the Future, 2002, Table 2.1. [66].

Alternative 2 (Implementation of a LRT) is thus correctly considered as not a plausible alternative in the context of the stepwise procedure of ACM0016 for identifying the baseline scenario. This alternative is thus not further considered and is not included in the investment analysis in accordance with ACM0016 Step 2 page 5: "Conduct an investment comparison analysis for all alternatives that are remaining after Step 1".

ALTERNATIVE 3: CONTINUATION OF THE CURRENT SYSTEM INCL. FUTURE INVESTMENTS

A continuation of the current transport system complies with all applicable legal and regulatory requirements. A continuation of the current system has various advantages compared to all other options:

- No large-scale public investment requiring additional income/tax sources.
- Lowest technical and financial risk of all options.

The carrying capacity of the current public transport system is in line with the actual transport demand. Increasing passenger demand can be accommodated through the establishment of new routes using also alternate roads, which might imply potentially longer travel distances complying, however, with the purpose of transporting passengers from their trip origin to their trip destination. Additional transit demand might also lead to increased trip times due to increased congestion. The existing transport system relies not on single or

fixed routes like a BRT, metro or LRT but on a multitude of possible routes and modes of transport using the existing road infrastructure and modes of transit. It is thus highly flexible and can accommodate passenger flows in excess of any single-route based MRTS.

The current mixed transit system as established in Delhi is continuously expanded i.e. new roads, intersections, flyovers or road extensions are built. The mixed road conditions are continuously upgraded to meet with increasing traffic demand as a result of increased population and economic wellbeing resulting in more trips as well as a rapidly increasing number of private vehicles using additional road space.

This situation was confirmed by the validation team by reviewing Annual Plan 2006-07 of the Transport Dep. Of the Gov. of NCT of Delhi.

ALTERNATIVE 4: THE PROJECT BEING REALIZED IN A LATER DATE WITHOUT CDM

The 9th 5-year plan (1997-2002) of the Government of India has no policy mandating a metro. Chapter 7.1.20 indicates: "It is necessary to encourage such modes of transport which are not heavily dependent on scarce land resources and to adopt construction procedures and practices which do not disfigure the land and do not create ecological problems." The section on strategy states in 7.1.23. "The length and breadth and the quality of the highways must be improved greatly as part of a national grid to provide for speedy, efficient and economical carriage of goods and people. Road transport needs to be regulated for better energy efficiency and pollution control, while the mass transport network needs to be made viable through a rational tariff policy and a refurbishment of the fleet." [69]. The Transport Department of the Government of NCT of Delhi in its Operating Plan for Delhi, 10.2002 with the title "Tackling Urban Transport" has a policy for mass transit in Delhi: "With the objective of achieving a balanced modal mix and to discourage personalized transport, it is proposed to augment mass transport by massive investments accompanied by institutional improvements. The focus, therefore, will be on increasing mass transport options by providing adequate, accessible and affordable modes like buses, mini-buses, electric trolley buses complemented by a network of a rail based mass rapid transit systems like metro and commuter rail. Para transit modes like autos and taxis are envisaged to provide feeder services in designated areas catering to work and leisure trips. Non-motorized transport like bicycles and cycle rickshaws will be accommodated." [70]. The Master Plan of Delhi 2001 also included various options for Delhi urban transportation: "(The) Mass Transportation System (is) to be Multi Modal e.g. MRTS, Ring Rail and Road based public transportation system." [71]. Various MRTS options are thus included and no specific policy mandating metro exists. There are thus no concrete plans which lead to the construction of a metro in absence of the CDM and a multitude of transport options are assessed. The continuation of current practice with mixed traffic systems i.e. private as well as public transport means is thus the core strategy also for the future of Delhi.

By taking into account the considerations above, it is the opinion of the validation team that Alternative 3 (implementation of the project in the future without CDM) is thus correctly considered as a non-realistic and non-credible alternative in the context of the stepwise procedure of ACM0016 for identifying the baseline scenario. This has been confirmed with the literature cited. This alternative is thus not further considered and is not included in the investment analysis in accordance with ACM0016 Step 2 page 5: "Conduct an investment comparison analysis for all alternatives that are remaining after Step 1".

ALTERNATIVE 5: THE PROJECT WITHOUT CDM

The implementation of the proposed project activity in absence of the CDM is considered as non-feasible due to financial reasons. The details are given in chapter B5 and are not repeated here to avoid duplication.

Step 3: Determination of the baseline scenario

If Step 2 results in more than one possible alternative baseline scenario, the most likely baseline scenario is the scenario with the lowest baseline emissions. Alternatives 1 (BRT), 2 (LRT), 4 (Future metro in absence of the CDM) and 5 (project without CDM) are not feasible. The most probable alternative in the future in absence of the project is, therefore, a continuation of the current transport system. This is thus the baseline for this project.

Details about the rationale for not considering the project without CDM as a realistic and credible alternative, including the validation assessment, are presented in the Section Assessment and demonstration of Additionality.

Following alternatives are thus credible, realistic and comparable:

- Continuation of the current situation
- Project without CDM

The options BRT, LRT and the option project in the future without CDM are NOT considered credible, realistic or comparable alternatives as argued above. They are thus eliminated in Step 1 and not further considered. Step 2 conducts an investment comparison analysis for all alternatives that are remaining after Step 1 (page 6 of methodology).

The continuation of the current situation requires no investment. Also, the project owner and investor would neither have operational costs nor operational revenues with this alternative as baseline buses, taxis, cars, motorcycles and other forms of baseline transport are not managed by the PP. As this option has no investment, no cost and no revenues, and as the project investor is not involved directly in this alternative, no investment calculation can be made.

For the 2nd remaining option the investment analysis is made including the situation with and the situation without CDM in accordance with ACM0016 and the latest approved version of the Tool for the demonstration and assessment of additionality.

All other options were eliminated in step 1 and are, thus, not further considered in line with ACM0016 p.6

By taking into account the considerations above to assess the baseline identification, it is SQS's opinion that assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. The validators confirm that all assumptions and data used by the project participants to identify the baseline are listed in the PDD, including their references and sources. As reported above, documentation including national and/or sectoral policies and circumstances used are relevant for establishing the baseline scenario and have been correctly quoted and interpreted in the PDD.

3.5.5 Algorithms and/or formulae used to determine emission reductions

The desk review has detected several inconsistencies in the calculation of the emission reductions. The sum of the reductions over eight years had been used to calculate the expected reduction for the seven years crediting period (CAR #5). The CORINAIR Guidebook was not the latest edition (CAR #16). The result of formula 18 was the speed dependent fuel consumption, but not the speed dependent CO₂ emission as indicated (CAR #17). All the CAR's could be closed after the PDD had been revised [1, 5, 30].

Vehicle categories are appropriately selected and justified; the on-site visit has confirmed that there are no other vehicle types, which should be included in the calculations [8]. The car distribution, however, was taken from a 9 years old document (CL #11). Objective evidence was provided by the PP, which showed that the general distribution did not change significantly over the last years. Furthermore, information was requested why leakage is assumed to be zero in the ex-ante calculation (CL #6); sufficient explanations were given by the PP and accepted by SQS.

The desk review has determined that the calculation of the emission reductions is carried out step by step according to the methodology ACM0016 as follows:

BASELINE EMISSION CALCULATIONS

The following steps are made:

Step 1: Conduct a survey in which for each surveyed passenger the trip distance per transport mode that would have taken place in the baseline is determined.

The survey is a monitored parameter. For ex-ante projections the PP made a pilot survey on existing metro lines of Delhi which serve as an approximation for the projections. The survey conducted was checked by the validation team through documentary review and local interview with field personnel of the survey team.

Step 2: Calculate the individual baseline emissions for each surveyed passenger.
See step 4 below.

Step 3: Apply an individual expansion factor to each surveyed passenger in accordance with the survey sample design (as defined in Annex 3), and summarize these to get the total baseline emissions of the period (week) surveyed. To get the annual (or monitoring period) baseline emissions, the baseline emissions of the surveyed period (week) are calculated per passenger of the period (week) and multiplied with the total passengers transported per year (or monitoring period).

The survey is a monitored parameter. For ex-ante projections the PP made a pilot survey on existing metro lines of Delhi and used an uniform expansion factor as no passenger distribution data was available for the lines not yet in operation.

Step 4: Take the lower limit of the 95% confidence interval as total baseline emissions.

The survey is a monitored parameter. For ex-ante projections the PP made a pilot survey on existing metro lines of Delhi which serve as an approximation for the projections.

$$BE_y = \frac{P_y}{P_{SPER}} \sum_p (BE_{p,y} \cdot FEX_{p,y}) \quad (1)$$

Where:

BE_y	Baseline emissions in the year y (g CO ₂)
$BE_{p,y}$	Baseline emissions per surveyed passenger p in the year y (g CO ₂)
$FEX_{p,y}$	Expansion factor for each surveyed passenger p surveyed in the year y (each surveyed passenger has a different expansion factor)
P_y	Total number of passengers in the year y
P_{SPER}	Number of passengers in the time period of the survey (1 week)
p	Surveyed passenger
y	Year of the crediting period

FEX and P are monitored data. The calculations performed were based on ex-ante projections.

The baseline emission per surveyed passenger is calculated based on the mode used, the trip distance per mode and the emission factor per mode:

$$BE_{p,y} = \sum_i BTD_{p,i,y} \cdot EF_{PKM,i,y} \quad (2)$$

Where:

$BE_{p,y}$	Baseline emissions per surveyed passenger p in the year y (g CO ₂)
$BTD_{p,i,y}$	Baseline trip distance p per surveyed passenger using mode i in the year y (PKM)
$EF_{PKM,i,y}$	Emission factor per passenger-kilometre of mode i in the year y (g CO ₂ /PKM)
i	Relevant vehicle category

p	Surveyed passenger
y	Year of the crediting period

The baseline is a continuation of the current transport system consisting of various transport modes between which the population chooses:

- NMT (Non-Motorized Traffic) with bikes and per foot;
- Private passenger car;
- Taxis;
- Motorcycles;
- Motorized auto-rickshaws (used as taxis);
- Buses;
- Suburban rail.

The survey includes also induced traffic i.e. trips which in absence of the project would not have been made.

(2) Determination of the emission factor per passenger-kilometre ($EF_{PKM,i,y}$)

For the suburban rail (electricity-based vehicle category), the following equation is used:

$$EF_{PKM,i,y} = \frac{TE_{EL,i,y}}{P_{EL,i,y} \cdot TD_{EL,i}} \quad (3)$$

Where:

$EF_{PKM,i,y}$	Emission factor per passenger-kilometre of suburban rail for year y (gCO_2/PKM)
$TE_{EL,i,y}$	Total emissions from suburban rail for year y (tCO_2)
$P_{EL,i,y}$	Total passengers transported per year by suburban rail for year y (passengers)
$TD_{EL,i}$	Average trip distance of passengers using suburban rail prior to project start (km)
i	Suburban rail
y	Year of the crediting period

The total emissions from suburban rail is calculated using the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”. When applying the tool, the parameter $EC_{BL,k,y}$ in the tool is taken as the amount of electricity used by suburban rail for the year y , consistent with the transportation of $P_{EL,i}$ passengers along the average distance $TD_{EL,i}$ ³.

For all other fuel-based vehicle categories, the emission factor per PKM is calculated as:

$$EF_{PKM,i,y} = \frac{EF_{KM,i,y}}{OC_i} \quad (4)$$

Where:

$EF_{PKM,i}$	Emission factor per passenger-kilometre of vehicle category i in the year y ($g CO_2/PKM$)
$EF_{KM,i}$	Emission factor per kilometre of vehicle category i in the year y ($g CO_2/km$)
OC_i	Average occupation rate of vehicle category i prior project start (passengers)
i	Relevant vehicle category
y	Year of the crediting period

³ The trip distance is only monitored prior project start. The electricity consumed and the passengers transported are monitored annually to track technological improvements in the rail-based system leading to changes in the emission factor per passenger transported.

The average occupation rate of vehicle category i is determined based on visual occupation studies. In the case of taxis, the driver is not included. Formula (5) of the methodology is not required as also for buses the occupation rate has been determined based on visual occupation studies.

Relevant fuel types, for each vehicle category, have to be identified. The emission factor per kilometre is re-calculated annually based on the recorded share of fuels per category. In case biofuel blends are used the biofuel share of the blend is accounted for with zero emission factor ($EF_{CO2,x,y}$). In the case of Delhi currently no biofuels are used.

Emission factors per passenger kilometres are transparently calculated based on above formulae in accordance with the methodology in the CER spreadsheet (PDD tables Phase II, [5]) and are reported per vehicle category and per annum.

For option (1) i.e. buses the following formula applies:

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

Where:

$EF_{KM,i,y}$	Emission factor per kilometre of vehicle category i in the year y (g CO ₂ /km)
$SFC_{x,i}$	Specific fuel consumption of vehicle category i using fuel type x prior project start (g/km)
$NCV_{x,y}$	Net calorific value of fuel x in the year y (J/g)
$EF_{CO2,x,y}$	Carbon emission factor for fuel type x in the year y (g CO ₂ /J)
$N_{x,i}$	Number of vehicles of category i using fuel type x prior to project start (units)
N_i	Number of vehicles of category i prior to project start (units)
i	Relevant vehicle category
x	Fuel type
y	Year of the crediting period

For option (2) i.e. all other vehicle categories except buses and suburban rail the following formula applies:

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

Where:

$EF_{KM,i,y}$	Emission factor per kilometre of vehicle category i in the year y (g CO ₂ /km)
$SFC_{x,i}$	Specific fuel consumption of vehicle category i using fuel type x prior project start (g/km)
$NCV_{x,y}$	Net calorific value of fuel x in the year y (J/g)
$EF_{CO2,x,y}$	Carbon emission factor for fuel type x in the year y (g CO ₂ /J)
$N_{x,i}$	Number of vehicles of category i using fuel type x prior to project start (units)
N_i	Number of vehicles of category i prior to project start (units)
IR_i^{t+y}	Technology improvement factor for the vehicle of category i per year $t+y$ (ratio)
i	Relevant vehicle category
x	Fuel type
t	Years of annual improvement (dependent on age of data per vehicle category)
y	Year of the crediting period

For train (idem for metro) using electricity, the EF is calculated based on the latest approved version of the "Tool to calculate project, baseline and or leakage emissions from electricity consumption".

$$EF_{KM,i} = SEC_{KM,i} \times EF_{grid,CM} \times (1 + TDL) \quad (7)$$

Where:

$EF_{KM,i}$	Emission factor per kilometre of vehicle category i (train/metro) (gCO ₂ /km)
$SEC_{KM,i}$	Quantity of electricity consumed per kilometre of vehicle category i train/metro (kWh/km)
$EF_{grid,CM}$	Emission factor for electricity generation in the grid based on combined margin (gCO ₂ /kWh)
TDL	Average technical transmission and distribution losses for providing electricity

Emission factors per kilometre are transparently calculated based on above formulae in accordance with the methodology in the CER spreadsheet (PDD tables Phase II, [5]) and are reported per vehicle category and per annum.

The alternative of the Combined Margin (CM) is chosen, determined ex-ante for the entire crediting period. The CM is calculated based on the "Tool to calculate the emission factor for an electricity system", Version 01.1. The tool to calculate baseline, project and/or leakage emissions from electricity consumption (EB 39 Annex 7) is also included. Scenario A of this tool applies as the electricity consumed is from the grid. Option A1 is used to calculate the emission factor of the grid based on the CM.

The data used for the calculations are determined ex-ante and ex-post according to parameter (see details section B.6.2. and B.7.1.):

- Specific fuel consumption per vehicle category determined ex-ante (with exception of buses and rail)
- CM and TL determined ex-ante
- Occupation rate all vehicle categories except rail determined ex ante
- Average trip distance on rail determined ex-ante
- Specific fuel consumption buses monitored
- Rail energy consumption and rail passenger numbers monitored
- Passengers project monitored
- Baseline trip distance per mode, passenger baseline per mode and expansion factor monitored
- NCV and EF of fuels monitored
- Usage of biofuels monitored

The validator controlled all formulas for baseline emissions and confirm that all are in accordance with the approved methodology. All data has been inserted appropriately and all calculations have been performed correctly. This was controlled by the validator through the CER spreadsheet (PDD tables Phase II, [5]) provided by the PP which includes all parameters, all values, all formulas and performs all calculations. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.

PROJECT EMISSION CALCULATIONS

Project emissions are based on the electricity consumed by the metro for train traction (direct project emissions) plus emissions caused by project passengers from their trip origin to the entry station of the metro and from the exit station of the metro to their final destination (indirect project emissions).

$$PE_y = DPE_y + IPE_y \quad (8)$$

Where:

PE_y	Project emissions in the year y (tCO ₂)
DPE_y	Direct project emissions in the year y (tCO ₂)
IPE_y	Indirect project emissions in the year y (tCO ₂)

y Year of the crediting period

Determination of direct project emissions (DPE_y)

The project activity involves an electricity-based transport system. The emissions from electricity consumption are based on the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”. Only electricity consumed for train propulsion is included in rail-based MRTS. Formulas (10) and (11) of the methodology are thus not required.

Electricity usage is monitored. The CM and TDL are determined ex-ante

Determination of indirect project emissions (IPE_y)

Indirect project emissions are those caused by passengers from their trip origin up to the project activity entry station, and from the project activity exit station up to the trip final destination.

Following core steps are realized:

Step 1: Realize a survey in which for each surveyed passenger the trip distance per mode used to/from the MRTS is determined.

The trip distance is monitored.

Step 2: Calculate for each surveyed passenger his indirect project emissions.

Step 3: Apply to each surveyed passenger an individual expansion factor in accordance with the survey sample design and summarize these to get the total indirect project emissions of the week surveyed. To get the annual (or monitoring period) indirect project emissions the indirect project emissions of the surveyed week are calculated per passenger of the week and multiplied with the total passengers transported per year (or period).

The expansion factor is monitored

Step 4: Application of the upper 95% confidence interval to the total indirect project emissions.

$$IPE_y = \frac{P_y}{P_{SPER}} \sum_p (IPE_{p,y} \cdot FEX_{p,y}) \quad (9)$$

Where:

IPE _y	Indirect project emissions in the year y (g CO ₂)
IPE _{p,y}	Indirect project emissions per surveyed passenger p in the year y (g CO ₂)
FEX _{p,y}	Expansion factor for each surveyed passenger p surveyed in the year y (each surveyed passenger has a different expansion factor)
P _y	Total number of passengers in the year y
P _{SPER}	Number of passengers in the time period of the survey (1 week)
p	Surveyed passenger
y	Year of the crediting period

The indirect project emissions per surveyed passenger are calculated based on the transport mode used, the trip distance per mode and the emission factor per mode.

$$IPE_{p,y} = \sum_i IPTD_{p,i,y} \times EF_{PKM,i,y} \quad (10)$$

Where:

$IPE_{p,y}$	Indirect project emissions per surveyed passenger p in the year y (g CO ₂)
$IPTD_{p,i,y}$	Indirect project trip distance p per surveyed passenger using mode i in the year y (PKM)
$EF_{PKM,i,y}$	Emission factor per passenger-kilometre of mode i in the year y (g CO ₂ /PKM)
i	Relevant vehicle category
p	Surveyed passenger
y	Year of the crediting period

The EF per mode applied in the project emission calculation is the same as the one applied in the BL calculations. The IPTD, the electricity usage, the expansion factor, passenger per mode and the number of passengers are monitored (see section B.7.1.)

The validators controlled all formulas for project emission calculations and confirm that all are in accordance with the approved methodology. All data has been inserted appropriately and all calculations have been performed correctly. This was controlled by the validator through the CER spreadsheet (PDD tables Phase II, [5]) provided by the PP which includes all parameters, all values, all formulas and performs all calculations. All estimates of the project emissions can be replicated using the data and parameter values provided in the PDD.

LEAKAGE EMISSION CALCULATIONS

Leakage emissions include the following sources:

- Emissions due to changes of the load factor of taxis and buses of the baseline transport system due to the project; and,
- Emissions due to reduced congestion on affected roads, provoking higher average vehicle speed, plus a rebound effect.

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

Leakage emissions are calculated as follows:

$$LE_y = LE_{LFB,y} + LE_{LFT,y} + LE_{CON,y} \quad (11)$$

Where:

LE_y	Leakage emissions in the year y (tCO ₂)
$LE_{LFB,y}$	Leakage emissions due to change of load factor buses in the year y (tCO ₂)
$LE_{LFT,y}$	Leakage emissions due to change of load factor taxis in the year y (tCO ₂)
$LE_{CON,y}$	Leakage emissions due to reduced congestion in the year y (tCO ₂)
y	Year of the crediting period

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

If $LE_y > 0$, then leakage is included

Determination of emissions due to change of load factor of buses (LE_{LFB,y})

$$LE_{LFB,y} = \frac{1}{10^6} \cdot N_{B,y} \cdot AD_B \cdot EF_{KM,B,y} \cdot \left(1 - \frac{OC_{B,y}}{OC_B}\right) \quad (12)$$

Where:

LE _{LFB,y}	Leakage emissions due to change of load factor of buses in the year y (tCO ₂)
N _{B,y}	Number of baseline buses in the year y (buses)
AD _B	Average annual distance driven by baseline buses (km/bus)
EF _{KM,B,y}	Emission factor per kilometre of baseline buses in the year y (g CO ₂ /km)
OC _{B,y}	Average occupancy rate of baseline buses in the year y (passengers)
OC _B	Average occupancy rate of baseline buses prior project start (passengers)
y	Year of the crediting period

The occupancy rate of buses is monitored through visual occupation studies (see Annex 3).

Determination of emissions due to change of load factor of taxis (LE_{LFT,y})

$$LE_{LFT,y} = N_{T,y} \cdot AD_T \cdot EF_{KM,T,y} \cdot \left(1 - \frac{OC_{T,y}}{OC_T}\right) \cdot \frac{1}{10^6} \quad (13)$$

Where:

LE _{LFT,y}	Leakage emissions due to change of load factor of taxis in the year y (tCO ₂)
N _{T,y}	Number of taxis in the year y (taxis)
AD _T	Average annual distance driven per taxi (km/taxi)
EF _{KM,T,y}	Emission factor per kilometre of taxis in the year y (g CO ₂ /km)
OC _{T,y}	Average occupancy rate of taxis in the year y (passengers)
OC _T	Average baseline occupancy rate of taxis prior project start (passengers)
y	Year of the crediting period

The occupancy rate of taxis is monitored through visual occupation studies counting the number of passengers (see Annex 3).

Determination of emissions due to reduced congestion (LE_{CON,y})

$$LE_{CON,y} = LE_{REB,y} + LE_{SP,y} \quad (14)$$

Where:

LE _{CON,y}	Leakage emissions due to reduced congestion in the year y (tCO ₂)
LE _{REB,y}	Leakage emissions due to induced traffic / rebound effect in the year y (tCO ₂)
LE _{SP,y}	Leakage emissions due to changing vehicle speed in the year y (tCO ₂)

The PP identified “affected roads” are the roads influenced by the establishment of the MRTS. Affected roads are those inside a radius of minimum 1 kilometer running parallel to the MRTS line (roads on both sides of the MRTS line are included) in accordance with the methodology. This was controlled by the validation team with road maps.

$$LE_{REB,y} = \frac{1}{10^6} \cdot \sum_i \left(TDIZ_{i,y} \cdot EF_{KM,i,y} \cdot (NIZ_{i,y} - NIZ_{i,BL} + NIZ_{i,MS,y}) \right) \quad (15)$$

Where:

$LE_{REB,y}$	Leakage emissions due to rebound effect in the year y (tCO ₂)
$NIZ_{i,y}$	Number of cars/taxis per annum using the affected roads in the year y (cars, taxis)
$NIZ_{i,BL}$	Number of cars/taxis per annum using the affected roads in the baseline (cars, taxis)
$NIZ_{i,MS,y}$	Number of cars/taxis per annum not used anymore due to mode shift to the MRTS in the year y (cars, taxis)
$TDIZ_i$	Average trip distance made by cars/taxis on the affected roads in the year y (km)
$EF_{KM,i,y}$	Emission factor per kilometre of cars and taxis in the year y (g CO ₂ /km)
i	Cars, taxis
y	Year of the crediting period

$$NIZ_{i,MS,y} = \frac{MS_{i,s} \cdot P_y}{OC_i} \quad (16)$$

Where:

$NIZ_{i,MS,y}$	Number of cars/taxis per annum not used anymore due to mode shift to the metro in the year y (cars, taxis)
$MS_{i,y}$	Net share of passengers using the metro which would have used mode i in the year y (%)
P_y	Passengers transported by the project in the year y (passengers)
OC_i	Average occupation rate of vehicle category i prior project start (passengers)
i	Cars, taxis
y	Year of the crediting period

$$LE_{SP,y} = \frac{1}{10^6} \cdot \sum_i \left(NIZ_{i,y} \cdot TDIZ_{i,y} \cdot (EF_{KM,VP,i,y} - EF_{KM,VB,i}) \right) \quad (17)$$

Where:

$LE_{SP,y}$	Leakage emissions due to changes in vehicle speed of cars and taxis in year y (tCO ₂)
$NIZ_{i,y}$	Number of cars/taxis using the affected roads in the year y (cars, taxis)
$TDIZ_{i,y}$	Average trip distance made by cars/taxis on the affected roads in the year y (km)
$EF_{KM,VP,i,y}$	Emission factor per kilometre of cars/taxis at project speed in the year y (g CO ₂ /km)
$EF_{KM,VB,i}$	Emission factor per kilometre of cars/taxis at baseline speed (g CO ₂ /km)
i	Cars, taxis
y	Year of the crediting period

To determine the correct CORINAIR formula the average speed, Euro category and engine capacity need to be determined. The application of the correct factor was documented by the PP and the provided documents were checked by the validation team.

The validators controlled all formulas for leakage emission calculations and confirm that all are in accordance with the approved methodology. All data has been inserted appropriately and all calculations have been performed correctly. This was controlled by the validator through the CER spreadsheet (PDD tables Phase II, [5]) provided by the PP which includes all parameters, all values, all formulas and performs all calculations. All estimates of the leakage emissions can be replicated using the data and parameter values provided in the PDD.

SENSITIVITY ANALYSIS

The sensitivity analysis is discussed in the PDD in Annex 5.

The sensitivity analysis is performed on all parameters except default and IPCC values listed as monitored values/parameters or values to be monitored. The sensitivity analysis is based on calculating the change of the data parameter that would be required to reduce emission reductions by 5%. This value gives an indication of the magnitude of change of the data parameter required to significantly change calculated emission reductions. Based on the methodology, sensitive parameters are those where a change of less than 10% leads to a reduction of ERs of more than 5%.

Table A12: Sensitivity Analysis

Parameter	Original value	% Change required for 5% less ERs	Sensitive o Not	Comments on parameters and means of validation
Project passengers	See table A5	4% less passengers	Sensitive	The data project passenger is monitored precisely through turnpikes at all entry stations. As this data is vital for DMRC itself (income) it is controlled carefully. The data is conservative as passengers avoiding controls are not counted. The conservative approach is plausible. Monitored parameter.
Metro electricity consumption	See table A7	14% increase	Not sensitive	
Indirect project emission factor per passenger	See table A8	20% increase	Not sensitive	
Specific fuel consumption gasoline cars	7.1 l/100km	8% lower fuel consumption	Sensitive	The value taken from the literature is conservative due to following facts: <ul style="list-style-type: none"> - Only passenger cars are included while SUVs which have a higher fuel consumption (31% more in according to same source table 12). SUVs represent according to the same report (table 13) for 2010 17% of all passenger vehicles. Including SUVs the parameter SFCC would be 5.3% higher - The fuel consumption reported is average over all driving modes while urban traffic modes have a much higher fuel consumption. For Delhi only urban driving modes would apply. - IPCC default values are all higher with the lowest reported value for US cars being 11.8 l/100km (66% higher) and for European vehicles 8.1 l/100km (14% higher than the reported value) [72] SQS agrees with the reasons for the conservative approach
Specific fuel consumption diesel cars	5.9 l/100km	> 50% lower fuel consumption	Not sensitive	
Specific fuel consumption CNG cars	6.4 kg/100km	> 50% lower fuel consumption	Not sensitive	
Specific fuel consumption taxis	6.4 kg/100km plus 0.8 l/100km	10% lower fuel consumption	Sensitive	The value taken from the literature is conservative due to following facts: <ul style="list-style-type: none"> - The average age of the taxi fleet is 1 year and thus virtually only new taxis are included while other operators in Delhi have much older taxis consuming more fuel. - IPCC default values are significantly higher being (lowest of all reported values) 9.4kg/100km or 46% higher than the reported

				value [73]. SQS agrees with the reasons for the conservative approach
Specific fuel consumption motor-cycles	1.8 l/100km	> 50% lower fuel consumption	Not sensitive	
Specific fuel consumption motorized rickshaws	3.2 kg/100km	36% lower fuel consumption	Not sensitive	
Specific fuel consumption buses	34.8 kg/100km	> 50% lower fuel consumption	Not sensitive	
Electricity consumption suburban rail	3,855 MWh	> 50% lower electricity consumption	Not sensitive	
Passengers transported suburban rail	2.887 million	> 50% more passengers	Not sensitive	
Average trip distance passengers suburban rail	29	> 50% longer trip	Not sensitive	
Occupation rate passenger cars	1.6	7% higher occupation rate	Sensitive	<p>Following factors indicate that the monitored value is conservative:</p> <ul style="list-style-type: none"> - The monitoring procedure is in accordance with the TORs of the methodology. - The upper 95% confidence interval is taken. - The sample size required for a 95% confidence level and a 5% maximum error bound of a point estimation of simple random sample is 454 while the actual sample size taken was 46,945 units i.e. 100x the required sample size. - Compared with values of other cities the occupation rate is high: Values of cities with a CDM project in validation are between 1.2 and 1.7 with an average of 1.5 i.e. a lower value than the one recorded for Delhi [74]. - The trend over time is to lower occupation rates while the PDD assumes for calculation constant occupation rates over time. <p>SQS agrees with the reasons for the conservative approach</p>
Occupation rate taxis	1.16	12% higher occupation rate	Not sensitive	
Occupation rate motorcycles	1.4	> 50% higher occupation rate	Not sensitive	
Occupation rate motorized rickshaws	1.4	49 % higher occupation rate	Not sensitive	
Occupation rate buses	42	> 50% higher occupation rate	Not sensitive	
Baseline emission factor per passenger	See table A5	3% lower emission factor	Sensitive	<p>A detailed survey design has been made in accordance with the methodology. A re-test is done annually of the survey. The data is based on monitored values and the lower 95% confidence interval is taken.</p> <p>With the lower 95% confidence interval the conservative approach is given.</p>

From the total of 19 varied parameters, 5 are sensitive i.e. where a change of less than 10% leads to a reduction of ERs of more than 5%. The validation team concluded that conservative assumptions were taken for those sensitive data.

As a summary, the validation team concludes that the Excel file "PDD tables Phase II" (calculation of emissions) [5] was checked extensively for correct input values, formulas, and crosschecked for consistency with the referenced documents (see Validation Protocol B.6.1. – B.6.4. and 2.4 above). No errors were found after the corrections had been made. The passenger survey was validated by verifying a random sample of 28 original documents of the survey [37], which gave a good conformity (see CL #4).

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.

3.6 Additionality of the project activity

The proof of additionality has been an essential point during this validation process. It has been checked by desk review and by interviews. Information with regard to additionality has been taken from the identification of alternative scenarios, the investments analysis and the common practice analysis. Several CAR's were raised (details see below).

3.6.1 Prior consideration of the clean development mechanism

The project is an existing project activity with a starting date before 02/08/2008.

The project starting date (as per the applicable definition of the Glossary of CDM Terms) is correctly considered as 10/11/2005. This is the date when the first infrastructure construction service contract for the project was signed. The appropriateness of the selected project starting date was confirmed by the SQS validation team through assessment of such construction service contract [29].

Step 1 – indication of awareness of the CDM as a decisive factor:

The project participant has presented following documented evidences to the validation team for indication of its awareness of the CDM and the benefits of the CDM as a decisive factor in the investment decision as follows:

Milestone	Date	Documentary Proof
Note Board of Directors of DMRC indicating that Kyoto Protocol (KP) should be used to offset additional costs of Metro Delhi	9.01.2001	[12], Note Board of Directors
Note Chief Project Manager DMRC that additional costs for DMRC to provoke e.g. mode shift from buses and other modes of transport towards metro should be borne by Kyoto Protocol finance mechanisms	12.01.2001	[45], Note
DMRC invitation to discuss access to CDM to offset additional costs of Metro Delhi	24.4.2002	[13], invitation
Contact with CDM consultants	22.10.2003	[14], letter
Meeting with CDM consultant	22.03.2004	[15], letter
Environmental strategy for DMRC	09.02.2005	[16], Letter Chief Engineer
Article on DMRC seeking carbon credits for mode shift (article based on interview with DMRC chief public relations officer Anuj Dayal)	06.04.2005	[46], The Tribune, 6/4/2005 (row 4)
Contact with alternative CDM consultants	04.08.2005	[47], Letter
Project start date: Signature date of 1st construction contract	10.11.2005	[29], Contract

The above mentioned evidence ([12,45,13,14,15,16,46,47]) was provided to the validation team and was reviewed during the on-site assessment.

Step 2 – indication of continuing and real actions:

The following documented evidence was provided to the validation team to indicate that continuing and real actions were taken to secure the CDM status for the project in parallel with its implementation.

Milestone	Date	Documentary Proof
Ministry of Finance informs DMRC that CERs can be kept by DMRC and are not tied to Japanese credit for metro	01.03.2006	[48], invitation
Order of CEO to identify CDM consultants	10.05.2006	[17], order
Offer CDM consultant methodology and PDD development DMRC	29.09.2006	[49], e-mail
Reminder Director General (MD) on success of MRT project with KP and that DMRC should identify consultant	21.12.2006	[50], letter MD
Note of MD reminding of usage of Kyoto Protocol to make metro sustainable	16.01.2007	[18], Letter MD
Grütter Consulting AG enters 1st methodology for MRTS (NM0229)	29.05.2007	NM0229; see UNFCCC website
Offer CDM services for DMRC by Grütter Consulting	10.7.2007	[51], offer
2nd offer CDM services for DMRC by Grütter Consulting	22.10.2007	[52], offer
Contract project development DMRC – Grütter Consulting	19.03.2008	[19], contract
CDM methodology for rail-based Mass Rapid Transit by Grütter Consulting NM0266	30.03.2008	NM0266; see UNFCCC website
Data collection including realization of specific studies for DMRC (various studies)	May 2008 to August 2009	File studies Grütter Consulting
Methodology discussion with UNFCCC incl. various feedbacks of Grütter Consulting to UNFCCC	May 2008 to October 2009	Methodology Panel reports on NM0266 Approval EB 50 16.10.2009
GSC first version of the PDD	November 2009	UNFCCC website
GSC 2nd version of the PDD (current project)	May 2010	UNFCCC website

The above mentioned evidence ([48,17,49,50,18,51,52,19]) was reviewed during the on-site assessment. The information about timeline of planning and implementation of the project activity has been verified to be in consistency with the actual situation. The validation team has assessed the above documented evidence presented by the PP by means of documentation review, on-site interview and background investigation on the internet.

In compliance with paragraph 100 of the VVM, the project is determined to be an existing project activity with a starting date prior 02/08/2008. PP was aware of CDM prior project start and CDM benefits were a decisive factor in the decision to proceed with the project which was clearly indicated in the Note of the Board of Directors ([12]), the Note of the chief project manager ([45]), contacts with CDM consultants as well as a publication in a newspaper ([46]) – all prior project starting date. The longest gap between docu-

mented evidences after project start is less than 2 years. In this time, the metro methodology developed by the CDM consultant for the project was discussed at the UNFCCC (between 5/2007 until approval 10/2009). However, the time elapsing between the starting date of the project activity and the first real action for CDM – the appointment of Grütter Consulting AG in March 2008 – was mistakenly described in the PDD as less than two years; the EB 49 annex 22 guidelines were not in place at that time. Therefore, they are not applicable. CAR #9 was raised. The reference to EB 49 Annex 22 was removed from the PDD. The PP has explained how the documents show serious and continuous consideration of CDM for this project. After crosschecking the submitted documents [12, 13, 14, 15] again CAR #9 could be closed.

By taking the above-mentioned information into consideration and comparing it with the applicable CDM requirements, the validation team was able to confirm that the CDM was demonstrated to be considered in the decision to undertake the project and that prior CDM consideration information as presented in the PDD is deemed sufficient and correct.

3.6.2. Identification of alternatives

The list of alternatives is discussed in chapters B4 and B5 of the PDD. SQS' opinion on chapter B4 of the PDD is given in clause 3.5.4 of this validation report. SQS confirms that the identified alternative 3 "Continuation of the current system incl. future investments" is correctly determined as the baseline scenario, i.e. the current situation in the absence of the project. Therefore, an investment analysis must be made for alternative 5 only.

3.6.3. Investment analysis

The additionality is shown according to ACM0016 by means of the investment analysis. The methodology requires that NPV be used as indicator.

The number of passengers using the metro and thus the fare box revenue as well as cost overruns are crucial points in the investment analysis. According to the methodology ACM0016 "cost overruns of former investments in MRTS or reduced revenues of former MRTS investments compared to original projections" can be taken into account for "MRTS that were implemented in the same host country in the last 20 years at the time of project start". This "risk factor" was validated as follows:

Risk Factor:

In accordance with ACM0016 which states that when applying the investment comparison analysis, cost overruns of former investments in MRTS or reduced revenues of former MRTS investments compared to original projections, which make new investments less viable and riskier, can be considered in the investment analysis.

India had, prior to Metro Delhi, only one metro in Kolkata which was opened to traffic in stretches between October 1984 and September 1995.

The following table summarizes the planned versus actual performance of Kolkata metro prior project start. Kolkata metro was the only metro operational prior project starting date. Delhi Metro Phase I only entered in operation after project starting date and thus performance data of Phase I cannot be included. However, for plausibility checks, actual performance data of Delhi Metro Phase I are considered.

Planned versus Actual Performance of Kolkata Metro

Para-meter	Planned	Actual	Relation actual to projected	Comment	Source
Kolkata investment (million INR)	1,403 in 1971/72 2,495 in 1974/75 8,634 in 1908/81 13,308 in 1990/91	17,066	+ 28%	The estimate of 1990/91 is the first detailed estimate and is recent. This estimate is thus taken instead of the original. With the original cost estimate cost overruns are in the order of factor 12. In relation to the detailed last estimate the cost overrun is	Kolkata metro (2000, [22] Singh (2002, [63] for control

				28%. Singh (2002) also came to a factor 11 of increased costs.	
Kolkata passenger numbers (millions)	1.32 per day (1995/96) 630 per annum (2000)	0.128 per day 55.8 per annum	- 90%	Both data sources (different years) have 90% less passengers than projected. The lower (more conservative) difference between actual and expected passengers is taken.	Kolkata metro (2000), Singh (2002)

Only passenger numbers and not the investment sur-cost is taken for inclusion of past experience thus being conservative (Kolkata metro had experienced investment cost overrun plus less passengers). The more value of 90% (see table above) less passengers is taken. The fare box revenue is adjusted accordingly and at the same time (to remain conservative), the operational costs are also reduced in the same magnitude to have a conservative assessment (costs will probably reduce in a minor magnitude as not all costs are variable ones but partially costs can be reduced e.g. by running less trains, less electricity consumption, less staff etc). Other income sources of metro, such as property development, are not adjusted although latter would also potentially suffer as especially advertisement revenues tend to decline with lower ridership as outreach and attractiveness of advertisement is lower with less passengers.

Due to having only one example in India prior DMRC (Kolkata), the performance of latter might be exceptional. For this reason, the financial analysis is realized with 3 base cases:

- 90% less passengers than expected based on the historic experience in India with MRTS in line with ACM0016
- 80% less passengers than expected i.e. twice better than the historic experience.
- 70% less passengers than expected i.e. 3x better than the historic experience.

The validation team has revised all these sources and has found the information to be correct and the conclusions to be valid.

Additionally a plausibility check ex-post was performed as well as a comparison internationally with other metros. The plausibility check is performed with the relation between projected and actual passenger numbers of DMRC Phase I metro lines since 2006.

Projected versus Actual Passenger Numbers of DMRC Phase I Corridors

Year	actual passengers per day	projected passengers per day	actual as % of projected
2006	492,750	2,497,300	20%
2007	621,830	2,759,517	23%
2008	767,662	3,049,266	25%
2009	889,094	3,369,439	26%

Source: [28] and [64]

At maximum, the relation between actual and projected passenger numbers for Phase I is 26%. This is less than the adjusted base case II calculated ex ante in section 2A (30% of expected passengers was assumed in this case). With the best case of Phase I (actual passengers are 26% of projected) the NPV of DMRC Phase II is - 41,965 million INR i.e. the NPV is still clearly negative.

Thus taking into consideration actual performance of DMRC with Phase I the NPV of Phase II remains negative. Thus, the assumptions taken in the NPV calculation with a base case and two adjusted base cases prove to be conservative and in line with the context and experience of metros in India including DMRC Phase I. The conclusion reached is thus that the risk adjustment factor used for determination of the project NPV is plausible and compatible not only with Kolkata metro but also with the most recent experience of DMRC on Phase I corridors.

The relation used by the PP has been checked by the validation team also with international literature. GTZ MRTS training module shows that mass cost overruns and less passengers are typical of rail based systems with examples being Washington metro 85% cost overrun, Mexico City metro 60% cost overrun and 50% less passengers, Tyne and Wear metro 55% cost overrun and 50% less passengers, Miami metro 50% less passengers ([62]). GTZ/ITDP (Institute for Transportation and Development Policy) as authors state „Higher cost options such as rail-technologies, also tend to demonstrate greater disparity between projected and actual costs“ (p.16). Similar results are obtained by other international studies e.g. Flyvjerg et.al., Megaprojects and Risk, 2003, p. 25 ([65]) where for a group of metros the actual passenger numbers are compared with projected numbers with relations of 5 to 50%. These all in countries which already previously established metros (UK, USA, France, Mexico) and thus had experience and where also serious consulting firms comparable to Rites have made the feasibility. The same source on page 14 also shows that many metros have had serious cost overruns. The risk of having thus projections which are far off the reality is real and has been experienced by numerous comparable projects not only in India. The complexity of making correct metro passenger projections is highlighted by the fact that for Delhi Metro Phase I the actual passenger numbers are only 20-26% of the projected passenger numbers, this although the same consulting company (RITES) made the projections for DMRC as for Kolkata metro i.e. a comparable “error” was made concerning projections.

The magnitude of the risk adjustment is thus evidenced by the host country experience and is plausible in the international context of metros as well as by the actual experience of DMRC with Phase I corridors.

Similarly, with regard to passenger numbers, only the Kolkata experience is taken into account, namely 90% less passengers and thus 90% less fare box revenue than projected [22]. This procedure is in line with the methodology ACM0016 and is thus accepted by the validators. The same reduction factor of 90% is applied to the costs for staff, maintenance and energy [21] although these costs cannot be expected to be reduced proportionally to the passenger numbers. This is a conservative approach. The revenue from advertisement and property development is not reduced [21] although one must expect it to be lower if fewer passengers use the Metro. This also is conservative.

As Kolkata with only 10% of the projected fare box revenue [22] may be considered an extreme situation, a plausibility check has been added. It complements the sensitivity analysis by increasing the reduced fare box revenue by a factor of 3. The financial calculations [21] show that even if the fare box revenue is at 30% of the projections the NPV will still be negative. A negative NPV is plausible because Metro Delhi Phase I is only at 26% of projected ridership numbers in its fourth year of operation. Thus, the additionality is demonstrated in line with the methodology.

The financial parameters (table 11) are taken primarily from the DPR developed by RITES Ltd (File 42, 1.2005), a reputed Government of India enterprise. The input parameters used in the financial analysis can be considered as information provided by an independent and recognized source. The validation team considers that the period of time between the finalization of the DPR (i.e. January 2005) and the investment decision (September 2005) is sufficiently short that it is unlikely in the context of the underlying project that the input values would have materially changed. The financial parameters have been assessed by crosschecking the referenced documents and the financial analysis spreadsheet. For all parameters used in the investment analysis documentary proof was given by the project participants. Those parameters which were not documented by an official source were crosschecked by the validators during the site visit.

- **Investment:** The investment costs of 100,442 million INR are the sum for the three parts of the project which had been decided on the date of the project start (10/11/2005), namely the six corridors shown in table 2 of the PDD and the two corridors Noida and Gurgaon. The numbers have been correctly taken from the Detailed Project Report (DPR) for Phase II Corridors of Delhi Metro [20] and from the DPR for the Noida Extension [31] and the Gurgaon Metro Corridor [32].

Projected and actual investment were compared and found to be consistent and conservative. Taking

the actual investment based on audited accounts of DMRC reviewed by the validation team, the NPV is more negative than with the original projected investment.

The initial investment cost of 100,442 million INR is equivalent to around 2,278 million USD (as of September 2005) for 74.5km of metro (PD table 2 p. 8 plus Noida and Gurgaon) which gives a cost per km of 30.6 million USD. This is low in the international context of metros. See L. Wright, GTZ, Training Course: Mass Transit, 2004, page 16, table 6 ([62]) with metro costs all over 40 million USD/km and IEA (Bus Systems for the Future, 2002) table 2.1 page 29 which estimates initial capital costs for at grade metros between 15 and 30 million USD/km, 30-75 million for elevated and 60-180 million USD/km for underground. The project metro has at grad, elevated and underground sections. Compared with international literature, the investment cost as documented by the project is, therefore, considered to be conservative and consistent.

- **Staff costs:** As the staff costs vary over the time of the project, the annual costs for all three projects parts [20, 31, 32] were totaled over the 30 year time span [21], and an annual average of 7,246 million INR is mentioned in the PDD [21]. Projected and actual staff cost were reviewed by the validation team with audited accounts of DMRC. The values are plausible according to the validators' experience.
- **Maintenance cost:** Projected and actual costs were reviewed by the validation team with audited accounts of DMRC and were found to be consistent. The annual average of the maintenance costs for all three project parts [20, 31, 32] is 10,298 million INR, i.e. approximately 10% of the investment. This ratio is acceptable. Even with 0 maintenance costs, the NPV would remain negative.
- **Energy cost:** Projected and actual costs were reviewed by the validation team with audited accounts of DMRC and were found to be consistent. The annual average of 3,297 million INR for the energy costs results from the numbers given in the three DPR [20, 31, 32]. Similarly to the costs for staff and maintenance, the energy costs rise over time as the expected fare box revenue rises also. Even with 0 energy cost the NPV would remain negative.
- **Fare box revenue (see also "risk factor"):** Projected and actual revenues were reviewed by the validation team with audited accounts of DMRC and were found to be consistent. The numbers of the fare box revenue (38,120 million INR) are taken from the DPR of the three project parts [20, 31, 32]. The annual average is calculated and shown in table 11 of the PDD. It was not clear how DMRC fixes the fares, a basis for calculating the revenues. A document was provided [40] about the role of the fare fixing committee, which sufficiently explained the criteria for the fare fixing (CL #8): Fare fixation is based on the "Delhi Metro Operation and Maintenance Act, 2002"
- **Advertisement and property development revenue:** Projected and actual revenues were reviewed by the validation team with audited accounts of DMRC and were found to be consistent (See also CL#10). Rental earnings are reflected as percentage of operational revenues (last audited year 20%) in p. 14 of the audited statements; this is idem to the adjusted financial projection made (see CL#10). The annual average of 994 million INR is calculated as the parameters above by adding the numbers for the three project parts [20, 31, 32]. Even with a tripling of the non-fare box revenue, the NPV would remain negative
- **Price of CERs:** The price of CERs is given as 1,244 INR / ton for early September 2005 [42]. This could be confirmed by crosschecking [43].
- **Discount rate:** The discount rate is 0.7%. It is based on the preferential interest rate for external debt as provided by JBIC (Japan Bank for International Cooperation) for 56% of the funding, while 0% is tak-

en for the part of Government Funding (DPR table 10.1 [20]). This effectively represents the lowest (most conservative) discount rate based on the 2 funding options identified in the DPR under table 10.2 ([20]). The first option includes JBIC funding at 1.3% interest rate (Table 10.1. DPR, [20]) while the domestic funding option would amount to a discount rate of 9.5% (see point 10.8.2. table 10.1 and 10.2. ([20]). This corresponds to an estimate of the cost of financing for the project as assessed in the DPR. The JBIC route followed is the same route as followed in Phase I of DMRC (see DPR point 10.9.2. Option 1, ([20]). The approach is conservative as this rate is lower than the domestic debt rate which would be 6-9% (DPR Phase II, table 10.1, [20] states 9.5% and point 10.8.2. DPR states a potential rate of 6.5% p.a). The same financing structure has also been identified for the NOIDA extension as well as for the Gurgaon extension. The financing structure as detailed in the DPR has been compared with the audited statements of DMRC year 2010 and have been found as consistent (see also CAR#6)

- **Grant/Subsidy:** Grants from local governments amount to 11,804 million INR [31, 32]. This applies to lines which extend outside to territory of the Capital but are within the project boundary. In accordance with ACM0016 this has been deducted from the investment.
- **Period of assessment:** The period of assessment taken is 30 years of full operations (total 37 years due to construction time and partial operation), [20,31,32]. This corresponds to the full technical life-time of rolling stock (see following point). This is also in accordance with time frame of DPR see table 9.5. This is a longer period than the maximum period suggested in the guidelines and thus conservative. The salvage value is taken into consideration.
- **Salvage value:** For land, the full original value is included as salvage value. The rolling stock and traction have a lifetime of 30 years and signaling and electrical works 20 years. For construction works 30 years due also to requiring major repairs plus wear and tear. The estimated technical life-span is based on Rites Ltd. which is independent of the PP. The validation team confirms that in the financial calculation spreadsheet, the fair value of the project fixed assets at the end of the assessment period have been included as a cash inflow.
- **Funding:** The PDD refers to 56% of JBIC funding; this value is related to the first sub-stage of the Phase II investments and is diluted by the fact that JBIC funding is not provided for the Phase II lines that are outside of the Capital's territory. The further details shown during the site visit result in an overall 36% JBIC and 64% Indian public financing mix.
CAR #18 was raised to get more information about the relationship between the different funds and official development assistance (ODA). The first explanation by the PP and the submitted files [39] clearly indicated that the JBIC funding does not result in a diversion of official development assistance (ODA) and is a long term debt; but the text in the PDD (A4.5 and Annex 2) was still not conforming to the requirements of the guidelines for completing the CDM-PDD. The text was adapted by the PP and CAR #18 could be closed.
A clarification request was raised concerning the Japanese funds, which was answered satisfactorily (CL #5). A question came up during the on-site visit about the property development revenue (CL #10). The PP has explained the property development income and has given documentary evidence [38].

The Excel "File 47 new finance, [21]" has been extensively checked for correct values and formulas. No errors were found after the corrections had been made.

Sensitivity Analysis for Financial Parameters

Fluctuations in the range +/- 10% in six financial parameters have been made. In all the NPV remains negative

Case	NPV in million INR
Base case	-114,694
Case 1: 10% lower investment cost	-96,039
Case 2: 10% lower staff cost	-112,797
Case 3: 10% lower maintenance cost	-111,988
Case 4: 10% lower energy cost	-113,821
Case 5: 10% higher fare box revenue	-104,673
Case 6: 10% higher other revenues	-112,054

Source: [21]

The range of variations was assessed by the validation team to be reasonable for the project.

Also the risk factor was varied by the PP from 10% to 30% with the NP remaining negative. The plausibility of this range is considered as reasonable as the actual performance of DMRC Phase I (information available after project decision date) was less than 30%.

The NPV remains negative with following maximum variations of the parameters (see finance sheet version 1.2):

Case	Percentage change until NPV is 0
Case 1: lower investment cost	NPV gets 0 if actual investment is 39% of projected investment
Case 2: lower staff cost	Staff cost can be reduced to 0 (100% reduction) and NPV remains highly negative
Case 3: lower maintenance cost	Maintenance cost can be reduced to 0 (100% reduction) and NPV remains highly negative
Case 4: lower energy cost	Energy cost can be reduced to 0 (100% reduction) and NPV remains highly negative
Case 5: higher fare box revenue	Fare box revenue can increase 114% over the base case to achieve a 0 NPV
Case 6: higher other revenues	Other revenues can increase 434% over the base case to achieve a 0 NPV

Above data show that even with very high variations the NPV remains negative. In line with ex-post actual metro performance, the validation team comes to the conclusion that the sensitivity analysis performed by the PP is reasonable.

SQS has come to the conclusion that all the assumptions are now reasonable and that the calculations are done in a proper way. The investment analysis and the sensitivity analysis show that the project cannot be economically feasible without CDM.

3.6.4. Barrier analysis

According to the methodology ACM0016 additionality must be proven by investment analysis. The participants have followed the methodology. No further barriers were identified.

3.6.5. Common practice analysis

Common practice analysis is described in methodology ACM0016 and supersedes the common practice analysis in the tool for the demonstration and assessment of additionality. Common practice analysis per-

formed is in line with the methodology. The geographical scope (India) of the common practice analysis is appropriate for the assessment of common practice and compliant to the methodology. Table 16 in the PDD shows clearly that less than 50% of Indian cities with more than 1 million habitants do not use MRTS without CDM revenues.

Table 16: Indian Cities with over 1 Million Inhabitants and Existence of MRTS as of Project Starting Date (9/2005)

City	Inhabitants (in millions)	MRTS system (Metro, LRT, BRT/bus lane)
Agra	1.3	No MRTS
Ahmedabad	4.5	No MRTS (Ahmedabad plans a BRT but as of project start this was not yet operational)
Allahabad	1.0	No MRTS
Amritsar	1.0	No MRTS
Asansol	1.1	No MRTS
Bangalore	5.7	No MRTS (Metro is under construction and has realized a CDM tender for this project)
Bhopal	1.5	No MRTS (BRT is under planning)
Chennai (Madras)	6.6	Elevated train (In fact this is an extension of the suburban rail and not a metro e.g. the trains have no automatic doors. However some sources (e.g. www.subways.net) consider it as a metro due to the fact that there is a specific elevated line where only these trains run on i.e. the line is not shared with various trains.)
Coimbatore	1.5	No MRTS
Delhi	12.9	Metro Phase I
Dhanbad	1.1	No MRTS
Faridabad	1.1	No MRTS (DMRC plans to cover the city with a metro extension)
Hyderabad	5.7	No MRTS (Metro is under planning; the current rail-service is commuter rail to suburbs)

CAR #15 was raised because the way Metro Delhi (Phase I) was mentioned in the table of Indian cities gave the impression that it is the present project; it was corrected by the PP.

Thus it is SQS' opinion that the proposed CDM project activity is not common practice.

3.7 Application of the Monitoring Methodology and Description of the Monitoring plan

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

3.7.1.1.1 Parameters fixed ex-ante

Parameter / Data	Value applied	Source of used data/ SQS assessment opinion
SFC _{C, G/D/CNG} Specific fuel consumed of passenger cars using gasoline, diesel or CNG	Cars gasoline: 53.98 g/km Cars diesel: 48.59 g/km Cars CNG: 64.00 g/km	Passenger car with gasoline or diesel fuel: ADB, Breaking the Trend, Table 12, 2008 ([53]) Passenger car using CNG: Based on taxis using CNG, 2008 (File 9) For gasoline and diesel cars based on national literature. This is conservative as only cars are considered and not SUVs which have a higher fuel consumption (31% more in gasoline and 43% more in diesel cars according to same source table 12) while representing according to the same report (table 13) for 2010 17% of all passenger vehicles. For CNG cars the value of taxi CNG vehicles is taken which is based on a large fleet. Taxi fleets manage new vehicles and maintain these well, thus the data is conservative. As confirmed also by SQS validation team data is compared to IPCC 1996 (last available source for fuel consumption data vehicles) conservative: IPCC reports for gasoline cars as lowest US values 11.8 l/100km

		<p>(table 1-27) and as lowest European value 8.1 l/100km (Table 1-36). Both values are higher than the one used by the project (7.1 l/100km)</p> <p>IPCC reports for diesel cars as lowest US values 10.0 l/100km (table 1-30) and as lowest European value 7.3 l/100km (Table 1-37). Both values are higher than the one used by the project (5.9 l/100km)</p> <p>Gasoline cars represent > 80% of vehicles and diesel cars >10% thus being the 2 dominant and most important categories</p>
<p>$N_{C,G/D/CNG}$ Percentage of passenger cars using fuel type: gasoline, diesel or CNG</p>	<p>Gasoline: 81.8% Diesel: 10.6% CNG: 7.6%</p>	<p>Department of Transport, Delhi, 2008 and Centre for Science and Environment (CSE), 2008 ([8])</p> <p>Official data adjusted in the case of CNG for converted vehicles</p> <p>The validation team has reviewed the documentary source</p>
<p>SFC_T Specific fuel consumed of taxis</p>	<p>64 g/km CNG plus 6.07 g/km gasoline (dual fuel)</p>	<p>Easy Cab, 2008 ([9])</p> <p>Easy Cab has a large fleet in Delhi which is very new (average age 1 year). The data is thus representative and better than a survey and very conservative as the fleet is very new.</p> <p>Data has been cross-checked by the validator with Mumbai with a comparable taxi fleet (61g/km) showing that the value of 64 g/km is comparable and thus plausible.</p>
<p>N_T Percentage of taxis using CNG N_{TR} Percentage of motorized auto-rickshaws using CNG N_B Percentage of buses using CNG</p>	<p>100%</p>	<p>Supreme Court of India mandated that all commercial passenger vehicles including taxis be CNG powered (July 28, 1998 implemented by late 2002; see U. Narain et.al., The Impact of Delhi's CNG Program on Air Quality, RFF, 2007, Appendix A; [54])</p> <p>The official regulation has been confirmed by the SQS validation team.</p> <p>Confirmed also with DTC during on-site visit.</p>
<p>SFC_{TR} Specific fuel consumed of motorized auto-rickshaws</p>	<p>32.0 g/km</p>	<p>Based on sample realizing measurements of fuel consumption. The lower 95% confidence interval was taken.</p> <p>The sample size required for a 95% confidence level and a 5% maximum error bound of a point estimation of simple random sample is 3 (due to the very low variance of data) while the actual sample size taken was 50 units.</p> <p>The validation team has reviewed the survey with original data and confirms the conformity of the survey realized.</p> <p>The data was compared with a recent survey of CNG consumption of motorized rickshaws in Mumbai (2010) which had as result 3.3kgCNG/100km while Delhi had 3.2kg/100km i.e. a comparable value. The validation team thus comes to the conclusion that the value is reasonable and conservative.</p>
<p>SFC_M Specific fuel consumed of motorcycles</p>	<p>13.43g/km</p>	<p>Based on sample realizing measurements of fuel consumption. The lower 95% confidence interval was taken.</p> <p>The sample size required for a 95% confidence level and a 5% maximum error bound of a point estimation of simple random sample is 23 while the actual sample size taken was 30 units.</p> <p>The validation team has reviewed the survey with original data and confirms the conformity of the survey realized.</p> <p>The data was compared with data for gasoline motorcycles from other cities where recent data was available including Seoul, Quito, Mexico City, Medellin and Barranquilla all of which had</p>

		<p>higher values (between 2.4l/100km and 5.1l/10km while Delhi has 1.8l/100km) than the project.</p> <p>IPCC 1996 (last available report for fuel consumption of vehicles) reports for US a value of 10.8l/100km (table 1-33) and for Europe 2.4l/100km (Table 1-42) as lowest values. IPCC values are thus significantly higher than the values used by the PP (Delhi 1.8l/100km). The validator can thus confirm that the value is conservative.</p>
N _M Percentage of motorcycles using gasoline	100%	<p>ARAI, Emission Factor Development for Indian Vehicles, 2007 only reports gasoline motorcycles and scooters (File 61)</p> <p>Official data source reviewed by the validator</p>
SFC _B Specific fuel consumed of buses	348.43g/km	<p>Delhi Transport Corporation (DTC), 2009 ([55])</p> <p>DTC manages the urban bus fleet of Delhi. Data of all buses (not based on survey).</p> <p>Data is monitored annually as the PP has chosen to update SFC_B annually.</p> <p>The validator has reviewed the documents by DTC and has also confirmed the data through an on-site visit.</p> <p>Data is from the entire fleet and thus represents a very good data base.</p> <p>Data has been cross-checked with other CNG bus fleets, specifically Mumbai which has comparable buses and where the SFC was 374g/km compared to Delhi. The value reported can thus be confirmed as plausible.</p>
EC _{EL,R} Quantity of electricity consumed by the baseline rail system per annum	3,855 MWh	<p>Northern Railway, Delhi, 2008/2009 ([56])</p> <p>Official report checked by validator. Value is also monitored annually.</p> <p>The incidence of this parameter is marginal as in the metro survey no passengers would have used rail due to rail being used more for sub-urban transport on other routes.</p>
EF _{Grid} Emission factor for the grid	0.8409kgCO ₂ /kWh	<p>Government of India, CEA, Version 5.0, 11-2009, NEWNE grid ([6])</p> <p>Official data; follow procedures as in "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", newest version of tool. All data and calculations reviewed by the validator.</p>
TDL Average technical transmission and distribution losses for providing electricity	3.91%	<p>Powergrid corporation of India, 3.2010, http://www.nldc.in/NLDC/updates/loss/webdata.htm ([57]) Northern Grid Based on average value for entire year 2009 from the National Dispatch Center.</p> <p>Information cross checked by validator through website</p>
OC _C Average occupation rate of passenger cars	1.6	<p>Survey realized using upper 95% confidence interval.</p> <p>The sample size required for a 95% confidence level and a 5% maximum error bound of a point estimation of simple random sample is 454 while the actual sample size taken was 46,945 units.</p> <p>Procedure followed TORs for occupation rate studies described in methodology.</p> <p>Survey has been checked by validator.</p> <p>Data has been cross-checked with Mumbai (1.87) with a comparable value. The value is also in the range of various other cities worldwide where data was supplied with a median value of 1.60 idem to Delhi.</p>

		The validator can thus confirm that the data is conservative and plausible.
OC _T Average occupation rate of taxis	1.16 excluding driver	<p>Survey realized using upper 95% confidence interval.</p> <p>The sample size required for a 95% confidence level and a 5% maximum error bound of a point estimation of simple random sample is 1,537 while the actual sample size taken was 6,744 units.</p> <p>Procedure followed TORs for occupation rate studies described in methodology.</p> <p>Survey has been checked by validator.</p> <p>Data has been cross-checked with Mumbai (0.99) with a comparable value. The value is also in the range of various other cities worldwide where data was supplied with a median value of 0.91 i.e. slightly lower than Delhi (a higher figure leads to lower baseline emission factors).</p> <p>The validator can thus confirm that the data is conservative and plausible.</p>
OC _M Average occupation rate of motorcycles	1.40	<p>Central Road Research Institute (CRRI) Delhi, 2007, Table 3.4 ([58])</p> <p>Recognized research institute in India; realized on various locations. Information checked by validation team.</p> <p>Data has been cross-checked with Mumbai (1.38) with a comparable value. The value is also in the range of various other cities worldwide where data was supplied with a median value of 1.18 i.e. lower than Delhi (a higher figure leads to lower baseline emission factors).</p> <p>The validator can thus confirm that the data is conservative and plausible.</p>
OC _{MR} Average occupation rate of motorized auto-rickshaws	1.40	<p>Central Road Research Institute (CRRI) Delhi, 2007, Table 3.4 ([58])</p> <p>Recognized research institute in India; realized on various locations. Information checked by validation team.</p> <p>Data has been cross-checked with Mumbai (1.11) with a slightly lower value (the higher the occupation rate the lower the baseline emission factor – a higher value is thus more conservative). The validator can thus confirm that the data is conservative and plausible.</p>
OC _B Average occupation rate of buses	43 passengers	<p>Central Road Research Institute (CRRI) Delhi, 2007, Table 3.4 ([59])</p> <p>Recognized research institute in India; realized on various locations</p> <p>Based on the bus capacity an average occupation rate of 57% results(Percentage based on 43 passengers on average and an average bus capacity of 75 passengers based on Leyland CNG buses used by DTC with capacities between 60 and 92 passengers (average 75; see [60])). This is high in the international context. The value is at the higher range of various other cities worldwide where data was supplied with a median value of 30% (a higher figure leads to lower baseline emission factors). The value of Delhi is higher compared to other cities due to bus crowding as well as due to usage of large buses (entire fleet) while in other cities also medium and small buses are used.</p> <p>The validator can thus confirm that the data is conservative and plausible.</p>
P _{EL,R}	2,887,200	Northern Railway, Delhi, 2008/2009 ([56])

Total passengers transported by baseline suburban rail-system per year		Official report checked by validator. Value is also monitored annually. The incidence of this parameter is marginal as in the metro survey no passengers would have used rail due to rail being used more for sub-urban transport on other routes.
TD _{EL,R} Average trip distance of baseline urban rail passengers prior project start on rail system	29km	Based on survey of rail passengers. Same year as for data passenger on rail system and electricity consumption of rail system Upper 95% confidence interval. Survey checked by validation team. The incidence of this parameter is marginal as in the metro survey no passengers would have used rail due to rail being used more for sub-urban transport on other routes.
AD _B Average annual distance driven of buses (kilometre)	53,325km	Delhi Transport Corporation (DTC), 2008 ([61]) Based on total distance driven of 183 million km and the average fleet of the same year of 3,439 units Used for leakage load factor change buses if calculation is required. Data is updated if leakage occurs in occupation rate buses with the same source. The validator has reviewed the documents by DTC and has also confirmed the data through an on-site visit.
AD _T Average annual distance driven of taxis	91,250km	Easy Cab, 2008 ([9]) Based on records of taxi company with 250km per car per day and 365 days per year. Used for leakage load factor change taxis if calculation is required Records have been reviewed by validator.
AD _{TR} Average annual distance driven of motorized rickshaws	43,800km	Report Expert Committee on Auto Rickshaw for GOI, p.10, 2003 ([11]) Based on 120 km per vehicle per day and 365 days per year. Used for leakage load factor change motorized rickshaws if calculation is required Report has been reviewed by validator.
NIZ _{C,T,BL} Number of cars/taxis on roads affected per annum in the baseline	See table 20 PDD	Visual counting on the identified roads. Based on measurements realized 6AM to 10PM both directions during 3 different days. No expansion factor for remaining hours. 365 days per annum. Exact locations of monitoring are defined for each affected road. The same measurements will be realized annually to determine the leakage congestion and speed. Report and survey has been reviewed by validation team
V _B Vehicle baseline speed on affected roads.	See table 21 PDD	On-board measurements determining the average speed when circulating. The average moving speed is measured as this is required for vehicle speed change. Report and survey has been reviewed by validation team

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.

3.8 Parameters monitored

Parameter / Data	Value applied	Source of used data/ SQS assessment opinion
NCV_{G/D} NCV_{CNG} Net calorific value of gasoline, diesel, CNG	Gasoline: 43.9 MJ/jg Diesel: 42.7 MJ/kg CNG: 35.6 MJ/m ³	Bharat Petroleum Corporation, 2008 ([10]) The value is within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. The validation team thus confirms the plausibility of the value.
EF_{CO₂,G/D/CNG} CO ₂ emission factor for gasoline, diesel and CNG	Gasoline: 67.5 gCO ₂ /MJ Diesel: 72.6 gCO ₂ /MJ CNG: 54.3 gCO ₂ /MJ	IPCC 2006, table 1.4, lower 95% confidence interval No national value; IPCC default value lower 95% confidence interval. Confirmed by validation team.
EF_{KM,B,CH₄} CH ₄ emission factor of CNG buses per kilometre in CO _{2eq}	162.0 gCO _{2eq} /km	IPCC 2006, table 3.2.4. IPCC value as no national measurements exist The methodology requires that CH ₄ emissions of vehicles using gaseous fuels are included. Value of 7,715 mg CH ₄ of IPCC is multiplied with the GWP of 21 for CH ₄ to calculate CO _{2eq} Value and calculation checked by validator.
EF_{KM,C/T/TR,CH₄} CH ₄ emission factor of CNG cars. Taxis and motorized auto-rickshaws per kilometre in CO _{2eq}	9.9 gCO _{2eq} /km	IPCC 2006, table 3.2.4. (average of upper and lower boundary) IPCC value as no national measurements exist The methodology requires that CH ₄ emissions of vehicles using gaseous fuels are included. Average of 725 mg and 215 mg CH ₄ of IPCC is multiplied with the GWP of 21 for CH ₄ to calculate CO _{2eq} Value and calculation checked by validator
N_{x,C/T/TR} Number of passenger cars (C), taxis (T) and motorized auto-rickshaws (TR) using fuel type x	No value required for projections	Registration statistics Centre of Science and Environment based on Department of Transport, Delhi and Indraprastha Gas Limited, the CNG supplier in Delhi Required to check if passenger cars, taxis or motorized rickshaws use different fuels than those used for calculating the baseline parameter.
P Total passengers transported by the project	Table 24 PDD	Turnpike controls at stations and electronic smart cards. Only passengers are included which enter stations of the lines include in the project. Passengers entering line 1 and line 2 stations of Phase I are not included. In case line 1 and/or line 2 have joint stations with project lines the entering passengers are allocated proportionally i.e. if e.g. line 1 and line 3 have a joint station passengers are distributed 50:50 of that station between line 1 and line 3. Procedure and values controlled and found as plausible by validator. Passenger numbers based on projections by RITES (3 rd party)
EC_{PJ} Electricity consumed by MRTS (trains)	Table 25 PDD	Control with electricity invoices. The electricity meters are calibrated by the local electricity board of the state government and are sealed. They can only be opened by officials of the electricity board therefore the project owner cannot realize independent calibrations. There is also a check meter with controls realized by the local electricity department in case of large variations between readings. Projections based on train usage and consumptions as measured in lines 1-3 Procedure and values controlled and found as plausible by validator.
MS_i	No value required for	Only used for leakage calculation of rebound effect.

Net share of passengers using the metro which would have used baseline mode i (%)	projections	Based on survey detailed in the PDD. Survey in line with methodology. Checked by validator.
N_{B,T,TR} Number of buses, taxis and motorized rickshaws circulating in the city	No value required for projections	Department of Transport, Delhi and BTC, Delhi Year 1,4, and 7 if required i.e. if a change of occupation rate is registered Official data source
OC_{B,T,TR} Average occupancy rate of buses, taxis and motorized auto-rickshaws	No value required for projections	For taxis and motorized rickshaws based on visual occupation studies excluding the driver. For details concerning measurement procedures see guidelines in Annex 3. Survey realized using upper 95% confidence interval. Procedure follows TORs for occupation rate studies described in methodology No change of occupation rate previewed to baseline. Practical experience of a comparable MRTS (Transmilenio Bogota, which has a comparable outreach) has shown no negative change (reduced occupation rate) of occupation rates of baseline vehicles. See verification report TransMilenio 2009 project 0672 Information checked by validator and found as accurate.
NIZ_{C,T} Number of cars/taxis using affected roads	No value required for projections	Same roads, same data points, same hours and same number of days are monitored as in the baseline study.
TDIZ_{C,T} Distance driven by taxis and passenger cars on affected roads	No value required for projections	Same roads as in the baseline study. Visual tracking of samples of vehicles entering/exiting the affected roads registering the entry and the exit point and measuring the distance by GPS or other means
V_P Vehicle project speed on affected roads; Average moving speed is recorded.	No value required for projections	Same roads, same data points, same hours and same number of days are monitored as in the baseline study.
BTD_{p,i} Baseline trip distance of the cluster p of surveyed passengers using mode i	Value per passenger see CER spreadsheet for pilot survey used for projection	Based on survey detailed in the PDD. Survey in line with methodology. Checked by validator Pilot survey reviewed on site, interview with surveyor on-site and spot-check of random original surveys by validator.
IPTD_{p,i} Indirect project trip distance of the surveyed passenger using mode i	Value per passenger see CER spreadsheet for pilot survey used for projection	Based on survey detailed in the PDD. Survey in line with methodology. Checked by validator Pilot survey reviewed on site, interview with surveyor on-site and spot-check of random original surveys by validator.
SFC_B Specific fuel consumed of buses	348.43g/km	Delhi Transport Corporation (DTC) See section B.6.2. for control of data used for projection For projection purposes a 1% improvement of the baseline factor per annum was assumed. This projection is based on the default technology improvement factor for buses as per methodology.
EC_{EL,R}	3,855 MWh	Northern Railway, Delhi

P_{EL,R} Quantity of electricity consumed by the baseline rail system per annum Total passengers transported by baseline rail-system per year	2,887,200 passengers	See section B.6.2. for control of data used for projection For projection same value assumed.
P_{SPER} Number of passengers in the time period of the survey (1 week)	No value required for projections	DMRC Turnpike controls at stations and electronic smart cards. Only passengers are included which enter stations of the lines include in the project. Passengers entering stations of Phase I are not included. In case Phase I lines have joint stations with project lines the entering passengers are allocated proportionally i.e. if e.g. line 1 and Phase II line x have a joint station passengers of that station are distributed 50:50 between the two lines.
FEX_p Expansion factor for each surveyed passenger <i>p</i> surveyed (each surveyed passenger has a different expansion factor)	Value 1 assumed for projection	Projection is based on pilot survey with limited number and Phase II lines were not yet operational thus assumption of 1. Using factor 1 does not imply over- or understating ERs.

The monitoring plan is described in PDD B.7., in Annex 3 (A.8.) and Annex 4. The desk review has detected some wording in the passenger survey questionnaire which was not precise enough (CAR #19). The phrasing was adapted and is now idem to the methodology. The descriptions contain the organizational structure and responsibilities for monitoring, quality assurance and record retention [41]. The design of the passenger survey, a core element of monitoring, is explained in detail. 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 complies with the requirements of the methodology. SQS concludes that the monitoring plan is compliant with the methodology and that the project participants will be able to implement this plan.

3.9 Sustainable development

SQS corroborates the confirmation of the Indian DNA that the project contributes to the sustainable development of the host party. It is documented in the LoA issued by the DNA of India.

3.10 Local stakeholder consultation

The stakeholder groups, which have been identified and invited for comments are the general public as well as persons living near to construction sites. The on site visit showed that wide publicity and public consultations were held for the DMCR developments and a helpline was established for passengers which resulted in around 2800 monthly calls.

SQS rates the consultation of stakeholders as adequate.

3.11 Global stakeholder consultation

The PDD version 1.0 dated 3 May 2010 was published on 8 May 2010 for 30 days on the UNFCCC website. Comments from two global stakeholders were received:

Stakeholder Javid Sayeed

Stakeholder's comment (1)
It is really a tragedy happened with the PP who has changed DOE and webhosted the PDD in a short span.
Response by PP
No question but personal statement of stakeholder.
Validator conclusion
Agreed. No further action required.

Stakeholder's comment (2)
It seems that PP would like to hide the reality or truth which was addressed by old DOE or Global Stakeholder comments received during public consultation which PP wouldn't have addressed properly.
Response by PP
No question but personal statement of stakeholder.
Validator conclusion
Agreed. No further action required.

Stakeholder's comment (3)
PP has to justify the change of DOE from old DOE and re-webhosting of the PDD, along with change of information from already webhosted PDD to the PDD under comments, in track change mode.
Response by PP
PP is not required to justify this decision or to provide a track-mode version of the PDD as it is webhosted again as new project.
The PDD was webhosted again as it was decided to only include Phase II and exclude all lines of Phase I. For increased transparency the PDD was webhosted again.
As the PDD required new webhosting the PP decided to change the DOE due basically to two reasons:
<ul style="list-style-type: none"> - Lack of competency and familiarity of TÜV Nord with ACM0016 which became apparent during the validation. - TÜV Nord has not complied in any project of the PP with agreed upon time schedules taking on average more than 1 year for validation even of small scale projects and could thus have dragged on this project for 2 or more years.
Validator conclusion
This issue has been addressed with CL #2. PP has added an explanation of the difference between the first and the second PDD (PDD version 1.2, table 8 and following text). Three lines have no longer been included for reasons given in the PDD.
No further action required.

Stakeholder's comment (4)
As PP has mentioned that the funding is from the GOI (Government of India) and GNCTD (Government of National Capital Territory of Delhi), how it could be justified that the funding is not from ODA? As per funding details received from the web it seems that DMRC has received fund of Japan Bank.
Response by PP
Funding from Japan is a credit and not ODA.
Validator conclusion
CAR #18 has been raised to clarify the situation. The PP has presented objective evidence showing that the funds are a long-term loan and thus not ODA.
No further action required.

<p>Stakeholder's comment (5)</p> <p>If DMRC has considered CDM revenue since 2001, Than why this project has been webhosted now? Even as per chronology of event he has appointed consultant in 2007, means what he was doing till date on CDM front? Please justify</p>
<p>Response by PP</p> <p>DMRC was in no rush to get the project approved as full operations are only mid 2010. Before project start (11.2005) DMRC, also due to legal reasons, did not want to sign a contract with a CDM project developer which could thereafter sue DMRC if the project would not get underway.</p> <p>Before webhosting a project an appropriate methodology needs to get approved by the EB. The methodology approval process took nearly 3 years which is not the fault of the PP. After methodology approval the PDD was finished and the project was webhosted less than 1 month after approval of the methodology. For details see table 6 in the PDD.</p>
<p>Validator conclusion</p> <p>The first version of ACM0016 has been adopted on 16/10/2009 (CDM website).</p> <p>No further action required.</p>

<p>Stakeholder's comment (6)</p> <p>The consultant has carried out baseline studies but has not provided the information of the data collection and the calculation from base data to data used for preparing the PDD.- PP should include authenticity of the data collection with sample calculations of each data from raw form to the final calculations.</p>
<p>Response by PP</p> <p>All studies have been provided to the validator. Studies are property of the company which developed latter and the information disclosed publicly is sufficient to check data and procedures while the validator and the UNFCCC has full access to all information.</p>
<p>Validator conclusion</p> <p>Samples of the collected data have been verified during the on site visit and requested with CL #4. The data collection is correct and consistent. No further action required.</p>

<p>Stakeholder's comment (7)</p> <p>The alternatives listed in the PDD are vague, these options are not available to DMRC as DMRC is not an individual investor who has other alternatives (options) of investments, as DMRC was only ventured for Delhi Metro and involved for this project.</p>
<p>Response by PP</p> <p>DMRC is a special purpose vehicle established to realize a metro. As such by nature DMRC is not the entity which could take different transit mode decisions. However the owner of DMRC (DMRC has equal equity participation from the Government of India and from the Government of National Capital Territory of Delhi) had the options as addressed in section B4 of the PDD.</p>
<p>Validator conclusion</p> <p>Agreed. No further action required.</p>

<p>Stakeholder's comment (8)</p> <p>The CDM consideration data used related to meth proposal are not relevant, PP should remove it, as PP hasn't proposed it.</p>
<p>Response by PP</p> <p>Grütter Consulting is a PP and is the sole proponent of both methodologies cited (NM229 and NM266). DMRC, not being specialized in the field of carbon and transport made a contract with Grütter Consulting just for this purpose in which both parties are project proponents. It is thus correct to list methodology development in table 6.</p>
<p>Validator conclusion</p>

Methodology development was the main reason why this PDD has not been submitted earlier. It is acceptable to mention methodology development in table 8 (originally 6) CDM Project Chronology. See also CAR #9. No further action required.

Stakeholder's comment (9)

As per corporate finance, PP should invest into any of the project if NPV is positive, with negative NPV how PP has planned to invest into this project. The viability of the project is questioned at investment decision than why PP has invested?

Response by PP

- A). Corporate finance does not indicate that all projects with a positive NPV must be realized.
- B). The viability of the project in absence of the CDM is questioned. With CDM the project is however viable and therefore the PP invested.
- C). The viability of the project is dependent on the risk. This is assessed following the guidance as established in ACM0016 based on historical performance of MRTS in India. Under these circumstances the project risk leads to negative NPV without carbon finance.

Validator conclusion

The answer by the PP seems to be reasonable and the DOE does not see any necessity for further explanations since it is the decision of the PP whether he wants to invest or not.

Stakeholder Saagar Pathak**Stakeholder's comment (1)**

We understand that Delhi Metro is being implemented in two phases, I & II.

Red Line Line No.1- Shahdara-Tri Nagar-Rithala

Yellow line Line No.2- Vishwa Vidyalaya-Central Secretariat

Blue line Line No.3- Indraprastha-Barakhamba Road-Dwarka Sub City

Phase II of the Delhi Metro Project consist of the following lines:- Shahdara – Dilshad Garden

Blue Line Indraprastha – Noida Sector 32 City Centre

Green Line Yamuna Bank – Anand Vihar ISBT

Blue line Vishwavidyalaya – Jahangir Puri

Green Line Inderlok – Kirti Nagar -Mundka

Yellow line Central Secretariat – Sushant Lok

Blue Line Dwarka Sector 9 to Dwarka Sector 21

Orange Line New Delhi – Airport

Blue Line Anand Vihar – KB Vaishali

Violet Line Central Secretariat – Badarpur

Source: http://en.wikipedia.org/wiki/Delhi_Metro,
http://www.delhimetrorail.com/corporates/projectupdate/phase1_network.html

As evident from the above tables, many lines of phase II are mere extensions of the lines established in phase I (See red/ blue lines). The project is an environmental friendly project and contributes towards decreasing the emissions. However, we fail to understand why certain sections of the metro network are being projected as a CDM project?

Response by PP

ACM 0016 requires that a new rail infrastructure is established and not just operational improvements. This is the case with the new Phase II lines.

In the definition section of ACM 0016 a clear description of line extensions is also made where extensions are also a project. The applicability condition is thus that lines are additional i.e. that new infrastructure is established which is the case of the project.

The additionality of the project is proven using the procedure as described in ACM0016. In absence of the CDM the project would therefore not occur.

Phase I is not eligible for CDM because the project starting date was prior the year 2000.

Validator conclusion

The project meets the requirements of ACM0016, specifically the applicability conditions which include the extension of railroad lines provided new rail infrastructure is built. No further action required.

Stakeholder's comment (2)

Section A.2 states that “all corridors of Phase II and Line 3 of Phase I of Metro Delhi managed by DMRC (Delhi Metro Rail Corporation Ltd.). Lines 1 and 2 of Phase I are not included as CDM project...”.

We fail to understand that how it is being projected as a CDM project and why the previous phases were not considered under Clean Development Mechanism of the Kyoto Protocol. Why does these specific lines require CDM revenue when the lines under phase I had started their operation in 25th December 2002 and have been earning profits. With the success of the lines opened for public in 2002, why does DMRC require CDM revenue for the already profitable DMRC?

Response by PP

The comment does not refer to the published PDD but to an earlier version. No lines of Phase I are included in the PDD.

The additionality of the project is proven for the project lines and not for other lines. For the project lines CDM is required to make them financially sustainable. The decision that CDM is required for the project was done in the year 2001 before DMRC had any lines operational.

Phase I of DMRC is not making profits but a positive cash flow which is a difference. Actual ridership of DMRC Phase I is 79% below the projected ridership for Phase I. DMRC can be called a success in terms of being finished on time and with the investment as previewed. In financial terms 79% less passengers than expected results in much less revenues than projected and therefore losses. As mentioned above the term profit has been mixed up with operational cash flow or even income.

This is exactly the risk of metros which is taken into consideration when realizing the financial assessment of the DMRC project based on ACM0016.

Validator conclusion

PP has explained why the Phase I lines have not been entered into a CDM project. Furthermore, the PDD explains why Metro Delhi Phase II will not have a positive NPV without CDM support. See also CAR # 11 and CAR #12. No further action required.

Stakeholder's comment (3)

Further, "Internationally, of the 135 Metros worldwide, only four make an operating profit apart from Delhi, these are Hong Kong, Taipei, Singapore and Tokyo. (Source: <http://www.thehindu.com/2007/09/24/stories/2007092457210400.htm>). Then why is CDM revenue required for the already profitable DMRC? "The Delhi Metro Rail Corporation (DMRC) has earned a profit of Rs 398.69 crore during 2006-07, an increase of 15% over the previous year." (Source: <http://www.financialexpress.com/printer/news/220261/>)

Response by PP

The stakeholder has not quoted the article correctly. The article states:

"The DMRC has made an operation profit of Rs.398.69 crore as against Rs.346.53 crore in 2005-06." <http://hindu.com/2007/09/24/stories/2007092457210400.htm>

And in the other source:

"After meeting all the expenditure (except interest and depreciation), an operating profit of Rs 398.69 crore was generated, Dayal said" <http://www.financialexpress.com/printer/news/220261/>

Also, the statement of the 135 metros relates to operational profits.

Operational profit means that revenues are higher than costs. However a metro has a major initial investment which it should recover. The operational profit does not include interest, depreciation and repayment of loans with which the metro was built.

The financial assessment made is for the Phase II lines of DMRC. It follows the EB guidelines on financial assessments and the procedures as detailed in ACM0016. It therefore takes into account the experience of already existing metros in the host country. See for details Step 2 Investment Analysis in section B.5. of the PDD.

Validator conclusion

Agreed. The payback of the investment costs has not considered in the stakeholder's comment. No further action required.

Stakeholder's comment (4)

What is the difference between the metro infrastructure installed in these phases and why the previous phase did not foresee all such requirements?

Response by PP

<p>The infrastructure Phase I and Phase II are comparable. Passenger numbers, revenues, costs have been assessed for Phase II as this is the CDM project. The results of Phase I have been taken into consideration together with the results of Kolkata metro (to a minor extent) based on ACM0016.</p>
<p>Validator conclusion See answer to point 1 above. It explains why Phase I has not been considered for CDM. No further action required.</p>
<p>Stakeholder's comment (5) Out of Rs. 70 lakhs per day, which is its operating revenue, as high as 25% comes from property development and includes activities like leasing out commercial spaces, advertising, construction of shopping arcades, setting up of accommodation units, construction of IT parks etc.(Source: http://www.indianrealtynews.com/real-estate-india/delhi/dmrc-earning-high-from-property-development.html) – is this revenue considered while calculating the Net Present Benefit?</p>
<p>Response by PP Yes this has been included in the financial assessment based on the DPR Phase II. See Table 10 for the figure used.</p>
<p>Validator conclusion The validator has crosschecked the financial spreadsheet and the DPR documents and confirms that property development and advertisement revenues are included in the calculations. See also CL #10. No further action required.</p>
<p>Stakeholder's comment (6) Also, the land that has been given to DMRC by the government is subsidized, why has this not been taken into account.</p>
<p>Response by PP The statement of the stakeholder that subsidized land has not been taken into account is wrong. The investment is based on the DPR Phase II. See for explanation DPR Phase II point 9.4.2.: “The cost of land required for Delhi Metro is assumed to be met by GOI and GNCTD and the land is leased to DMRC for 99 years on a nominal rent of Rs.1 p.a. with the cost of land being treated as premium and recovered by way of interest free subordinate debt after the senior debt has been repaid fully. Therefore, the amount of subordinate debt works out to be Rs. 350 crore.”</p>
<p>Validator conclusion The land cost can be found in the financial analysis (File 47 new finance.xls) where an amount of 3505 million INR is entered, compatible with point 9.4.2 in DPR Phase II.</p>
<p>Stakeholder's comment (7) Revenue earnings of Delhi Metro Rail Corporation (DMRC) are likely to shoot up by about 194% in next 3 years and touch Rs.2100 crore, according to the ASSOCHAM (http://www.assocham.org/prels/shownews.php?id=1607) , then why does such a profitable project need more revenue?</p>
<p>Response by PP Revenues including rental charges are based on DPR Phase II which is an official source and the base for decision taking in the year 2005. The source cited by the stakeholder is non-official but a projection of ASSOCHAM, it is for the entire DMRC and not only for the Phase II project and it was published July 20, 2008 i.e. after decision taking of the project. Due to these facts the source provided by the stakeholder is irrelevant.</p>
<p>Validator conclusion The plausibility check in the PDD version 1.2 shows that NPV is negative even if the performance of Metro Delhi Phase I up to and including the year 2009 is taken into account. No further action required.</p>
<p>Stakeholder's comment (8) Further, section B.5 of the PDD states that “The project could not be entered earlier into validation due to the fact that no approved methodology for this case existed, with the first methodology for MRTS entered</p>

by Grütter Consulting in May 2007 (NM0229) subsequently being rejected by the Methodology Panel with a new methodology being submitted March 2008 (NM0266). The approval of this methodology took more than 1½ years thus delaying the entry to validation of the project.”

Then it states that the Contract for project development was being awarded to the consultant in 19/03/2008. Unfortunately the timelines are not matching!!!! How can DMRC state that it could not enter into validation because it did not have a methodology for more than 6years!!!! when it did not make any attempts for new methodology. Also, it should be noted that the methodologies that were rejected by CDM EB in 2007 when the consultant was not even appointed.

The methodology NM105 (transportation sector) was proposed before 09 May 2005 & the methodology AM0031 was valid from 28th July 2006. Why did the DMRC not make any attempts to propose a new methodology?

Response by PP

Projects can only enter validation with an approved methodology. This is UNFCCC procedure. Thus the project had to await the approval of a MRTS methodology before entering validation. The approval of the methodology took 2.5 years which was outside the scope of influence of DMRC. DMRC as explained was also in no particular rush to get the project validated as the construction time of metro is very long and no credits can be gained prior project approval. The project will only be fully operational by mid 2010.

It is not under control of the PP how long methodology approval takes. In this case it took more than 2.5 years.

The consultant was already in negotiations with DMRC since 2003. Grütter Consulting specializes on transport projects and was realizing contracts with various metros/MRTS worldwide. Knowing from the experience with AM0031 (BRT methodology) that the methodology approval process is very time consuming the first methodological proposal was entered while still negotiating the final contract with DMRC.

Table 6 clearly shows that DMRC was taking numerous steps to ensure carbon finance including first identification of appropriate consultants, negotiation of the contract with the involved consultant and thereafter methodology insertion and approval which took nearly 3 years. The UNFCCC only permits projects being entered into validation after methodology approval and therefore the statement made by the stakeholder why DMRC waited 6 years to enter the project into validation is wrong and based on a lack of understanding of the procedures required to validate a project. Also the project starting date (table 6) is 11.2005 and the project was entered into validation 11.2009 which gives 4 and not 6 years. Of these 4 years 3 were used only for methodology approval....

The time taken for preparation of such a project including identification of consultants, contract negotiation, methodology development, PDD etc is by no means singular for a large scale public infrastructure project:

- The registered cable car project of Metro Medellin started contacts and negotiations with CAEMA and Velnec as project developers in the year 2.2002, project starting date was 4.2003 and the project started validation 10.2008 i.e. 5 years after project start and 6.5 years after considering CDM (<http://cdm.unfccc.int/Projects/DB/TUEV-SUED1260805836.78/view>).
- The registered CDM project of the BRT Bogota where the decision to go for carbon credits with CAF was made in the year 2001, project start was early 2002, the contract with Grütter Consulting was closed in the year 2005 and the project was forwarded for validation 7.2006 i.e. more than 4 years after project start and 5 years after CDM consideration (see PDD project 0672 on UNFCCC website).
- The project BRT Barranquilla (under validation) where the signature to do a CDM project was made in 2.2003, project starting date was 12.2005, the contract with the project developer was closed end 2008 and validation started 2.2010 i.e. 5 years after project start and 7 years after considering CDM (<http://cdm.unfccc.int/Projects/Validation/index.html>).

Validator conclusion

The validator agrees with the response by the PP. Table 8 (originally table 6) gives a consistent picture of

the chronology.
Stakeholder's comment (9) DMRC is earning profits from phase I and this can be evaluated by the validators by conducting a small google search. But, still phase II anticipated loss and considered CDM...!!! now that is contradictory!
Response by PP This issue has already been raised and responded under points 2 and 3.
Validator conclusion See statements made by the validator for point 3 and 7 above.
Stakeholder's comment (10) EB 39, annex 22 states that, "The project participant must indicate, by means of reliable evidence, that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation. Evidence to support this should include, inter alia, contracts with consultants for CDM/PDD/methodology services, Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs (including correspondence with multilateral financial institutions or carbon funds), evidence of agreements or negotiations with a DOE for validation services, submission of a new methodology to the CDM Executive Board, publication in newspaper, interviews with DNA, earlier correspondence on the project with the DNA or the UNFCCC secretariat" It must be noted that neither of the above mentioned evidences are available. The PDD has mentioned that DMRC discussed the option of CDM with many consultants but as the timeline demonstrates, it did not finalize until 2008. If CDM was an important part of the decision making process then why did DMRC not seriously consider CDM. None of the evidences mentioned by UNFCCC have been met by DMRC.
Response by PP Table 6 has the entire project chronology. It includes as listed by the EB: <ul style="list-style-type: none"> • Contracts with consultants for PDD and methodology services • Submission by the PP of a new methodology • Publications in newspapers. Not only has the project clear prior consideration but it also has continuous action to strive for CDM in accordance with EB guidance.
Validator conclusion The validator has crosschecked the documentary proof listed in table 8 (originally table 6). The chronology is supported by sufficient objective evidence. See also CAR #9. No further action required.
Stakeholder's comment (11) Also, line 3 of phase 1 started operation in 2005, if CDM revenue was such an integral part then how is the project operating till date.
Response by PP Line 3 Phase I is not part of the project.
Validator conclusion Agreed. No further action required.
Stakeholder's comment (12) The Japanese Government has financed about 60% of the cost by the way of a soft loan through JBIC. Is there any agreement with them about the project considering carbon credits? If yes, then why have these facts not been disclosed to the general public? If no, then we guess it might pose a question on DMRC that why it did not disclose such crucial information to the investor? The funds received for the project can be accessed at http://www.mofa.go.jp/POLICY/oda/data/02ap_sa01.html#INDIA . The funds accrued from JICA can be accessed at
Response by PP The financial calculations include a 56% soft loan from Japan. The Ministry of Finance informed DMRC that CERs can be kept by DMRC and are not tied to Japanese credit for metro. Thus the soft loan has been accounted for in the projections and the GOI letter clearly states that CERs are not tied to loan.
Validator conclusion

<p>This issue has been brought up in CAR #18 and satisfactorily answered by the PP. CAR #18 is closed. No further action required.</p>
<p>Stakeholder's comment (13)</p> <p>Further, as per the statements given by DMRC officials earlier about the climate change initiatives of DMRC, the modal shift project never featured.</p> <p>Source: http://timesofindia.indiatimes.com/city/delhi/Carbon-conscious-DMRC-earns/articleshow/1087010.cms, http://www.tribuneindia.com/2008/20080105/nation.htm#2, http://docs.google.com/viewer?a=v&q=cache%3AjjzuYP36yVwJ%3Aanidm.gov.in%2FNews%2520in%2520PDF%2F2008%2FJanuary%2F05-01-08.pdf+dmrc+cdm&hl=en&gl=in&sig=AHIEtbRD4rq8X3kdadkCt1BWCFXV3VtbAw&pli=1</p> <p>However, lately there have been articles on the modal shift CDM project, http://www.indiaenvironmentportal.org.in/files/DMRC.pdf</p> <p>We would request DMRC to clarify how the modal shift project has started featuring now although the PDD mentions in Section B.5, DMRC indicating that Kyoto Protocol should be used to offset additional costs of Metro Delhi.</p>
<p>Response by PP</p> <p>The appreciation of the stakeholder is not correct and evidence is given in table 6 of the mode shift project of DMRC such as:</p> <ul style="list-style-type: none"> • Note Chief Project Manager DMRC year 1/2001 ("shift in ridership from buses"; File 25) • DMRC invitation 4/2002 ("reduction of CO2 and other gases due to the shift from other modes of transport to metro"; File 26) • Environmental strategy year 2/2005 ("CDM project viz on modal shift"; File 29) • Tribune News services 4/2005 ("the reduction in atmospheric pollution, due to decreased vehicular emission and fuel consumption with a number of cars and buses going off roads will also earn the DMRC substantial carbon credits", File 30) <p>All of above occurred prior project start evidencing thus that mode shift was considered previous project start even publishing this fact in a respectable national newspaper envisaging significant carbon credits from mode shift.</p>
<p>Validator conclusion</p> <p>The validator has crosschecked the documentary proof listed in table 8 (originally table 6). The chronology is supported by sufficient objective evidence. See also CAR #9. No further action required.</p>
<p>Stakeholder's comment (14)</p> <p>Delhi Metro is one of the laurels of our country and one of our greatest green initiatives. However, in order to gain carbon revenues, DMRC should not make such futile attempts at turning the events. Delhi Metro has been in news ever since it was conceptualized and not even once did DMRC mention about the need or importance of carbon credit.</p> <p>One of the projects of DMRC is also registered under the Kyoto mechanism of CDM.</p> <p>"Installation of Low Green House Gases (GHG) emitting rolling stock cars in metro system" which is a small scale project activity and has a potential to reduce 41,160 CER/ annum. However in the PDD of the modal shift project DMRC has not mentioned anything about this small scale project activity nor has it subtracted the emissions from the modal shift project. The PDD does not throw any light on how the credits from that project will be accounted and considering the credit from the entire metro system will lead to double counting of credits.</p>
<p>Response by PP</p> <p>Point 13 above clearly shows that the appreciation of the stakeholder is not correct and that internally as well as publicly the mode shift project and its importance for DMRC were announced prior project start.</p> <p>The regenerative energy project is Phase I of DMRC and is not related to the proposed mode-shift project. The mode-shift project also only includes Phase II and not Phase I thus even theoretically not overlapping is possible. The credits gained from the proposed project are due to mode shift from other modes of trans-</p>

port towards metro. No need is seen to relate this project to another effort DMRC is doing.
<p>Validator conclusion</p> <p>This issue has been brought up during the interviews on the occasion of the on site visit and in CL #1. The PP has exhaustively explained why double counting cannot occur. No further action required.</p>
<p>Stakeholder's comment (15)</p> <p>Further, the DRMC project has attained loan subsidies, land subsidies (http://web.iitd.ac.in/~tripp/delhibrts/metro/Metro/Metro%20delhi%20BS%20Oct%2008.pdf) – has this been taken into account the NPV calculation?</p>
<p>Response by PP</p> <p>This is a repetition of point 6. See thus answer point 6. All these elements are included in the financial calculations.</p>
<p>Validator conclusion</p> <p>See conclusion to point 6. No further action required.</p>
<p>Stakeholder's comment (16)</p> <p>In section B.5 of the PDD it is being stated that identification of the consultant began in 22.10.2003. However, the consultant was not being appointed till 19.03.2008. It seems very unlikely that in country with the highest number of CDM project registrations (one being their own) DMRC did not find any CDM consultant over a period of Five years nor did it make any attempts to submit a new methodology!! We would request you to clarify this!</p>
<p>Response by PP</p> <p>This is a repetition of point 8 and has been answered under point 8. As the answer under point 8 shows the long negotiation time is common for public transit projects. Also India has only 1 transport project registered which is an energy efficiency project and not a mode-shift project thus having a complete lack of practical experience in mode shift public transit projects. Even as of today the amount of project developers with concrete experience in mode shift transit and in developing such complex methodologies and projects is very limited and Grütter Consulting has developed to the amount 3 out of 3 approved large scale transport methodologies (AM0031 and ACM0016 which consolidated two methodologies) and 2 out of 5 approved small scale transport methodologies including all mode-shift methodologies. Negotiations with the company were time-consuming not least due to the higher than average cost demanded by the consultancy compared to Indian carbon consultancy firms.</p>
<p>Validator conclusion</p> <p>This subject has been dealt with under point 8 above. No further action required.</p>
<p>Stakeholder's comment (17)</p> <p>Delhi metro is expected to cover the entire NCR and ridership will be divided accordingly. But the PDD does not state how it has planned to account for the difference in the ridership in the satellite cities o like Noida, Gurgaon.</p> <p>We understand that the DMRC routes are based on the routes proposed by them in their Delhi Metro Master Plan. They are also, at times based on the basis of commuter demand and population density based on a transportation demand study conducted by RITES. Then the proposal is being sent to the government for approval.</p>
<p>Response by PP</p> <p>The metropolitan area is covered with the project including all lines and all passengers of the lines included in the PDD. The separation of lines and passengers not included in the PDD is made according to the methodology i.e. based on entry control of passengers. The PDD has clearly stated this: Project passengers are those which enter stations of the project metro lines as included in the PDD. For stations shared by a non-project metro line (metro lines of Phase I) as well as a project metro line the passengers are distributed proportionally i.e. if the station is used by line 1 plus a project metro line then the passengers are distributed 50:50, if the station is used by metro lines 1, 2 plus a project line then the passengers are distributed 66:33 i.e. 33% are considered as project passengers.</p>
Validator conclusion

The description of “project passenger” in the PDD is unequivocal. It answers the question of “account for the difference in ridership”. No further action required.

Stakeholder's comment (18)

We would like to know if the proposal to the government included carbon credits and if the government considers it while giving approval? The approval for the DMRC projects is being given by a group of ministers (government) & hence documents demonstrating that they had considered CDM while approving the project should be shown to the public. Further, there is no mention about CDM being assessed as a key factor in the approval that has been given (<http://www.delhicapital.com/delhi-metro/news/metro-line-to-noida-gets-go-ahead.html>). The DOE should use RTI to check the authenticity of all the documents and claims or our NGO would use RTI and go public with all these documents. If CDM revenue was so very seriously considered than how were some phases of the phase II commissioned? Without CDM??

Response by PP

The same argument has already been repeated various times by the stakeholder; see answers 2, 3, 8, 9, 10 and 14 for prior consideration and additionality. See also chapter B5 of the PDD which answers all the questions raised.

Commissioning of Phase II lines was done with the first contract 11.2005 and previously CDM had been considered by the project. There is no regulation that projects cannot start construction or even operation before being registered as a CDM project. What is essential is that CDM was considered prior project start and this has been proven extensively in chapter B5.

Validator conclusion

The validator has crosschecked the documentary proof listed in table 8 (originally table 6). The documents show that DMRC has considered CDM all along. No further action required.

Stakeholder's comment (19)

The PDD considers 12/03/2003 as the project start date. However, many activities have been initiated for the Delhi Metro long before its constructions began (<http://civilaviation.nic.in/ccrs/Annual%20report05-06/Activities%20in%20regard%20to%20Delhi%20Metro%20Rail%20Corporation.html>)

a. Delhi Metro Rail (Operation & Maintenance) Act 2002 was enacted by the Parliament and was published in the Gazette of India vide Notification No.72 dated 18.12.2002.

b. In May 1998, as a first step, the DMRC appointed Japan's Pacific Consultants International (PCI) as general consultant to the project. The general consultant's role is vital. It will choose the firm which will finally execute the project (<http://www.india-today.com/itoday/14091998/urban.html>). And for the phase II, DMRC awarded the contract for general consultancy for Phase II construction to a consortium of five companies comprising Pacific Consultants International (PCI), Parsons Brinckerhoff International, Japan Railway Technical Services, TONICHI Engineering Consultant and RITES Ltd. These companies had earlier provided consultancy for Phase I of the Delhi Metro Project as well. Hence this was a mere extension of the consultancy contract awarded earlier. Then how is the start date considered beginning of construction.

Response by PP

The statement that the start date considered in the PDD is wrong. Table 6 clearly lists the start date as 10.11.2005.

The definition of project start date is made by the EB and not by the PP. The stakeholder's interpretation of start date is thereby not in line with the EB. The EB starting date is not the start of construction but the date of the first construction contract for the first line included in the project (Phase II line). This is based on a tender and the date of the contract (not the date of construction start which is later). Before this date the project owner had no financial commitment to any of the lines included in the project. The project start date is defined in accordance with EB 41 point 67: The “Glossary of CDM terms” defines the start date of a CDM project activity as: “the earliest date at which either the implementation or construction or real action of a project activity begins”. To facilitate the clear definition of this term the Board further clarified that: "In light of the above definition, the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date on which contracts have been signed for equipment or construc-

tion/operation services required for the project activity.”
<p>Validator conclusion</p> <p>Agreed. No further action required.</p>
<p>Stakeholder's comment (20)</p> <p>The PDD states that the total investment of the project activity is 81783 million INR and the CER revenue over a period of 7 years will be 475.5 million INR. We fail to understand how revenue which is about 0.5% of the project cost is going hedge the risk. Further, in which all investments has the Government of India considered Net present value analysis that this project has taken?</p>
<p>Response by PP</p> <p>The numbers indicated by the stakeholder are wrong. The investment is 81,180 million INR. The revenues and the costs are taken from the DPR.</p> <p>Total carbon finance revenue cited by the stakeholder is also wrong. It is 26,608 million INR representing 1/3rd of total investment.</p> <p>The usage of NPV is dictated by ACM0016. The financial calculations show that without CDM the NPV in all variations is negative and with CDM it is positive. This is the step required to show the importance of CDM.</p>
<p>Validator conclusion</p> <p>When the PDD has been modified as a consequence of the CAR and CL these numbers have changed slightly. The investment is now 92,536 million INR, the carbon finance revenue over 30 years is 27,396 Million INR. These changes do not alter the reasoning of the PP. The carbon finance revenue is a substantial portion of the investment. No further action required.</p>
<p>Stakeholder's comment (21)</p> <p>We would seriously acknowledge that this is a CDM project if Mr. E. Sreedharan and the group of ministers give it in writing that this project was conceptualized as a CDM project and without CDM revenue, the project will stop operation. Hence, if the DOE gives a negative validation report, entire metro network of Delhi will come to a standstill!</p>
<p>Response by PP</p> <p>This is a statement and not a question.</p> <p>The EB has issued guidance on CDM consideration. It is thereby not a requirement that a CDM project is approved previously by a group of ministers. Using this criteria no Indian and probably worldwide no CDM project has considered CDM seriously as in no PDD published it has been mentioned that the cabinet of a group of ministers has approved a singular CDM project.</p> <p>The PP follows the guidance of the EB for CDM consideration and as already shown in numerous points before this has been the case.</p>
<p>Validator conclusion</p> <p>The stakeholder's opinion that the “entire metro network of Delhi will come to a standstill” is disproved by reality. Despite the fact that the Kolkata Metro “has been facing continuous deficit since its partial opening in 1984” (The Kolkata Metro Dum Dum – Tollygunge, Design & Construction Phase II, June 2000; file 48), it is still operating today. Metro Delhi can and would survive without CDM but as the PP has shown it will incur a deficit. No further action required.</p>

3.12 Environmental impacts

Metros in India do not require an environmental permit or a clearance for construction and operation. However DMRC has prepared an environmental impact assessment (EIA) for each line and section. Mostly positive impacts resulted from these studies as can be seen in PDD part D2. The validator has verified a copy of the "Environmental Impact Assessment for Phase-II Corridors of Delhi Metro" (August 2005) [26]. SQS is convinced that the overall impacts are positive.

3.13 Validation protocol

In order to ensure transparency and organize the corrective or additional information and measures a validation protocol was established for the project. The protocol shows in a transparent manner the criteria (requirements), the means of validation and the results from validating the identified criteria including any resulting CAR, CL and FAR.

Corrective Action Requests

No.:	CAR #1	Reference to Checklist	44 - 48
Validator finding:	LoAs have not been issued for the project.		
Validator request:	LoAs have to be submitted from the Host country (India) and the Annex I country (Switzerland) approving the project.		
Project proponent response:	Swiss LoA can only be provided once the draft validation report has been issued by the DOE. India LoA has been issued and is attached.		
Validator conclusion:	The LoA of the host country India (No. 4/2/2010-CCC, dated 6 August, 2010) has been submitted. LoA of Switzerland pending. The LoA of Switzerland (No. G514-3487, dated November 25, 2010) has been submitted. CAR #1 is closed. Date: 23/09/2010 Date: 30/11/2010		

No.:	CAR#2	Reference to Checklist	Table I
Validator finding:	Evidence about project progress and implementation stages are not sufficiently detailed and up-to-date.		
Validator request:	Further details as contained in the updated DPRs of Phase II have to be submitted.		
Project proponent response:	Additional information has been added in section A.4.3.		
Validator conclusion:	The DOE considers the additional information in the PDD and the referenced files as sufficient to explain the project progress. CAR #2 is closed. Date: 23/09/2010		

No.:	CAR#3	Reference to Checklist	A.2.1.
Validator finding:	The description of the project activity refers to the entire 102 km extension of the Delhi Metro system. However, the Detailed Project Report for Phase II (January 2005) comprises 53 km only. The project has subsequently been expanded step by step. No information is given on the dates when the decisions about the additional 49 km have been taken.		
Validator request:	Since the additionality analysis will use figures from the original 53 km plan further details and evidence about the sub-stages of Phase II extension covering the entire project boundary are requested.		
Project proponent response:	See details given in section A.4.3. where the sequence of corridors and decision taking is explained The updated additionality calculations based on original DPR for Phase II plus DPRs extension Noida and DPR Gurgaon all available as of 10.2005. This includes 76 of the total of 102 km i.e. 75%. The financial calculations have been adapted to include these 2 DPRs available as of early 2005 i.e. prior project start. To test the plausibility of the financial calculations in view of the extensions made ex-post and to see if above mentioned calculations are conservative the financial calculations have also been performed for the total investment, total revenues and total operational cost in section B5 step 2B. Also the investment cost per km of the extension has been compared with the investment cost of the original sections. The later investments are slightly higher per km than the original ones (see section B.5. Step 2B.		

	See changes made in finance document (file 47 finance new) as well as in PDD chapter B.5.
Validator conclusion:	The history of the project is sufficiently described in the revised PDD. The updated investment analysis is consistent with this history. It comprises those lines of the final project which had been decided upon at the time of the project start. The plausibility check in sub-step 2B of clause B5 shows that the project will not be financially feasible even if the ex-post passenger numbers of Metro Delhi Phase I up to and including the year 2009 are achieved. CAR #3 is closed.
Date: 23/09/2010	

No.:	CAR #4	Reference to Checklist	A.4.4.1.
Validator finding:	The project name in file “PDD tables Phase II.xls”, sheet “Project Emissions”, cell A1 is not the same as the project name given in the PDD.		
Validator request:	The same project name as in the PDD must be used to avoid any doubts.		
Project proponent response:	The name of the CER spreadsheet has been changed to be consistent with the PDD		
Validator conclusion:	The project name in file “PDD tables Phase II.xls” now reads correctly Metro Delhi, India. CAR #4 is closed.		
			Date: 23/09/2010

No.:	CAR #5	Reference to Checklist	A.4.4.2.
Validator finding:	The crediting period is not consistently used in the calculations. The Annual Average Estimated Reductions are calculated by adding up the reductions of <u>8</u> years (2011 – 2018) and then dividing by <u>7</u> only (Table in A.4.4. and file “PDD tables Phase II.xls”).		
Validator request:	The calculation of the emission reduction must be corrected together with all the numbers, which depend on this result.		
Project proponent response:	All numbers have been corrected. The year 2018 had been included erroneously.		
Validator conclusion:	The changes have been verified throughout the PDD and in file “PDD tables Phase II.xls”. They are correct and consistent. CAR #5 is closed.		
Date: 23/09/2010			

No.:	CAR #6	Reference to Checklist	A.4.5.2., F.2.1.
Validator finding:	The PDD refers to 56% of JBIC funding; this value is related to the first sub-stage of the Phase II investments and this value is diluted by the fact that JBIC funding is not provided for the Phase II lines that are outside of the Capital's territory. The further details shown during the site visit result in an overall 36% JBIC and 64% Indian public financing mix.		
Validator request:	PP shall provide further explanation and breakdown how the various public sources finance the Phase II extension of the Delhi Metro.		
Project proponent response:	<ol style="list-style-type: none"> 1. Extension to NOIDA with its financing structure (government of NOIDA) has been included in new finance file (see CAR 03). The NOIDA extension has the same finance structure according to DPR as the original Phase II lines (point 12.5.3.1). The grant of the local government has been subtracted from the investment cost and thus the original finance structure with 56% JBIC finance is correct. 2. Extension to Gurgaon with its financing structure has been included in new finance file (see CAR 03). The Gurgaon extension has the same finance structure according to DPR as the original Phase II lines (point 12.6.2.1). The grant of the local government has been subtracted from the investment cost and thus the original finance structure with 56% JBIC finance is correct. 		

	<p>Prior project start thus all lines and corridors have the financial structure used for the benchmark with 56% JBIC funding.</p> <p>Badarpur corridor decided thereafter recommends a financing structure with 60% JBIC funding i.e. even slightly higher than the original one (DPR 14.7.3). No grants are included in this corridor. The small extensions of 2.6 and 2.8km have no DPR with a finance structure.</p> <p>All information as available in all DPRs thus have the financial structure as chosen for the benchmark. The subsidy part has been deducted directly from the investment in accordance with ACM0016 (grants/subsidies are not included as investment). The figures in the annual accounts of DMRC include the subsidy under investment as well as under finance source. Therefore the share of JBIC in the DMRC accounts is lower. Also the current finance structure in the audited accounts does not include the 5th disbursement (p.24 point 9). Current shares of JBIC funding can thus not be compared to projections and all information available of all DPRs point to the same finance structure.</p> <p>Even assuming a benchmark of 0% the NPV would still remain with -122,820 highly negative and also the adjusted base cases 1 and 2 with higher passenger numbers would still, have a negative NPV thus showing the robustness of results.</p> <p>See documentation new finance file 47 plus DPRs new/extension of corridors attached as files 73-75 and 77 plus Audited Accounts DMRC as of 31.3.2010</p>
Validator conclusion:	<p>The validator considers the explanations given by the PP together with the new finance file (CAR #3) as satisfactory. The grant is indeed subtracted from the investment costs in the years 2007 – 2010 (4 instalments). CAR #6 is closed</p> <p style="text-align: right;">Date: 23/09/2010</p>

No.:	CAR #7	Reference to Checklist	B.3.2.
Validator finding:	CH4 emissions of the project transport system are excluded from the project boundary but indicated as included (Yes in Table 3, column "Included?").		
Validator request:	The exclusion of CH4 has to be indicated consistently in Table 3.		
Project proponent response:	<p>Table 3 has been corrected.</p> <p>CH4 emissions are only included for indirect project emissions (emissions to and from metro which involve e.g. gaseous fuelled buses and taxis). Direct project emissions do not include CH4 as they are based on electricity usage only of DMRC.</p>		
Validator conclusion:	<p>Table 5 (after revision of the PDD; originally table 3) has been verified and found to be correct.</p> <p>CAR #7 is closed.</p> <p style="text-align: right;">Date: 23/09/2010</p>		

No.:	CAR #8	Reference to Checklist	B.3.4.
Validator finding:	No emission sources for leakage are listed in Table 3.		
Validator request:	Emission sources for leakage must be discussed in the PDD to be in line with the methodology.		
Project proponent response:	Table 3 has been corrected to include leakage in accordance with the methodology.		
Validator conclusion:	<p>Table 5 (after revision of the PDD; originally table 3) has been verified and found to be correct.</p> <p>CAR #8 is closed.</p> <p style="text-align: right;">Date: 23/09/2010</p>		

No.:	CAR #9	Reference to Checklist	B.5.1.
Validator finding:	Prior consideration is documented according to the requirements. However, the time elapsing between the project activity start date (10 November 2005) and the first real action for CDM – the appointment Grütter Consulting on 20 March 2008 – is mistakenly described as less than two years. The EB 49 annex 22 guidelines were not in place; therefore they are not applicable as the PP could not be aware of the legislation that was not created yet.		
Validator request:	PP is requested to alter the reference to the EB 49 annex 22 guidelines in the text in line with the emergence of the legislation and the actual time elapsing between project starting date and first real action.		
Project proponent response:	<p>EB 49 Annex 22 states in point C b) as documentation for continuous action: "...<i>inter alia</i>, contracts with consultants for CDM/PDD/methodology services, Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs..."</p> <p>Prior to closing a contract with a CDM project developer 3.2008 i.e. 27 months after project start DMRC had to establish contacts and negotiate the contract. Documentation of this is available as of 5.2006 (6 months after project start), 9/2006 (10 months after project start), 12/2006 (13 months after project start), 1/2007 (14 months after project start), 7/2007 (20 months after project start) and 10/2007 (23 months after project start). Thus clearly serious action was taken on a continuous base. Also the PP Grütter Consulting entered a methodology for metro applicable for this project as of 5.2007 i.e. within 18 months of project start. We consider that the project clearly shows continuous action to secure CDM status. We do however agree that the relevant legislation was not in force as of time of project decision taking and have thus, in accordance with the DOE request altered the respective reference to EB 49 Annex 22.</p>		
Validator conclusion:	The reference to EB 49 Annex 22 was altered in the PDD. The explanations show again the fulfilments of the prior consideration requirements. CAR #9 is closed		

Date: 23/09/2010

No.:	CAR #10	Reference to Checklist	B.5.5
Validator finding:	The project name in file “finance.xlsx”, sheet “Principles, General Information”, cell C7 is not the same as the project name given in the PDD.		
Validator request:	The same project name as in the PDD must be used to avoid any doubts.		
Project proponent response:	The file name has been changed to Metro Delhi, India in accordance with the PDD		
Validator conclusion:	The project name in file “new finance.xlsx” now reads correctly Metro Delhi, India. CAR #10 is closed.		
Date: 23/09/2010			

No.:	CAR #11	Reference to Checklist	B.5.5.
Validator finding:	The DMRC phase I numbers in the PDD (Table 7 and 8) for the relation of actual to projected passengers differ from those shown in the PDD of Metro Mumbai One, India, version 1.0 for DMRC phase I (-79% versus -72% respectively for 2007). Furthermore, it is not evident why the passenger numbers for 2006 and 2007 are presented (file daily pax 2006 and 2007.xls) and used for the NPV calculation while the passenger numbers for 2008 and 2009 are not used nor discussed.		
Validator request:	<ol style="list-style-type: none"> 1. The differences between the passenger numbers given in this PDD versus the PDD of Metro Mumbai One, India, version 1.0 must be explained. 2. PP is requested to provide detailed information and evidence for the raw data and the calculations of those passenger numbers, which are used for proving the additionality. 3. In the context of taking into consideration the prior performance of MRTS in the host country PP is requested to justify the use of DMRC phase I passenger numbers for 		

	certain years (2007) while not considering the same numbers for other years (2008 and 2009).
Project proponent response:	<ol style="list-style-type: none"> 1. Passenger numbers have been corrected based on the last available version of DMRC as attached. Metro Mumbai 1 PDD will be adapted accordingly. Passenger numbers are taken only for Phase I lines (line 1, 2 and 3) for the years 2006 to 2009. See File 67new and changes made in PDD section B.5 2. See as proof screen shot of forwarded e-mail including original attachment by DMRC 3. We have updated this information and have included the entire information available 2006 to 2009 for assessing the plausibility of the financial calculations. See revised chapter B.5 substep 2B. The relation between actual and projected passenger numbers Phase I DMRC is thereby maximum 26% which is less than the adjusted base case 2 of 30% thus showing that the original projections are conservative and plausible in light of actual DMRC results.
Validator conclusion:	<ol style="list-style-type: none"> 1. The differences have been explained and eliminated. Accepted and closed. 2. The e-mail is not sufficient as a proof of the origin of the raw data because the attached file cannot be opened. This point remains open. (See new request below). 3. All data for Metro Delhi phase I which are currently available are now included, i.e. 2006 – 2009. Accepted and closed. <p style="text-align: right;">Date: 23/09/2010</p>
Validator request:	PP is requested to provide additional objective evidence for the origin of the actual pax numbers for 2006 to 2009 shown in file 67 new daily pax.
Project proponent response:	File 67 is an official document sent to us from DMRC. Attached the file with signature from DMRC representative Mr Verma. See also e-mail screenshot.
Validator conclusion:	<p>The passenger numbers raw data for Metro Delhi phase I (2006 -2009, day by day) have been submitted. Each page is signed by S.A. Verma, Dy. CEO DMRC whose signature has been crosschecked with another letter from DMRC. A sample of the raw data has been crosschecked with file 67 new and found to be correctly copied.</p> <p>CAR #11 is closed.</p> <p style="text-align: right;">Date: 04/11/2010</p>

No.:	CAR #12	Reference to Checklist	B.5.6.
Validator finding:	One of the assumptions for the Investment Analysis (financial feasibility) is that, based on experience with previous metro projects in India, the projected passenger numbers must be reduced by 81% (Table 8). There is uncertainty in this figure (see CAR#11). No sensitivity analysis has been done by varying the reduction for the planned passenger numbers (-81%).		
Validator request:	A sensitivity analysis must be done for the reduction figure in % of the passenger numbers depending on what comes out from CAR#11.		
Project proponent response:	<ol style="list-style-type: none"> 1. The sensitivity analysis is made on all relevant income/cost parameters. This includes fare box revenues. Fare box revenues are linked directly with the passenger numbers (fare box revenues increase either through higher passenger numbers or through higher fares – an increase of fares however leads to reduced passenger numbers due to price elasticity of demand). Through realizing a variation of fare box revenues the sensitivity of increasing passenger numbers to the NPV is thus accounted for. 2. The figure taken for previous Indian experience has been limited to Kolkata. The results of DMRC Phase I were not available as of project starting date as Phase I was not yet operational. This data was only available 2006 and thereafter. Thus the figure has been adjusted to only include Kolkata. 3. 3 different levels of adjusting the base case and thus passenger numbers have been taken: <ol style="list-style-type: none"> a). the base case based on the historic experience available as of project start with 90% less passengers than projected 		

	<p>b). an expanded base case with 80% less passengers than projected</p> <p>c) an expanded base case with 70% less passengers than projected</p> <p>In all cases the NPV is negative.</p> <p>The plausibility has been checked with actual data of DMRC Phase I which is on average 2006-2009 76% less passengers than projected and as best case 74% less passengers than projected. With the best case scenario the NPOV remains negative.</p> <p>4. To test the plausibility of assumptions (basically the adjustment due to previous Indian experience with metros) the actual relation DMRC Phase I of projected and actual passengers period 2006 to 2009 has been taken. This information was NOT available at the time of decision taking. It is therefore ONLY a plausibility test to assess if Kolkata metro is not comparable at all with other projects and a clear exception. The financial data itself is however not relevant for decision taking i.e. the test is only made to see if the path followed in the PDD which is idem to the path in ACM0016 is plausible due to discussions of Kolkata potentially being an exceptional case.</p> <p>5. As mentioned in CAR 11 data for this plausibility check are taken for the period 2006 to 2009.</p>
Validator conclusion:	<p>The revised PDD is based strictly on the information which was available at the time of the project start. Even if projected passenger numbers are reduced by 70% only the NPV is negative. The additional plausibility check – which is based on actual Metro Delhi phase I data covering the 2006 - 2009 period – confirms these sensitivity assumptions retrospectively as phase I is running at 26% of projected passengers in its fourth year of operation, i.e. a reduction of 74%. The revised PDD shows unambiguously and transparently that the project would have a negative NPV even if its passenger numbers achieve a higher percentage of the projections than has been observed for Metro Delhi phase I.</p> <p>CAR #12 is closed.</p>
Date: 04/11/2010	

No.:	CAR #13	Reference to Checklist	B.5.6.
Validator finding:	PDD Figure 5 contains the name “Baseline” for the first bar while it is called “Base Case” in Table 11. The name Baseline is confusing as this word has a different meaning in the CDM vocabulary.		
Validator request:	PP shall use the term “Base Case” in Figure 5.		
Project proponent response:	The term has been changed to “base Case”		
Validator conclusion:	Figure 5 “NPV in different Cases” is no longer shown in the PDD version 1.1. The term “Baseline” has been replaced in file 47 “new finance.xls”, sheet Graphs. CAR #13 is closed.		
Date: 23/09/2010			

No.:	CAR #14	Reference to Checklist	B.5.6.
Validator finding:	The investment costs presented in PDD Table 10 are without units and currency.		
Validator request:	PP is requested to incorporate the respective units and currency in Table 10.		
Project proponent response:	Table 10 (new table 11) has been amended		
Validator conclusion:	Investments costs are now shown as million INR. CAR #14 is closed.		
Date: 23/09/2010			

No.:	CAR #15	Reference to Checklist	B.5.10.
Validator finding:	PDD Table 14 mentions “Metro (project)” as the MRTS system for Delhi. It is not clear why this is not called “Metro Phase I”. The phase I lines are operational whilst “Metro (project)” gives the impression of being the present CDM Project. 3.13.1.1 <i>PP is requested to modify Table 14 and use unequivocal terms to describe the</i>		

Validator request:	<i>MRTS system of Delhi.</i>
Project proponent response:	Metro Phase I has been taken as text in the table 14 (new table 16)
Validator conclusion:	The entry in table 16 has been verified and found to be correct. CAR #15 is closed.
Date: 23/09/2010	

No.:	CAR #16	Reference to Checklist	B.6.1.7.
Validator finding:	At least one update of the CORINAIR Guidebook was published in 2007, therefore 2002 is not the latest update.		
Validator request:	The latest CORINAIR edition must be used and referred to as defined in the methodology.		
Project proponent response:	The latest version (2007) has been used. See change of formulas and change of parameters in chapter B.6.1. section Leakage.		
	See attached Corinair 2007		
Validator conclusion:	CORINAIR 2007 is now being used. CAR #16 is closed.		
Date: 23/09/2010			

No.:	CAR #17	Reference to Checklist	B.6.1.7.
Validator finding:	<p>The result of the formulas (18) for calculating the speed dependent emissions is the speed dependent fuel consumption, but not the speed dependent CO2 emission as indicated in the formulas.</p> <p><i>DOE's remark: The identical formulas are shown in the methodology ACM0016 with the same error in the interpretation of the result. The formulas will need to be modified in the methodology ACM0016.</i></p>		
Validator request:	The calculation formulas for the speed dependent CO2 emissions must be corrected in the PDD.		
Project proponent response:	The formulas have been changed based on the latest Corinair version as well as including NCV and EF to get EF in gCO2/km instead of gfuel/km as denominated in Corinair. The methodology is not precise in this and does not express that Corinair expresses EF in grams of fuel and not grams of CO2. The PDD chapter B.6.1. section Leakage has been amended.		
Validator conclusion:	The formulas and parameters in the revised PDD have been crosschecked with the CORINAIR edition 23 August 2007. They are correct including the calculation of the CO2 emissions based on the fuel consumption. CAR #17 is closed.		
Date: 23/09/2010			

No.:	CAR #18	Reference to Checklist	F.2.2
Validator finding:	The evidence for not having ODA associated with the project is insufficient as the JBIC/JICA funds of the Japanese Government may contain an element of ODA.		
Validator request:	A statement from DMRC and/or the Government of India is needed regarding the preferential/sovereign loan used for the project financing from Japan.		
Project proponent response:	See order GOI dated 30/03/2006 indicating that the JBIC funding is a long-term debt and not a donation. DMRC receives the credit from the GOI who is the actual creditor. Also the attached letter of the MOF indicates clearly that credits from Japan do not have an obligation to render CERs to Japan and thus finance is separate from and is not counted towards the Kyoto obligations of Japan. See File ODA attached		

Validator conclusion:	The attached files clearly indicate that ODA is not associated with the project. Moreover, they also clearly state that "JBIC ODA loan do not involve any obligation (...) to sell CERs to JBIC". CAR #18 is closed
Date: 23/09/2010	

No.:	CAR #19	Reference to Checklist	F.4.1.
Validator finding:	<p>The wording of the Passenger Survey questions 4 and 6 is not precise enough.</p> <p>Questions 4 and 6 do not specifically refer to “the Metro your are currently using”. The surveyed passengers will be misled to describe their entire trip without a Metro while in reality they may use Metro (Phase I) for part of their trip. This would illegitimately increase the baseline emissions.</p> <p>Question 4 “... how would you do this trip?” does not relate to the two choices of answers which are provided.</p>		
Validator request:	The Passenger Survey questions must be precise enough (similar to the methodology) to avoid misunderstandings during the passenger survey interviews.		
Project proponent response:	<p>Question 4 and its answers have been rephrased and are now idem to the methodology.</p> <p>Question 6 has been rephrased and is now idem to the methodology.</p>		
Validator conclusion:	<p>The questions are now clear and unequivocal.</p> <p>CAR #19 is closed.</p>		
Date: 23/09/2010			

No.:	CAR #20	Reference to Checklist	A.2.2.
Validator finding:	The project start date is defined as the date when the first construction contract has been signed, namely 10.11.2005 (PDD, table 8). PDD, table 3 indicates that the construction start date of the Indraprastha – New Ashok Nagar line was September 2005 which is two months earlier.		
Validator request:	PP is requested to check and correct the dates or add an explanation in the PDD.		
Project proponent response:	The contract signature date is 10.11.2005. The LoA (Letter of Approval), also mentioned in contract on page 2 point 2k was closed 1.9.2005, however legally binding as contract and thus also a financial commitment is the signed contract. The correct date is thus as indicated 10.11.2005. Potentially a constructor could start at his own risk with the LoA to construct but in practice he will get prepared to start as soon as possible once the contract is signed. Table 3 was changed accordingly to avoid confusions and an explanation has been added as footnote in table 3.		
Validator conclusion:	The contract (file 70) has been verified. It shows the date of the Letter of Approval (DMRC/20/II-06/2005) as 01.09.2005. The changes in the PDD version 1.2 are consistent with these dates. CAR #20 is closed.		

Date: 04/11/2010

No.:	CAR #21	Reference to Checklist	A.3.3.
Validator finding:	No Modalities of Communication Form has been received by the validators.		
Validator request:	Submit MoC for the project Metro Delhi, India.		
Project proponent response:	MOC is attached		
Validator conclusion:	A copy of the MoC has been received and its content verified by the validator. CAR #21 is closed.		
Date: 04/11/2010			

Clarification Requests

No.:	CL#1	Reference to Checklist	Table I
Validator finding:	There is another project registered under CDM (No 1351) "Installation of Low Green House Gases (GHG) emitting rolling stock cars in metro system" for the Metro Delhi.		
Validator request:	Please show how the two projects especially the CO ₂ emission reductions are related to each other and how a double counting can be excluded.		
Project proponent response:	<p>Project 1351 only includes rolling stock of Phase I (see chapter A2 PDD page 1). Section B3 of the mentioned PDD (project boundary) clearly indicates that the rolling stock of the three lines of Phase I is included.</p> <p>Phase I project emissions (rolling stock emissions) are not included in the modal shift PDD presented which includes only Phase II. Efficiency improvements of Phase I rolling stock have thus no effect over emissions of rolling stock Phase II. Thus no double counting of emission reductions can occur.</p>		
Validator conclusion:	<p>The explanation clearly states that there is no double counting of CO₂ emission reductions in this project.</p> <p>CL#1 is closed.</p>		

Date: 23/09/2010

No.:	CL #2	Reference to Checklist	A 1.2
Validator finding:	The published version of the PDD is not its first version. Its earlier version was submitted to TUV Nord in November 2009 (http://cdm.unfccc.int/Projects/Validation/DB/99JY5JXMJJTXJE5COMZALLMR5ZLLW4/view.html ; public commenting period 13 November -12 December 2009) but PP decided to discontinue the validation with the other DOE . The most important changes between the 2009 and 2010 versions of the PDD is the exclusion of Metro Delhi Phase I and Delhi Airport link from the project.		
Validator request:	The project chronology table needs to be extended to include 2009 PDD publication and also refer to the major changes between the PDD versions.		
Project proponent response:	The table project chronology has been extended and an explanation has been provided in table 8 section B5. The letter concerning claims on the airport link has been added as file 76.		
Validator conclusion:	The changes have been verified and found to satisfactorily respond to the validators' request. CL #2 is closed.		
Date: 23/09/2010			

No.:	CL#3	Reference to Checklist	A 1.2
Validator finding:	A web based application “Map my India” has been used to calculate distances during the survey.		
Validator request:	Please clarify the methodology of distance calculation as used by the web based application. [Map my India will provide the statement]		
Project proponent response:	MapMyIndia has responded to this query. The distance is basically determined through field surveys. The validator has been supplied with the respective telephone memo as well as contact details of the responsible staff at MapMyIndia to verify the information.		
	Document attached see Memo MapMyIndia		
Validator conclusion:	The explanation and the Memo MapMyIndia are satisfactory clarifications. CL #3 is closed.		
Date: 23/09/2010			

No.:	CL #4	Reference to Checklist	A.4.4.2., F.4.3.
Validator finding:	The Passenger Survey providing the input data for the ex-ante calculations is described in detail, however, without supporting evidence. The on-site visit included an attendance of 1.5 hours and discussion of the execution of the Survey. In file 'PDD tables Phase II, sheets BL trip and IDP trip' the fields Project, Lane, and Date are empty.		
Validator request:	Please provide the documentary evidence (electronic copy of the 803 completed Survey questionnaires) on how and when the data for the estimation of the projected emission reductions have been gathered and complete PDD tables.		
Project proponent response:	We have the surveys in hard copy. Each has 4 pages. We would need to scan all 803 surveys i.e. over 3,000 pages which is a considerable investment. We suggest that the DOE gives us list of x numbers of surveys indicating the ID number chosen by the DOE and we submit these randomly chosen (by the DOE, not by us) surveys to the DOE. Each survey has an ID number starting with 001 and finishing with 803. The ID number can be found in the CER excel spreadsheet. The PDD spreadsheet has the ID of each interview and all information relevant for the calculations from each interview has been included.		
Validator conclusion:	The DOE agrees with the proposition. Date: 23/09/2010		
Validator request:	Please submit the following 28 (square root of 803) survey documents: 007, 031, 071, 100, 135, 172, 199, 234, 255, 289, 301, 333, 368, 393, 422, 460, 487, 500, 529, 561, 590, 611, 649, 680, 710, 728, 777, 803.		
Project proponent response:	The requested surveys have been scanned and will be sent by e-mail.		
Validator conclusion:	All requested documents have been received and verified. CL #4 is closed. Date: 04/11/2010		

No.:	CL#5	Reference to Checklist	A 4.5
Validator finding:	It is understood DMRC received loans in "yen" and earns revenues in "Rupees".		
Validator request:	Please explain the choice of discount rate in light of exchange rate fluctuation between Yen and Rupees. [actually sovereign loan with exchange rate risk borne by Government]		
Project proponent response:	The credit given by JBIC is to the Indian government which again hands over the credit to DMRC. DMRC receives the credit in INR and the government covers the exchange rate risk. The audited statement provides the required clarity on page 24/35 where it is stated that: <ul style="list-style-type: none"> - Credits are in Yen - DMRC receives the credit in INR from the GOI - Exchange rate fluctuation risk is born by GOI and GNCTD and not by DMRC Document: Audited accounts DMRC, 2010		
Validator conclusion:	The explanation has been crosschecked with the Auditor's Report by S N Nanda & Co, Chartered Accountants, 22.06.2010, and has been confirmed. CL #5 is closed. Date: 23/09/2010		

No.:	CL #6	Reference to Checklist	B.3.4.
Validator finding:	The formula is appropriately given for leakage; however the value applied is zero in A.3.3.and B.6.3. sections of the PDD and appropriate tables.		
Validator request:	Please elaborate why leakage is considered zero in the ex-ante calculations.		
Project proponent	Leakage can occur due to following factors:		

response:	<ul style="list-style-type: none"> - Change in occupation rate of buses, taxis and motorized rickshaws. This factor is annually monitored. The projection has assumed that no change in the occupation rate will result based on the impact of a comparable MRTS project in Bogota where the occupation rate has been monitored and no negative change has occurred (see CDM project 0671 CER monitoring report 2008 on UNFCCC website incl. verification report SGS of 2009). - Congestion leakage composed of the rebound effect plus the speed effect. A rebound effect occurs if the average trip time is reduced e.g. through having less vehicles on the road. A reduction of the average trip time again means a higher average speed. Latter again means lower emissions. Thus the 2 factors tend to cancel each other out i.e. less vehicles provoke a rebound effect increasing emissions while higher speed leads to lower emissions. In projects using AM0031 this effect is ex-ante modelled. See projects: <ul style="list-style-type: none"> A). BRT Barranquilla (under validation, see UNFCCC website) with a rebound effect 5,900 tCO₂ (additional emissions, cumulative 7 yrs) and a speed effect of -15,400 tCO₂ (less emissions) B). BRT TransMilenio (registered under project # 671) with a cumulative rebound effect of 48,000 and a speed effect of -94,000 C). BRT Cali (project in validation at UNFCCC) with a cumulative rebound effect of 80,000 and a speed effect of -171,000 D). BRT Chongqing (project in registration at UNFCCC) with a cumulative rebound effect of -14,000 (negative rebound i.e. emission reductions due to rebound effect due to more traffic) and a speed effect of 0 E). BRT Pereira (project in validation at UNFCCC) with a cumulative rebound effect of 15,000 and a speed effect of -5,000 F). BRT Zhengzhou (project in validation at UNFCCC) with a cumulative rebound effect of -56,000 negative rebound i.e. emission reductions due to rebound effect due to more traffic) and a speed effect of 0 <p>In all cases except Pereira the combined speed and rebound effect is negative i.e. emission reductions are increased through leakage.</p> <p>Based on above historic and model data for comparable projects it is projected that leakage will be 0. A short explanation has been given in the respective parameters which determine leakage in chapter B.7.1. as well as in B.6.3.</p>
Validator conclusion:	<p>Explanation is accepted as logical and sufficient. CL #6 is closed.</p> <p style="text-align: right;">Date: 23/09/2010</p>

No.:	CL #7	Reference to Checklist	B.4.2.
Validator finding:	The discussion of the Baseline Scenario lists 7 transport modes. It is not clear why Metro Phase I lines are not included among these modes.		
Validator request:	Please explain why Metro Phase I lines are not included as a mode of transport in the baseline or add it to the list.		
Project proponent response:	<p>The baseline modes are those that the passenger can use in absence i.e. instead of the project Metro Phase II for the respective trips. Baseline modes are replaced thereafter by the project mode. Metro Lines Phase I are not a substitute for metro lines Phase II i.e. the project metro lines (Phase II) do not replace the metro lines Phase I nor can the passenger use in absence of metro lines Phase II the metro lines Phase I. Baseline modes are however only such that are replaced potentially by the project. Therefore metro lines Phase I are no baseline mode of transport. It is important to remember that the baseline mode of transport in the city is not idem to the current transport system. Baseline modes are those that could be used alternatively to the project mode. Thus only trip modes are included in the baseline which are partially or completely substituted by the project metro. This has been explained also in section B.4. Baseline Identification</p>		

Validator conclusion:	Explanation understood and accepted. CL #7 is closed.	Date: 23/09/2010
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No.:	CL#8	Reference to Checklist	B 4
Validator finding:	The criteria by which the fares were fixed for DMRC will be provided.		
Validator request:	Please clarify the criteria that were taken into account by the Fare Setting Committee to fix the fare.		
Project proponent response:	The role, constitution and elements of fare fixation have been attached as File Fare fixation. These are based on the “Delhi Metro Operation and Maintenance Act, 2002”		
Validator conclusion:	The role of the Fare Setting Committee is explained in the attached document; the DOE considers it as an adequate clarification. CL #8 is closed		
Date: 23/09/2010			

No.:	CL #9	Reference to Checklist	B.5.4.
Validator finding:	It is not clear why the title of Table 11 and the sentence following this table mention “cases” (plural) but the table shows only one case (base case).		
Validator request:	Please explain or correct.		
Project proponent response:	The sentence below table 11 (new table 12) has been corrected from plural to singular.		
Validator conclusion:	This request is no longer applicable as the PDD version 1.1 shows several base cases in table 12. CL #9 is closed.		
Date: 23/09/2010			

No.:	CL #10	Reference to Checklist	B.5.6.
Validator finding:	Historic property development (renting of property at metro stations) revenue is around 20% as opposed to the 2% presented in Table 10. Stakeholder (No.2) comment No 5 highlighted this discrepancy that supports the fact that ridership was lower than planned resulting automatically in a higher proportion of property related revenues. The overall property investment was less than 3% of total (5, 4 billion out of 215 billion rupees) according to the latest DPR available and audited accounts for 2009-2010 shown on the site visit.		
Validator request:	Please provide an explanation why and how property development revenue share is higher than expected and submit the relevant parts of the audited DMRC annual accounts supporting the explanations.		
Project proponent response:	The annual income from property development is not higher than expected. Fare box revenues are much lower than expected. This increases the relative importance of property related revenues. This corresponds to the projections made in the PDD where with the figures of the base case the income from property development is on average for the entire period 9% and for initial years up to 30%. Actual financial results in fact prove that the financial projections made are realistic i.e. the fare box revenue has been adjusted not however the property revenues which per logic thereafter increase in proportion from a projected 3% to 20%. Rental earnings are reflected as percentage of operational revenues (last audited year 20%) in p. 14 of the audited statements. See document "Audited Accounts DMRC 2010" attached		
Validator conclusion:	The explanation together with the financial auditor report gives sufficient clarification to this point. CL #10 is closed.		

Date: 23/09/2010

No.:	CL#11	Reference to Checklist	B 6
Validator finding:	The car size distribution is taken from a 9 years old document (file 57).		
Validator request:	Please show that the car size distribution in India of today is still similar to the one of 2001.		
Project proponent response:	See file 78 attached plus clarification in PDD section B.6.1. part leakage. The 10 most sold car models in India (based on SIAM) with their cc for the year 2007/8 and 2008/9 have been included which shows that vehicle engines are < 1.4cc		
Validator conclusion:	File 78 shows new figures for the car distribution in India (2007/08 –and 2008/09) which are similar to those from 2001; the data were taken from “Autocar Magazine, New Buyer's Guide”. CL #11 is closed.		
Date: 23/09/2010			

Forward Action Requests

No.:	FAR #1	Reference to Checklist	F.4.2.
Validator finding:	See CAR#19		
Validator request:	The wording of the actual Passenger Survey questions, which have been used, must be checked for preciseness and consistency (see CAR #19) upon verification.		
Project proponent response:	NA		
Validator conclusion:	NA		
			Date: 19/08/2010

4 List of Interviewees and Documents Reviewed

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

The following stakeholders were interviewed during the validation (see appendix A).

The following documents were 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 reviewer. The reviewer is not a member of the validation team. Certificates of competence for each validation team member are included in appendix C to this report.

Name	Role (1)	Country	Duties				
			Desk review	On-site audit	Resolution of CAR & CL	Report	Technical review
Mr Bruno C. Baumann, PhD	LA	Switzerland	X		X	X	
Mr Hanspeter Graf, PhD	TM	Switzerland	X		X	X	
Mr Zsolt Lengyel	TM	Switzerland	X	X	X	X	
Mr David Gazdag, PhD	TM	Switzerland		X			
Mr Michael Gassner	TR	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, underwent an internal review (by a member of the validation team) before being submitted to the project participants. The final validation report underwent a review for final approval carried out by a reviewer (not a member of the validation team) before requesting registration of the project activity. The reviewer is qualified in accordance with SQS' qualification scheme for CDM validation and verification.

7 Appendix A: On-site Visit Programme

DAY/DATE	TIME	VENUE	AGENDA & Person-In Charge	CONCERNED
5-8-10 Thursday	10.30 AM	Metro Bhawan, Atrium	Site Visit to Rajiv Chowk, Travel to Phase II Metro Line and visit Patel Chowk Museum <i>Ms.Sandhya Sharma, PRO</i> <i>Mr.N.D.Khanna, Museum Curator</i> <i>Mr. Ritesh Ranjan, Station Controller, Rajiv Chowk</i>	✓ M/s SQS ✓ M/s Grutter Con- sulting ✓ PR Depptt DMRC
5-8-10 Thursday	1.00 PM	Patel Chowk	End of site visit	
5-8-10 Thursday	1.30 PM – 2.30 PM	DMRC Site Office, Laxmi Nagar	Lunch	✓ M/s SQS ✓ M/s Grutter Con- sulting ✓ DMRC
5-8-10 Thursday	2.30 PM- 5.00 PM	DMRC Site Office, Laxmi Nagar	Discussions • AGM(B) • CRRI <i>Mr.Neeraj Sharma Research Officer</i> • DyCEO <i>Mr.S.A.Verma</i>	✓ M/s SQS ✓ M/s Grutter Con- sulting ✓ DMRC
5-8-10 Thursday	5.00PM	END OF AUDIT DAY 1		
5-8-10 Thursday	7.00 PM	DINNER		✓ M/s SQS ✓ M/s Grutter Con- sulting ✓ DMRC
6.8.10 Friday	10.30 AM - 12.00 PM	DMRC Head Office, 7 th Floor, Metro Bhawan	Presentation to Direc- tor/DMRC & Discussions <i>Mr. Mangu Singh, Direc- tor- Works</i> <i>Mr.Shiv Mathan, Finance-AGM B</i> <i>Mr.S.A.Verma Dy.Chief Env. Officer</i>	✓ M/s Grutter Consult- ing
6.8.10 Friday	1.00-PM 2.00 PM	DMRC Site Office, Laxmi Nagar	Lunch	✓ M/s SQS ✓ M/s Grutter Con- sulting ✓ DMRC
6.8.10	2.00 PM-	Taj Ambassador Hotel	Discussions with Grutter	✓ M/s Grutter Consult-

Friday	4.30 PM		Consulting & Presentation on Surveys in relation to PDD <i>Ms.Devi(Supervisor/Inter viwer)</i>	ing ✓ M/s SQS
6.8.10 Friday	5.00PM- 5.30 PM	India DNA, Ministry of En- vironment and Forests	<i>Mr.R.K.Sethi</i> <i>Director</i>	✓ M/s Grutter Consult- ing ✓ M/s SQS
6.8.10 Friday	4.00 PM	END OF AUDIT DAY 2		

8 Appendix B: Documents Reviewed

Nr.	Title	Version
1	PDD DMRC Phase II	1.3
2	Letter of Approval by DNA of India	06/08/2010
3	Letter of Approval by DNA of Switzerland	25/11/2010
4	Modalities of Communication	without
5	PDD tables Phase II	1.2
6	File 1a CM 2009	5.0
7	File 1b CO Baseline Database for the Indian Power Sector	5.0
8	File 7 passenger cars fuel distribution delhi	23/12/2008
9	File 9 taxi fuel usage delhi	24/07/2008
10	File 18 Bharat petroleum NCV and CO2 EF India	20/10/2008
11	File 20 Report_Committee_of_Auto	without
12	File 24 early consideration 1	09/01/2001
13	File 26 early consideration CDM	24/04/2002
14	File 27 letter early consideration	22/10/2003
15	File 28 letter early consideration	22/03/2004
16	File 29 DMRC Environmental Strategy 001	09/02/2005
17	File 33 early consideration	10/05/2006
18	File 37 early consideration	16/01/2007
19	File 40 contract DMRC	19/03/2008
20	File 42 DPR Phase II corridors final 2005	Jan. 2005
21	File 47 new finance	27/09/2010
22	File 48 The Kolkata Metro	Jun. 2000
23	File 57 Pew report	May 2001
24	File 62 vehicle count affected roads 2009	29/06/2009
25	File 63 EC Notification	14/09/2006
26	File 65 EIA Phase II	Aug. 2005
27	File 66 JBIC report	without
28	File 67 new daily pax DMRC	without
29	File 70 contract Phase II	10/11/2005
30	File 72 corinar 2007 road	23/08/2007
31	File 73 DPR extension Noida	Nov. 2004
32	File 74 DPR Gurgaon 2004	Dec. 2004
33	File 75 DPR CS to Badarpur	Oct. 2006
34	File 76 airport link Letter	18/02/2010
35	File 78 Top 10 models car with cc	12/08/2010
36	Ridership Data 2006-2009	without
37	Surveys (28 original documents)	July 2008
38	Audited accounts	22/06/2010
39	ODA Documents	30/03/2006
40	Fare fixation document	22/02/2010
41	Monitoring Manual DMRC	2.0
42	File 49 EEX	07/09/2005
43	EU Emission Allowances	23/08/2005
44	Case Study of Delhi Metro	2005
45	File 25, early consideration CDM	12.01.2001
46	File 30 Tribune_06.04.2005	06.04.2005
47	File 31 letter Rites	04.08.2005
48	File 32 early consideration	01.03.2006
49	File 34 early consideration	29.09.2006
50	File 35 letter Managing Director	21.12.2006
51	File 38 offer metro delhi 7.2007	10.07.2007

52	File 39 offer metro delhi oct 22	22.10.2007
53	File 23 ADB fuel eff report, 2008	2008
54	File 60 RFF report on vehicles Delhi 2007	2007
55	File 12 DTC fuel consumption	2009
56	File 16 Railways Delhi 1-4	2008/2009
57	File 55 Northern grid losses	2009
58	File 11 occupation rate motorcycle and rickshaws	2007
59	File 14 occupation rate buses	2007
60	File 21 Leyland buses	2007
61	File 19 average DD buses	2007/2008
62	File 53, GTZ MRTS training	10.2004
63	File 44 Singhcolcata metro	2002
64	File 79 Expected ridership Phase I	without
65	File 54 Flyvberg, cost overrun metro	10.12.2008
66	IEA, Bus Systems for the Future, 2002, Table 2.1.	2002
67	GTZ/ITDP sustainable transport sourcebook 3A, Mass Transit Options, 2005, table 10	2005
68	DPR, 2005, Table 0.4	2005
69	http://planningcommission.nic.in/plans/planrel/fiveyr/index9.html	2002
70	http://webiitd.ac.in/~trip/delhibrts/brrts/hcbs/gnctpress1.htm	
71	http://delhi-masterplan.com/master-plan-2001/	
72	IPCC (1996), Revised Guidelines for National GHG Inventories: Reference Manual, (2006 no data was published), Table 1-27 and 1-36	1996
73	IPCC (1996), Revised Guidelines for National GHG Inventories: Reference Manual, table 1-43 (2006 no data was published)	1996
74	PDDs of BRT Bogota, BRT Cali, BRT Pereira, BRT Chongqing and BRT Mexico as well as cable car Medellin; all published on the UNFCCC website	Several

9 Appendix C: Certificates of Competence

Name: Mr Bruno Baumann, PhD

Scopes of expertise:		
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 TA 1.3: Other energy industries	<input type="checkbox"/> <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 TA 4.5: Other manufacturing industries	<input type="checkbox"/> <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 checked="" type="checkbox"/> <input checked="" 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 checked="" type="checkbox"/> <input checked="" type="checkbox"/>
13	Waste handling and disposal TA 13.1: Waste handling and disposal TA 13.2: Animal waste management	<input checked="" type="checkbox"/> <input checked="" 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 Hanspeter Graf**Scopes of expertise:**

1	Energy industries (renewable/non-renewable sources)	X
	TA 1.1: Thermal energy generation from fossil fuels as well as thermal energy from solar	X
	TA 1.2: Energy generation from renewable energy sources	<input type="checkbox"/>
	TA 1.3: Other energy industries	X
2	Energy distribution	<input type="checkbox"/>
	TA 2.1: Electricity distribution	<input type="checkbox"/>
	TA 2.2: Heat distribution	<input type="checkbox"/>
3	Energy demand	<input type="checkbox"/>
	TA 3.1 Energy demand	<input type="checkbox"/>
4	Manufacturing industries	X
	TA 4.1: Cement sector	<input type="checkbox"/>
	TA 4.2: Aluminium	<input type="checkbox"/>
	TA 4.3: Iron and steel	X
	TA 4.4: Refinery	<input type="checkbox"/>
	TA 4.5: Other manufacturing industries	X
5	Chemical industry	<input type="checkbox"/>
	TA 5.1: Chemical process industries	<input type="checkbox"/>
6	Construction	<input type="checkbox"/>
	TA 6.1: Construction	<input type="checkbox"/>
7	Transport	X
	TA 7.1: Transport	X
8	Mining/mineral production	<input type="checkbox"/>
	TA 8.1: Mining and mineral processes, excluding those included in TA 8.2 below	<input type="checkbox"/>
	TA 8.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/>
9	Metal production	X
	TA 9.1: Metal production	X
10	Fugitive emissions from fuels	<input type="checkbox"/>
	TA 10.1: Mining and mineral processes, excluding those included in TA 10.2 below	<input type="checkbox"/>
	TA 10.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/>
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	<input type="checkbox"/>
	TA 11.1: Chemical process industries	<input type="checkbox"/>
	TA 11.2: GHG capture and destruction	<input type="checkbox"/>
12	Solvents use	<input type="checkbox"/>
	TA 12.1: Chemical process industries	<input type="checkbox"/>
13	Waste handling and disposal	X
	TA 13.1: Waste handling and disposal	X
	TA 13.2: Animal waste management	<input type="checkbox"/>
14	Afforestation and reforestation	<input type="checkbox"/>
	TA 14.1: Forestry	<input type="checkbox"/>
15	Agriculture	<input type="checkbox"/>
	TA 15.1: Agriculture	<input type="checkbox"/>
	TA 15.2: Animal waste management	<input type="checkbox"/>

Name: M. Zsolt Lengyel

Scopes of expertise:

1	Energy industries (renewable/non-renewable sources)	X
	TA 1.1: Thermal energy generation from fossil fuels as well as thermal energy from solar	X
	TA 1.2: Energy generation from renewable energy sources	X
	TA 1.3: Other energy industries	<input type="checkbox"/>
2	Energy distribution	X
	TA 2.1: Electricity distribution	<input type="checkbox"/>
	TA 2.2: Heat distribution	X
3	Energy demand	X
	TA 3.1 Energy demand	X
4	Manufacturing industries	X
	TA 4.1: Cement sector	X
	TA 4.2: Aluminium	<input type="checkbox"/>
	TA 4.3: Iron and steel	<input type="checkbox"/>
	TA 4.4: Refinery	<input type="checkbox"/>
	TA 4.5: Other manufacturing industries	<input type="checkbox"/>
5	Chemical industry	<input type="checkbox"/>
	TA 5.1: Chemical process industries	<input type="checkbox"/>
6	Construction	<input type="checkbox"/>
	TA 6.1: Construction	<input type="checkbox"/>
7	Transport	<input type="checkbox"/>
	TA 7.1: Transport	<input type="checkbox"/>
8	Mining/mineral production	X
	TA 8.1: Mining and mineral processes, excluding those included in TA 8.2 below	<input type="checkbox"/>
	TA 8.2: Oil and gas industry, coal mine methane recovery and use	X
9	Metal production	<input type="checkbox"/>
	TA 9.1: Metal production	<input type="checkbox"/>
10	Fugitive emissions from fuels	X
	TA 10.1: Mining and mineral processes, excluding those included in TA 10.2 below	<input type="checkbox"/>
	TA 10.2: Oil and gas industry, coal mine methane recovery and use	X
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	<input type="checkbox"/>
	TA 11.1: Chemical process industries	<input type="checkbox"/>
	TA 11.2: GHG capture and destruction	<input type="checkbox"/>
12	Solvents use	<input type="checkbox"/>
	TA 12.1: Chemical process industries	<input type="checkbox"/>
13	Waste handling and disposal	X
	TA 13.1: Waste handling and disposal	X
	TA 13.2: Animal waste management	<input type="checkbox"/>
14	Afforestation and reforestation	<input type="checkbox"/>
	TA 14.1: Forestry	<input type="checkbox"/>
15	Agriculture	<input type="checkbox"/>
	TA 15.1: Agriculture	<input type="checkbox"/>
	TA 15.2: Animal waste management	<input type="checkbox"/>

Name: Mr David Gazdag

Scopes of expertise:

1	Energy industries (renewable/non-renewable sources)	<input type="checkbox"/>
	TA 1.1: Thermal energy generation from fossil fuels as well as thermal energy from solar	<input type="checkbox"/>
	TA 1.2: Energy generation from renewable energy sources	<input type="checkbox"/>
	TA 1.3: Other energy industries	<input type="checkbox"/>
2	Energy distribution	<input type="checkbox"/>
	TA 2.1: Electricity distribution	<input type="checkbox"/>
	TA 2.2: Heat distribution	<input type="checkbox"/>
3	Energy demand	<input checked="" type="checkbox"/>
	TA 3.1 Energy demand	<input checked="" type="checkbox"/>
4	Manufacturing industries	<input type="checkbox"/>
	TA 4.1: Cement sector	<input type="checkbox"/>
	TA 4.2: Aluminium	<input type="checkbox"/>
	TA 4.3: Iron and steel	<input type="checkbox"/>
	TA 4.4: Refinery	<input type="checkbox"/>
	TA 4.5: Other manufacturing industries	<input type="checkbox"/>
5	Chemical industry	<input type="checkbox"/>
	TA 5.1: Chemical process industries	<input type="checkbox"/>
6	Construction	<input type="checkbox"/>
	TA 6.1: Construction	<input type="checkbox"/>
7	Transport	<input type="checkbox"/>
	TA 7.1: Transport	<input type="checkbox"/>
8	Mining/mineral production	<input type="checkbox"/>
	TA 8.1: Mining and mineral processes, excluding those included in TA 8.2 below	<input type="checkbox"/>
	TA 8.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/>
9	Metal production	<input type="checkbox"/>
	TA 9.1: Metal production	<input type="checkbox"/>
10	Fugitive emissions from fuels	<input type="checkbox"/>
	TA 10.1: Mining and mineral processes, excluding those included in TA 10.2 below	<input type="checkbox"/>
	TA 10.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/>
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	<input type="checkbox"/>
	TA 11.1: Chemical process industries	<input type="checkbox"/>
	TA 11.2: GHG capture and destruction	<input type="checkbox"/>
12	Solvents use	<input type="checkbox"/>
	TA 12.1: Chemical process industries	<input type="checkbox"/>
13	Waste handling and disposal	<input type="checkbox"/>
	TA 13.1: Waste handling and disposal	<input type="checkbox"/>
	TA 13.2: Animal waste management	<input type="checkbox"/>
14	Afforestation and reforestation	<input type="checkbox"/>
	TA 14.1: Forestry	<input type="checkbox"/>
15	Agriculture	<input type="checkbox"/>
	TA 15.1: Agriculture	<input type="checkbox"/>
	TA 15.2: Animal waste management	<input type="checkbox"/>

Name: Mr Michael Gassner

Scopes of expertise:

1	Energy industries (renewable/non-renewable sources)	X
	TA 1.1: Thermal energy generation from fossil fuels as well as thermal energy from solar	<input type="checkbox"/>
	TA 1.2: Energy generation from renewable energy sources	X
	TA 1.3: Other energy industries	<input type="checkbox"/>
2	Energy distribution	<input type="checkbox"/>
	TA 2.1: Electricity distribution	<input type="checkbox"/>
	TA 2.2: Heat distribution	<input type="checkbox"/>
3	Energy demand	<input type="checkbox"/>
	TA 3.1 Energy demand	<input type="checkbox"/>
4	Manufacturing industries	<input type="checkbox"/>
	TA 4.1: Cement sector	<input type="checkbox"/>
	TA 4.2: Aluminium	<input type="checkbox"/>
	TA 4.3: Iron and steel	<input type="checkbox"/>
	TA 4.4: Refinery	<input type="checkbox"/>
	TA 4.5: Other manufacturing industries	<input type="checkbox"/>
5	Chemical industry	<input type="checkbox"/>
	TA 5.1: Chemical process industries	<input type="checkbox"/>
6	Construction	<input type="checkbox"/>
	TA 6.1: Construction	<input type="checkbox"/>
7	Transport	X
	TA 7.1: Transport	X
8	Mining/mineral production	<input type="checkbox"/>
	TA 8.1: Mining and mineral processes, excluding those included in TA 8.2 below	<input type="checkbox"/>
	TA 8.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/>
9	Metal production	<input type="checkbox"/>
	TA 9.1: Metal production	<input type="checkbox"/>
10	Fugitive emissions from fuels	<input type="checkbox"/>
	TA 10.1: Mining and mineral processes, excluding those included in TA 10.2 below	<input type="checkbox"/>
	TA 10.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/>
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	<input type="checkbox"/>
	TA 11.1: Chemical process industries	<input type="checkbox"/>
	TA 11.2: GHG capture and destruction	<input type="checkbox"/>
12	Solvents use	<input type="checkbox"/>
	TA 12.1: Chemical process industries	<input type="checkbox"/>
13	Waste handling and disposal	X
	TA 13.1: Waste handling and disposal	X
	TA 13.2: Animal waste management	<input type="checkbox"/>
14	Afforestation and reforestation	X
	TA 14.1: Forestry	X
15	Agriculture	X
	TA 15.1: Agriculture	X
	TA 15.2: Animal waste management	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 ₄	Methane
CL	Clarification Request
CO ₂	Carbon dioxide
CO ₂ 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 Organization
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

**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

Appendix E: CDM Validation Protocol

Enterprise

Business account:

Company:

Address:

Phone:

E-Mail:

Contact person:

319731

Grütter Consulting AG

Thiersteinerstrasse 22/5

CH-4153 Reinach

Switzerland

+591 2278 84 74

jgruetter@transport-ghg.com

Jürg Grütter

Service

Audit/Assessment:

Audit/Assessment beginning/end:

Project name:

GBZ/Report-No.:

CDM Validation

1 July 2010 – 31 January 2011

Metro Delhi, India

320692/P29524.33

UNFCCC Scope:

UNFCCC Methodology:

UNFCCC Scale:

7

ACM0016/Version 01

Baseline Methodology for Mass Rapid Transit Projects

Large Scale

Team of auditors/assessors:

Mr Bruno C. Baumann, PhD

Mr Hanspeter Graf, PhD

Mr Zsolt Lengyel

Mr David Gazdag, PhD

Scope:

- Large scale CDM projects
- ACM0016: Baseline Methodology for Mass Rapid Transit Projects ; Version 1.0
http://cdm.unfccc.int/UserManagement/FileStorage/CDM_ACM5L7HFZT82UX8RKPJFT4H24BRNK94CU

The contents of this checklist are the intellectual property of the DOE responsible for the:

Validation Report of CDM Project: Metro Delhi, India

<http://cdm.unfccc.int/Projects/Validation/DB/B0HZXF5XRHA0LZGP3DHW7QHPDSSA61/view.html>

References:

- I. Approved consolidated baseline and monitoring methodology ACM0016: Baseline Methodology for Mass Rapid Transit Projects ; Version 1.0
http://cdm.unfccc.int/UserManagement/FileStorage/CDM_ACM5L7HFZT82UX8RKPJFT4H24BRNK94CU
- II. Tool for the demonstration and assessment of additionality, version 5.2, EB 39
<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf>
- III. Tool to calculate baseline, project and/or leakage emissions from electricity consumption, version 1, EB39
<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf>
- IV. Tool to calculate the emission factor for an electricity system, version 02, EB 50
<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf>

Contents

Protocol 1	Mandatory Requirements for CDM Project Activities	3
Protocol 2	Checklist for Methodology ACM0016	5

PROTOCOL 1: MANDATORY REQUIREMENTS FOR CLEAN DEVELOPMENT MECHANISM (CDM) PROJECT ACTIVITIES

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference / Comment
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art.12.2	CAR #1	Indian & Switzerland LoA
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, Marrakesh Accords, CDM Modalities §40a	CAR #1	Indian LoA
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art.12.2.	CAR #1	Indian LoA
4. The project shall have the written approval of voluntary participation from the designated national authorities of each party involved	Kyoto Protocol Art. 12.5a, Marrakesh Accords, CDM Modalities §40a	CAR #1	Indian & Switzerland LoA
5. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	CAR 15, CL1	Resolution of CAR& CL
6. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5c, Marrakesh Accords, CDM Modalities §43	CAR #3, 11, 12	Resolution of CAR& CL
7. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance	Marrakech Accords	CAR# 2	A statement to be submitted by DMRC and/or Govt of India regarding ODA diversion.
8. Parties participating in the CDM shall designate a national authority for the CDM	Marrakech Accords, CDM Modalities §29	OK	
9. The host country shall be a Party to the Kyoto Protocol	Marrakech Accords, CDM Modalities §30	OK	
10. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	Marrakech Accords, CDM Modalities §37b	OK	
11. Documentation on the analysis of the envi-	Marrakech Accords,	OK	

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REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference / Comment
ronmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities §37c		
12. Baseline and monitoring methodology shall be previously approved by the CDM Methodology Panel	Marrakech Accords, CDM Modalities §37e	OK	
13. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP	Marrakech Accords, CDM Modalities §37f	OK	
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available	Marrakech Accords, CDM Modalities, §40	In progress	Period for comments: 08 May 2010 – 06 June 2010 Two comments received and are sufficiently answered by PP.
15. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances	Marrakech Accords, CDM Modalities, §45c,d	OK	
16. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure	Marrakech Accords, CDM Modalities, §47	OK	
17. The project design document shall be in conformance with the UNFCCC CDM-PDD format	Marrakech Accords, CDM Modalities, Appendix B, EB Decisions	OK	

PROTOCOL 2: CHECKLIST FOR METHODOLOGY ACM0016

CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.
A. General description of project activity					
A.1. Title of the project activity					
A.1.1. Does the used project title clearly enable to identify the unique CDM activity?		PDD A.1.	DR	OK	OK
Comments:	Yes, the project title clearly identifies the type and specific location of project activity.				
A.1.2. Are there any indication concerning the revision number and the date of the revision?		PDD A.1.	DR	CL#02	OK
Comments:	The published version of the PDD is not its first version. Its earlier version was submitted to TUV Nord in November2009 (http://cdm.unfccc.int/Projects/Validation/DB/99JY5JXMJJTXJE5COMZALLMR5ZLLW4/view.html ; public commenting period 13 November -12 December 2009) but PP decided to discontinue the vali- dation with the other DOE . The most important changes between the 2009 and 2010 versions of the PDD is the exclusion of Metro Delhi Phase I and Delhi Airport link from the project.				
A.1.3. Is this consistent with the time line of the project's history?		PDD A.1.	DR	OK	OK
Comments:	See A.1.2. above.				
A.2. Description of the project activity					
A.2.1. Is the description delivering a transparent overview of the project activities?		PDD A.2.	DR	CAR#03	OK
Comments:	The description of the project activity refers to the entire 102 km extension of the Delhi Metro system. However, the Detailed Project Report for Phase II (January 2005) comprises 53 km only. The project has subsequently been expanded step by step. No information is given on the dates when the deci- sions about the additional 49 km have been taken.				
A.2.2. What proofs are available demonstrating that the project de- scription is in compliance with the actual situation or planning?		PDD A.2. & File 42, 73, 74	DR, I	CAR#20	OK
Comments:	The project start date is defined as the date when the first construction contract has been signed, namely 10.11.2005 (PDD, table 8). PDD, table 3 indicates that the construction start date of the Indra- prastha – New Ashok Nagar line was September 2005 which is two months earlier.				
A.2.3. Is the information provided by these proofs consistent with the information provided by the PDD?		PDD A.2.	DR	CAR#20	OK
Comments:	See A.2.2.				
A.2.4. Is all information presented consistent with details provided by further chapters of the PDD?		PDD A.2.	DR	OK	OK
Comments:					
A.3. Project participants					
A.3.1. Is the form required for the indication of project participants correctly applied?		PDD A.3.	DR, I	OK	OK
Comments:	Project Participants' information contained in Annex 1 of the PDD is checked for accuracy with both PPs.				
A.3.2. Is the participation of the listed entities or parties confirmed by each one of them?		PDD A.3.	I	OK	OK
Comments:	Both PP representatives named in the PDD confirmed their participation during the on-site visit.				
A.3.3. Is all information on participants / parties provided in consisten- cy with details provided by further chapters of the PDD (in particular		PDD Annex 1	DR	CAR#21	OK

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CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.
annex 1)?					
Comments:	No Modalities of Communication Form has been received by the validators.				
A.4. Technical description of the project activity					
A.4.1. Location of the project activity					
A.4.1.1. Does the information provided on the location of the project activity allow for a clear identification of the site(s)?		PDD A.4.1.4.	DR	OK	OK
Comments:	See detailed Delhi Metro map in Figure 1.				
A.4.1.2. How is it ensured and/or demonstrated that the project proponents can implement the project at this site (ownership, licenses, contracts etc.)?		PDD A.2.	DR, I	OK	OK
Comments:	Partial implementation of Phase II demonstrates that the PP (DMRC) will implement the Phase II extension of the Delhi Metro system. See A.2. and the details in the updated DPRs.				
A.4.2. Category(ies) of project activity					
A.4.2.1. To which category(ies) does the project activity belong to? Is the category correctly identified and indicated?		PDD A.4.2.	DR	OK	OK
Comments:	Sectoral Scope 7 “Transport” is correctly described.				
A.4.3. Technology to be used by the project activity					
A.4.3.1. Does the technical design of the project activity reflect current good practices?		PDD A.4.3.	DR	OK	OK
Comments:	The implemented system – including the rolling stock and the rail infrastructure – represents current good practices.				
A.4.3.2. Does the description of the technology to be applied provide sufficient and transparent input/information to evaluate its impact on the greenhouse gas balance?		PDD A.4.3.	DR	OK	OK
Comments:	The PDD and its supplementary documentation provide sufficient information for calculating the GHG effects.				
A.4.3.3. Does the implementation of the project activity require any technology transfer from annex-I-countries to the host country(ies)?		PDD A.4.3. File 66	DR	OK	OK
Comments:	The JBIC/JICA loan agreement obliges the PP (DMRC) to purchase the key GHG related equipment (i.e. rolling stock) from Japan hence providing a guarantee that Annex I country technology transfer takes place.				
cA.4.3.4. Is the technology implemented by the project activity environmentally safe?		PDD A.4.3. File 66	DR	OK	OK
Comments:	The technology is tried and tested and it meets both Host country and Japanese respective standards (i.e for the rolling stock imported from Japan)				
A.4.3.5. Is the information provided in compliance with actual situation or planning?		PDD A.4.3.	DR, I	OK	OK
Comments:	As implementation is according to schedule both plans (e.g. arrival of the additional rolling stock) and actual situation (e.g. already built extension lines) are in compliance.				
A.4.3.6. Does the project use state of the art technology and / or does the technology result in a significantly better performance than any commonly used technologies in the host country?		PDD A.4.3.	DR	OK	OK
Comments:	The project is India’s flagship, modern Metro that uses state of art technology; the only other operational Metro was built in the eighties-nineties in Calcutta.				
A.4.3.7. Is the project technology likely to be substituted by other or		PDD A.4.3.	DR, I	OK	OK

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CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.
more efficient technologies within the project period?					
Comments:	The lifetime of the equipment – both the rail network and the rolling stock – is beyond the project period provided proper maintenance is conducted. The likelihood for technology substitution is very low and even if it happens it cannot result in any negative leakage.				
A.4.3.8. Does the project require extensive initial training and maintenance efforts in order to be carried out as scheduled during the project period?		PDD A.4.3.	DR, I	OK	OK
Comments:	As the project is an extension of an existing Metro Line which is implemented in a staged form PP (DMRC) has been conducting training on a continuous basis and would not expect any difficulty in training the required personnel.				
A.4.3.9. Is information available on the demand and requirements for training and maintenance?		PDD A.4.3.	DR, I	OK	OK
Comments:	DMRC has been operating since 2002 and has accumulated extensive training expertise over the time.				
A.4.3.10. Is a schedule available for the implementation of the project and are there any risks for delays?		PDD A.4.3.	DR, I	OK	OK
Comments:	Phase II of Metro Delhi project is already implemented to a large extent.				
A.4.4. <i>Estimated amount of emission reductions over the chosen crediting period</i>					
A.4.4.1. Is the form required for the indication of projected emission reductions correctly applied?		PDD A.4.4. & File PDD tables	DR	CAR #4	OK
Comments:	The project name in file “PDD tables Phase II.xls”, sheet “Project Emissions”, cell A1 is not the same as the project name given in the PDD.				
A.4.4.2. Are the figures provided consistent with other data presented in the PDD?		PDD A.4.4. & File PDD tables	DR	CAR #5 CL #4	OK
Comments:	<p>The crediting period is not consistently used in the calculations. The Annual Average Estimated Reductions are calculated by adding up the reductions of <u>8</u> years (2011 – 2018) and then dividing by <u>7</u> only (Table in A.4.4. and file “PDD tables Phase II.xls”).</p> <p>The Passenger Survey providing the input data for the ex-ante calculations is described in detail, however, without supporting evidence. The on-site visit included an 1.5 hours presentation and discussion of the execution of the Survey.</p> <p>In file ‘PDD tables Phase II, sheets BL trip and IDP trip’ the fields Project, Lane, and Date are empty.</p>				
A.4.5. <i>Public funding of the project activity</i>					
A.4.5.1. Is the information provided on public funding provided in compliance with the actual situation or planning as available by the project participants?		PDD A.4.5.	DR	OK	OK
Comments:	The JBIC/JICA preferential loan is a sovereign loan guaranteed by the Indian Government therefore not only the Government grants shall be considered as public funding. As the exchange risk of the yen denominated loan is with the Indian Government the project financing includes a potential interest subsidy component. The non-Japanese loan covered financing elements are all form public funding from the respective National and regional (Delhi Capital & Uttar Pradesh) governments.				
A.4.5.2. Is all information provided consistent with the details given in remaining chapters of the PDD (in particular annex 2)?		PDD A.4.3.	DR	CAR #6	OK
Comments:	The PDD refers to 56% of JBIC funding; this value is related to the first sub-stage of the Phase II investments and this value is diluted by the fact that JBIC funding is not provided for the Phase II lines. that are outside of the Capital’s territory. The further details shown during the site visit result in an				

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CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.										
overall 36% JBIC and 64% Indian public financing mix.															
B. Application of a baseline and monitoring methodology															
B.1. Title and reference of the approved baseline and monitoring methodology applied to the large scale project activity															
B.1.1.1. Are reference number, version number, and title of the base-line and monitoring methodology clearly indicated?		PDD B.1.	DR	OK	OK										
Comments:	Version 01 of ACM0016 is clearly indicated.														
B.1.1.2. Is the applied version the most recent one and / or is this version still applicable?		PDD B.1.	DR	OK	OK										
Comments:	At the time of the writing of the PDD the methodology version01 was the latest available version. The new methodology version 02 is applicable from 13 August 2010 with a grace period for the version 01 until 13 April 2010.														
B.2. Justification of the choice of the project category and why it is applicable to the project activity															
Comment on at least every line answered with “No”															
B.2.1. Is the applied methodology considered the most appropriate one?		PDD B.2.	DR	OK	OK										
Comments:	The Methodology was developed for projects enabling modal shift in transportation such as the Delhi Metro extension.														
B.2.2. Applicability Criterion 1: The project constructs a new rail-based infrastructure or segregated bus lanes. The segregated bus lanes or the rail-based MRTS replace existing bus routes (e.g. through scrapping units or through closing or re-scheduling existing bus routes) operating under mixed traffic conditions		PDD B.2.	DR	OK	OK										
<table><tr><td>Applicability checklist</td><td>Yes / No/ NA</td></tr><tr><td>In the case of rail systems the project needs to provide new infrastructure (new rail lines)</td><td>Yes</td></tr><tr><td>In the case of bus lanes the project can be based on existing road infrastructure, but which separates physically bus lanes from mixed traffic</td><td>NA</td></tr></table>		Applicability checklist	Yes / No/ NA	In the case of rail systems the project needs to provide new infrastructure (new rail lines)	Yes	In the case of bus lanes the project can be based on existing road infrastructure, but which separates physically bus lanes from mixed traffic	NA								
Applicability checklist	Yes / No/ NA														
In the case of rail systems the project needs to provide new infrastructure (new rail lines)	Yes														
In the case of bus lanes the project can be based on existing road infrastructure, but which separates physically bus lanes from mixed traffic	NA														
Comments:	The project is new rail (metro) infrastructure.														
B.2.3. Applicability Criterion 2: The methodology is not applicable for operational improvements (e.g. new or larger buses) of an already existing and operating bus lane or rail-based MRTS		PDD B.2.	DR	OK	OK										
<table><tr><td>Applicability checklist</td><td>Yes / No/ NA</td></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>		Applicability checklist	Yes / No/ NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Evidences provided in the PDD?	Yes	Compliance verified?	Yes				
Applicability checklist	Yes / No/ NA														
Criterion discussed in the PDD?	Yes														
Compliance provable?	Yes														
Evidences provided in the PDD?	Yes														
Compliance verified?	Yes														

CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.										
Comments:	The project is the physical extension of the Delhi metro network.														
B.2.4. Applicability Criterion 3: The methodology is not applicable for bus lanes replacing an existing rail-based system i.e. the existing urban or suburban rail infrastructure must remain fully (in its full length) operational.		PDD B.2.	DR	OK	OK										
<table><tr><td>Applicability checklist</td><td>Yes / No/ NA</td></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>						Applicability checklist	Yes / No/ NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Evidences provided in the PDD?	Yes	Compliance verified?	Yes
Applicability checklist	Yes / No/ NA														
Criterion discussed in the PDD?	Yes														
Compliance provable?	Yes														
Evidences provided in the PDD?	Yes														
Compliance verified?	Yes														
Comments:	As the project is the extension of the existing metro lines all existing rail infrastructure remain unchanged and in operation.														
B.2.5. Applicability Criterion 4: The methodology is applicable for passenger transport only.		PDD B.2.	DR	OK	OK										
<table><tr><td>Applicability checklist</td><td>Yes / No/ NA</td></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>						Applicability checklist	Yes / No/ NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Evidences provided in the PDD?	Yes	Compliance verified?	Yes
Applicability checklist	Yes / No/ NA														
Criterion discussed in the PDD?	Yes														
Compliance provable?	Yes														
Evidences provided in the PDD?	Yes														
Compliance verified?	Yes														
Comments:	DMRC and the Delhi metro system is only used for passenger transport.														
B.2.6. Applicability Criterion 5: Any fuels including (liquified) gaseous fuels or biofuel blends, as well as electricity can be used in the baseline or project case. The following conditions apply: In the case of gaseous fossil fuels, the methodology is applicable if equal or more gaseous fossil fuels are used in the baseline scenario than in the project activity. The methodology is not applicable in its current form if more gaseous fossil fuel is used in the project activity compared to the baseline scenario In the case of biofuels, project buses must use the same biofuel 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 biofuels than those used by conventional buses. In addition, the project buses shall not use a significantly higher biofuel blend than cars and taxis.		PDD B.2.	DR	OK	OK										

CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.										
<table><tr><td>Applicability checklist</td><td>Yes / No/ NA</td></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>		Applicability checklist	Yes / No/ NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Evidences provided in the PDD?	Yes	Compliance verified?	Yes				
Applicability checklist	Yes / No/ NA														
Criterion discussed in the PDD?	Yes														
Compliance provable?	Yes														
Evidences provided in the PDD?	Yes														
Compliance verified?	Yes														
Comments:	The project equipment (metro rolling stock) uses only electricity; the baseline fuels (CNG, petrol, diesel) for internal combustion vehicles are discussed in the PDD.														
B.2.7. Applicability Criterion 6: The methodology is not applicable for the implementation of air and water-based transport systems.		PDD B.2.	DR	OK	OK										
<table><tr><td>Applicability checklist</td><td>Yes / No/ NA</td></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>		Applicability checklist	Yes / No/ NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Evidences provided in the PDD?	Yes	Compliance verified?	Yes				
Applicability checklist	Yes / No/ NA														
Criterion discussed in the PDD?	Yes														
Compliance provable?	Yes														
Evidences provided in the PDD?	Yes														
Compliance verified?	Yes														
Comments:	The metro extension project neither air nor water based.														
B.2.8. Applicability Criterion 7: The project system partially replaces a traditional public transport system in a given city. The methodology cannot be used in areas where currently no public transport is available.		PDD B.2.	DR	OK	OK										
<table><tr><td>Applicability checklist</td><td>Yes / No/ NA</td></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>		Applicability checklist	Yes / No/ NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Evidences provided in the PDD?	Yes	Compliance verified?	Yes				
Applicability checklist	Yes / No/ NA														
Criterion discussed in the PDD?	Yes														
Compliance provable?	Yes														
Evidences provided in the PDD?	Yes														
Compliance verified?	Yes														
Comments:	Delhi has an extensive network of bus-based public transport system that is supported by taxis and auto rickshaws.														
B.2.9. Applicability Criterion 8: The methodology is applicable for urban or suburban trips. It is not applicable for inter-urban transport.		PDD B.2.	DR	OK	OK										
<table><tr><td>Applicability checklist</td><td>Yes / No/ NA</td></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></table>		Applicability checklist	Yes / No/ NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Evidences provided in the PDD?	Yes						
Applicability checklist	Yes / No/ NA														
Criterion discussed in the PDD?	Yes														
Compliance provable?	Yes														
Evidences provided in the PDD?	Yes														

CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.										
Compliance verified? Yes															
Comments:	The Delhi Metro Phase II connects urban areas. The parts that are outside of the Capital territory are within urban agglomerations therefore the criterion is met.														
B.3. Description of the sources and gases included in the project boundary															
Integrate the required amount of sub-checklists for sources and gases as given by the methodology applied and comment on at least every line answered with "No"															
B.3.1. Source:		PDD B.3.	DR	OK	OK										
<p>Mobile source emissions of different modes of transport due to the trips made by the passengers using the MRTS</p> <p>Gas(es): CO₂, CH₄, N₂O</p> <p>Type: Baseline Emissions</p> <table border="1"> <thead> <tr> <th>Boundary checklist</th> <th>Yes / No</th> </tr> </thead> <tbody> <tr> <td>Source and gas(es) discussed in the PDD?</td> <td>Y</td> </tr> <tr> <td>Inclusion / exclusion justified?</td> <td>Y</td> </tr> <tr> <td>Explanation / Justification sufficient?</td> <td>Y</td> </tr> <tr> <td>Consistency with monitoring plan?</td> <td>Y</td> </tr> </tbody> </table>		Boundary checklist	Yes / No	Source and gas(es) discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	Y	Consistency with monitoring plan?	Y				
Boundary checklist	Yes / No														
Source and gas(es) discussed in the PDD?	Y														
Inclusion / exclusion justified?	Y														
Explanation / Justification sufficient?	Y														
Consistency with monitoring plan?	Y														
Comments:	CO ₂ included, CH ₄ and N ₂ O excluded and justified by the fact that the project emissions of CH ₄ and N ₂ O are negligible due to metro system's electricity based nature.														
B.3.2. Source:		PDD B.3.	DR	CAR #7	OK										
<p>Mobile source emissions of the project transport system (MRTS) due to the trips made by the passengers using it</p> <p>Gas(es): CO₂, CH₄, N₂O</p> <p>Type: Project Activity Emissions</p> <table border="1"> <thead> <tr> <th>Boundary checklist</th> <th>Yes / No</th> </tr> </thead> <tbody> <tr> <td>Source and gas(es) discussed in the PDD?</td> <td>Y</td> </tr> <tr> <td>Inclusion / exclusion justified?</td> <td>Y</td> </tr> <tr> <td>Explanation / Justification sufficient?</td> <td>N</td> </tr> <tr> <td>Consistency with monitoring plan?</td> <td>Y</td> </tr> </tbody> </table>		Boundary checklist	Yes / No	Source and gas(es) discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	N	Consistency with monitoring plan?	Y				
Boundary checklist	Yes / No														
Source and gas(es) discussed in the PDD?	Y														
Inclusion / exclusion justified?	Y														
Explanation / Justification sufficient?	N														
Consistency with monitoring plan?	Y														
Comments:	CH ₄ emissions of the project transport system are excluded from the project boundary but indicated as included (Yes in Table 3, column "Included?").														
B.3.3. Source:		PDD B.3.	DR	OK	OK										
<p>Mobile source emissions of different modes of transport due to the trips made by the passengers using the MRTS, from their trip origin to the MRTS and from the MRTS to their trip destination</p> <p>Gas(es): CO₂, CH₄, N₂O</p> <p>Type: Project Activity Emissions</p> <table border="1"> <thead> <tr> <th>Boundary checklist</th> <th>Yes / No</th> </tr> </thead> <tbody> <tr> <td>Source and gas(es) discussed in the PDD?</td> <td>Y</td> </tr> <tr> <td>Inclusion / exclusion justified?</td> <td>Y</td> </tr> <tr> <td>Explanation / Justification sufficient?</td> <td>Y</td> </tr> <tr> <td>Consistency with monitoring plan?</td> <td>Y</td> </tr> </tbody> </table>		Boundary checklist	Yes / No	Source and gas(es) discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	Y	Consistency with monitoring plan?	Y				
Boundary checklist	Yes / No														
Source and gas(es) discussed in the PDD?	Y														
Inclusion / exclusion justified?	Y														
Explanation / Justification sufficient?	Y														
Consistency with monitoring plan?	Y														

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CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.										
Comments:	CO2 included, CH4 and N2O excluded. See B.3.1.														
B.3.4. Source: Emissions due to changes of the load factors of taxis and conventional buses; and due to congestion change (incl. change of vehicle speed and induced traffic (rebound effect)) Gas(es): CO2, CH4, N2O Type: Leakage <table><tr><td>Boundary checklist</td><td>Yes / No</td></tr><tr><td>Source and gas(es) discussed in the PDD?</td><td>N</td></tr><tr><td>Inclusion / exclusion justified?</td><td>N</td></tr><tr><td>Explanation / Justification sufficient?</td><td>N</td></tr><tr><td>Consistency with monitoring plan?</td><td>N</td></tr></table>		Boundary checklist	Yes / No	Source and gas(es) discussed in the PDD?	N	Inclusion / exclusion justified?	N	Explanation / Justification sufficient?	N	Consistency with monitoring plan?	N	PDD B.3.	DR	CL #6	OK
Boundary checklist	Yes / No														
Source and gas(es) discussed in the PDD?	N														
Inclusion / exclusion justified?	N														
Explanation / Justification sufficient?	N														
Consistency with monitoring plan?	N														
Comments:	The formula is appropriately given for leakage; however the value applied is zero in A.3.3.and B.6.3. sections of the PDD and appropriate tables.														
B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario															
B.4.1. Is the latest approved version of the “Tool for the demonstration and assessment of additionality” used?		PDD B.1.	DR	OK	OK										
Comments:	Version 05.2. is used in the PDD.														
B.4.2. Have all feasible baseline scenario alternatives to the project scenario been identified and discussed in the PDD. The following alternative scenarios should, <i>inter alia</i> , be considered: <ul style="list-style-type: none">The proposed project activity not being registered as a CDM project activity;The proposed project activity being implemented at a later date in the future, without being registered as a CDM project activity;The continuation of the current public and individual transport systems, including (future) investments in road based infrastructure if applicable;Transport systems which are different to the proposed project activity, e.g. if a bus lane is the project activity then alternatives might be a metro and reverse.		PDD B.4.	DR	OK	OK										
Comments:	All possible alternatives are discussed.														
B.4.3. Are the alternatives assessed in a dynamic framework for the entire crediting period, taking into account the evolutions foreseen during this period?		PDD B.4.	DR	OK	OK										
Comments:	The alternatives are assessed in a dynamic manner; as the methodology allows for incorporating the dynamism of changes by measuring the would-be transportation methods and by applying a technology improvement factors reflecting the evolution of the alternatives over time.														
B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity (assessment and demonstration of additionality)															

CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.
B.5.1. If applicable, Is prior consideration of CDM documented according to EB 49 Annex 22?		PDD B.5.	DR	CAR #9	OK
Comments:	Prior consideration is documented according to the requirements. However, the time elapsing between start date of project activity (10 November 2005) and first real action for CDM – the appointment Grütter Consulting on 20 March 2008 - is mistakenly described as less than two years. However, the EB 49 annex 22 guidelines was not in place therefore they are not applicable as the PP could not be aware of the legislation that was not created yet.				
B.5.2. Have applicable regulatory or legal requirements been identified?		PDD B.5.	DR, I	OK	OK
Comments:	DMRC's metro commissioning and metro operations are fully in line with the applicable Indian legislations.				
B.5.3 Does the project activity identify correctly and exclude those options not in line with regulatory or legal requirements?		PDD B.5.	DR	OK	OK
Comments:	Only the options that are in line with the regulatory framework are included in the analysis.				
B.5.4. Has an investment comparison analysis using NPV as indicator for all alternatives that are remaining after Step 1 been conducted?		PDD B.5.	DR	OK	OK
Comments:	Only one alternative remains after Step 1 therefore the NPV calculations are only done for the Project itself. See B.5.6. below regarding sensitivity analysis of this NPV.				
B.5.5. Is the investment analysis conducted according to the relevant EB guidance and compliant to the specific requirements of the methodology?		PDD B.5. File 47	DR	CAR#10 CAR#11	OK
Comments:	<p>The project name in file "finance.xlsx", sheet "Principles, General Information", cell C7 is not the same as the project name given in the PDD.</p> <p>The DMRC phase I numbers in the PDD (Table 7 and 8) for the relation of actual to projected passengers differ from those shown in the PDD of Metro Mumbai One, India, version 1.0 for DMRC phase I (-79% versus -72% respectively for 2007). Furthermore, it is not evident why the passenger numbers for 2006 and 2007 are presented (file daily pax 2006 and 2007.xls) and used for the NPV calculation while the passenger numbers for 2008 and 2009 are not used nor discussed.</p>				
B.5.6. Is the sensitivity analysis correctly applied and is the interpretation of the results in line with the methodology?		PDD B.5. & File 47	DR	CAR#12 CAR#13 CAR#14 CL #10	OK
Comments:	<p>One of the assumptions for the Investment Analysis (financial feasibility) is that, based on experience with previous metro projects in India, the projected passenger numbers must be reduced by 81% (Table 8). There is uncertainty in this figure (see CAR#11). No sensitivity analysis has been done by varying the reduction for the planned passenger numbers (-81%).</p> <p>PDD Figure 5 contains the name "Baseline" for the first bar while it is called "Base Case" in Table 11. The name Baseline is confusing as this word has a different meaning in the CDM vocabulary.</p> <p>The investment costs presented in PDD Table 10 are without units and currency.</p> <p>Historic property development (renting of property at metro stations) revenue is around 20% as opposed to the 2% presented in Table 10. Stakeholder (No.2) comment No 5. highlighted this discrepancy that supports the fact that ridership was lower than planned resulting automatically in a higher proportion of property related revenues. The overall property investment was less than 3% of total (5,</p>				

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	4 billion out of 215 billion rupees) according to the latest DPR available and audited accounts for 2009-2010 shown on the site visit.				
B.5.7. In case of applying step 3 (barrier analysis) of the additionality tool: Is a complete list of barriers developed that prevent the different alternatives to occur?				NA	NA
Comments:	Barrier analysis in not applied in line with the Methodology ACM0016.				
B.5.8. In case of applying step 3 (barrier analysis): Is transparent and documented evidence provided on the existence and significance of these barriers?				NA	NA
Comments:					
B.5.9. In case of applying step 3 (barrier analysis): Is it transparently shown that the execution of at least one of the alternatives is not prevented by the identified barriers?				NA	NA
Comments:					
B.5.10. Are all cities or urban areas in the host country with more than 1 million inhabitants, which have already implemented a MRTS, considered for common practice analysis?		PDD B.5. Table 14	DR	CAR #15	OK
Comments:	PDD Table 14 mentions “Metro (project)” as the MRTS system for Delhi. It is not clear why this is not called “Metro Phase I”. The phase I lines are operational whilst “Metro (project)” gives the impression of being the present CDM Project.				
B.5.11. Is verifiable evidences provided in the PDD, that the project activity is not common practice?		PDD B.5.	DR	OK	OK
Comments:	According to the methodology the project is clearly not common practice.				
B.6. Emissions reductions including parameters and calculations of the methodology and the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”					
B.6.1. Explanation of methodological choices					
B.6.1.1. Is it explained how the procedures provided in the methodology are applied by the proposed project activity?		PDD B.6.1.	DR	OK	OK
Comments:	An appropriate explanation is provided how the procedures are applied.				
B.6.1.2. Is every selection of options offered by the methodology correctly justified and is this justification in line with the situation verified on-site?		PDD B.6.1.	DR, I	OK	OK
Comments:	Option choices are appropriate and have been verified on site.				
B.6.1.3. Are relevant vehicle categories clearly identified in the PDD? Is the selection correctly justified and is this justification in line with the situation verified on-site?		PDD B.6.1.	DR, I	OK	OK
Comments:	Vehicle categories are appropriately selected and justified. On site visit conformed that there are no other vehicle types that should be included in the calculations.				
B.6.1.4. Are the formulae required for the determination of baseline emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?		PDD B.6.1.	DR	OK	OK
Comments:	See B.6.1.7.				

CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.
B.6.1.5. Are the formulae required for the determination of project emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?		PDD B.6.1.	DR	OK	OK
Comments:	PDD contains complete identification of used/monitored parameters.				
B.6.1.6. Are the formulae required for the determination of indirect project emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?		PDD B.6.1.	DR	OK	OK
Comments:	Indirect project emissions and their calculations are correctly presented.				
B.6.1.7. Are the formulae required for the determination of leakage emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?		PDD 6.1. & File 58	DR	CAR#16 CAR#17	OK
Comments:	At least one update of the CORINAIR Guidebook was published in 2007, therefore 2002 is not the latest update. The result of the formulas (18) for calculating the speed dependent emissions is the speed dependent fuel consumption, but not the speed dependent CO2 emission as indicated in the formulas. <i>DOE's remark: The identical formulas are shown in the methodology ACM0016 with the same error in the interpretation of the result. The formulas will need to be modified in the methodology ACM0016.</i>				
B.6.1.8. Are the formulae required for the determination of emission reductions correctly presented?		PDD B.6.1.	DR	OK	OK
Comments:					
B.6.1.9. Are correctness and conservativeness of sensitive data/ parameter (change of less than 10% leads to an emission reduction of more than 5%) discussed in the PDD?		PDD Annex 3 A.5.	DR	OK	OK
Comments:	4 sensitive data or parameters have been identified. The comments explain the conservativeness of the applied values or their monitoring to ensure correctness.				
B.6.2. Data and parameters that are available at validation					
Comment on at least every line in sub-checklists answered with "No"					
B.6.2.1. Is the list of parameters presented in chapter B.6.2 considered being complete with regard to the requirements of the applied methodology?		PDD B.6.2.	DR	OK	OK
Comments:	Parameter list is complete.				
B.6.2.2. If applicable, are changes required for methodology implementation in 2nd and 3rd crediting periods with regard to the data and parameters not monitored (baseline) addressed in the PDD?		PDD B.6.2.	DR	OK	OK
Comments:	No changes are foreseen.				
B.6.2.3. Parameter Title: TD _{EL,i} Average trip distance of passengers using the electricity-based vehicle category i prior to project start.		PDD B.6.2.	DR	OK	OK

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Correct value provided?	Y																																		
Has this value been verified?	Y																																		
Choice of data correctly justified?	Y																																		
Measurement method correctly described?	Y																																		
Comments:	The title is slightly different: Average trip distance of <i>baseline urban rail passengers</i> prior project start on rail system.																																		
B.6.2.4 Parameter Title: OC _B Average occupation rate of vehicle category B (buses)		PDD B.6.2.	DR	OK	OK																														
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Data Checklist	Yes / No																																		
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Has this value been verif ed?	Y																																		
Choice of data correctly justified?	Y																																		
Measurement method correctly described?	Y																																		
Comments:																																			
B.6.2.5. Parameter Title: OC _T / OC _C /OC _{MR} / OC _i Average occupation rate of vehicle category T (taxi), C (passenger cars), MR (motorized rickshaws) or other types i prior to project start.		PDD B.6.2.	DR	OK	OK																														
<table><tr><td>Data Checklist</td><td>Yes / No</td></tr><tr><td>Title in line with methodology?</td><td>Y</td></tr><tr><td>Data unit correctly expressed?</td><td>Y</td></tr></table>		Data Checklist	Yes / No	Title in line with methodology?	Y	Data unit correctly expressed?	Y																												
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Appropriate description of parameter?	Y				
Source clearly referenced?	Y				
Correct value provided?	Y				
Has this value been verified?	Y				
Choice of data correctly justified?	Y				
Measurement method correctly described?	Y				
Was survey data correctly collected according to the guideline for the establishment of load factor studies for taxis/motorcycles or passenger cars	Y				
Are statistical methods appropriate? Are they correctly and transparently applied?	Y				
Is uncertainty addressed?	Y				
Has this value been verified?	Y				
Choice of data correctly justified?	Y				
Measurement method correctly described?	Y				
List validation findings for each category applied in the comments line below.					
Comments:	Parameter values come from surveys (Grütter Consulting) or from Central Road Research Institute (CRR) Delhi.				
B.6.2.6 Parameter Title: PBL _B Passengers transported by baseline buses (per day or year)		PDD B.6.1. (2.1.)	DR	NA	NA
Data Checklist	Yes / No				
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?					
Measurement method correctly described?					
Comments:	This parameter is not used because the occupation rate is determined by visual occupation studies as explained in the PDD.				
B.6.2.7. Parameter Title: TDBL _{P,B} Average trip distance of passengers using buses prior to project start		PDD B.6.1. (2.1.)	DR	NA	NA
Data Checklist	Yes / No				
Title in line with methodology?					
Data unit correctly expressed?					
Appropriate description of parameter?					
Source clearly referenced?					
Correct value provided?					
Has this value been verified?					

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Choice of data correctly justified?																								
Measurement method correctly described?																								
Comments:	This parameter is not used because the occupation rate is determined by visual occupation studies as explained in the PDD.																							
B.6.2.8. Parameter Title: DD _B / DD _L / DD _M / DD _S Total distance driven by buses of various sub-categories prior to project start. B stands for all buses, L for large buses, M for medium buses and S for small buses			PDD B.6.1. (2.1.)	DR	NA	NA																		
<table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td></td></tr><tr><td>Data unit correctly expressed?</td><td></td></tr><tr><td>Appropriate description of parameter?</td><td></td></tr><tr><td>Source clearly referenced?</td><td></td></tr><tr><td>Correct value provided?</td><td></td></tr><tr><td>Has this value been verified?</td><td></td></tr><tr><td>Choice of data correctly justified?</td><td></td></tr><tr><td>Measurement method correctly described?</td><td></td></tr></table>			Data Checklist	Yes / No	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?		Measurement method correctly described?					
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List validation findings for each category applied in the comments line below.																								
Comments:	This parameter is not used because the occupation rate is determined by visual occupation studies as explained in the PDD.																							
B.6.2.9. Parameter Title: AD _B Average annual distance driven by baseline buses.			PDD B.6.2.	DR	OK	OK																		
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Source clearly referenced?	Y																							
Correct value provided?	Y																							
Has this value been verified?	Y																							
Choice of data correctly justified?	Y																							
Measurement method correctly described?	Y																							
Comments:																								
B.6.2.10. Parameter Title: SFC _{i,x} Specific fuel consumption of vehicle category <i>i</i> using fuel type <i>x</i> prior to project start.			PDD B.6.2.	DR	OK	OK																		
<table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Y</td></tr><tr><td>Data unit correctly expressed?</td><td>Y</td></tr><tr><td>Appropriate description of parameter?</td><td>Y</td></tr><tr><td>Source clearly referenced?</td><td>Y</td></tr><tr><td>Correct value provided?</td><td>Y</td></tr></table>			Data Checklist	Yes / No	Title in line with methodology?	Y	Data unit correctly expressed?	Y	Appropriate description of parameter?	Y	Source clearly referenced?	Y	Correct value provided?	Y										
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Has this value been verified?	Y																						
Choice of data correctly justified?	Y																						
Measurement method correctly described?	Y																						
Comments: Categories are: cars, taxis, motorized rickshaws, motorcycles, buses. Conservative values are applied.																							
B.6.2.11. Parameter Title: N _i Number of vehicles of category <i>i</i> prior to project start		PDD B.6.2.	DR	OK	OK																		
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Has this value been verified?	Y																						
Choice of data correctly justified?	Y																						
Measurement method correctly described?	Y																						
Comments: Categories are: cars, taxis, motorized rickshaws, motorcycles, buses.																							
B.6.2.12. Parameter Title: AD _T Average annual distance driven by taxis		PDD B.6.2. & File 9, 20	DR	OK	OK																		
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Data unit correctly expressed?	Y																						
Appropriate description of parameter?	Y																						
Source clearly referenced?	Y																						
Correct value provided?	Y																						
Has this value been verified?	Y																						
Choice of data correctly justified?	Y																						
Measurement method correctly described?	Y																						
Comments: This parameter is given for taxis and for motorized rickhaws.																							
B.6.2.13. Parameter Title: NIZ _{i,BL} / NIZ _{C,BL} / NIZ _{T,BL} Number of vehicles of vehicle category <i>i</i> using the affected roads per annum in the baseline. In particular, C stands for cars, and T for taxis		PDD B.6.2. & File 62	DR	OK	OK																		
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Correct value provided?	Y																						
Has this value been verified?	Y																						
Choice of data correctly justified?	Y																						
Measurement method correctly described?	Y																						
List validation findings for each category applied in the comments line below.																							
Comments:																							
B.6.2.14. Parameter Title: V _B Average total speed and average speed under circulation		PDD B.6.2.	DR	OK	OK																		
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Choice of data correctly justified?	Y																						
Measurement method correctly described?	Y																						
List validation findings for each category applied in the comments line below.																							
Comments:		The average moving speed is measured as this is required for vehicle speed change.																					
B.6.2.15. Parameter Title: EF _{Grid} Emission factor for the grid		PDD B.6.2. & File1a&b	DR	OK	OK																		
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Source clearly referenced?	Y																						
Correct value provided?	Y																						
Has this value been verified?	Y																						
Choice of data correctly justified?	Y																						
Measurement method correctly described?	Y																						
Comments:		The combined margin is taken from "CO ₂ Baseline Database for the Indian Power Sector" published by Government of India, Ministry of Power, Central Electricity Authority (version 5.0, November 2009).																					
B.6.3. Ex-ante calculation of emission reductions																							
B.6.3.1. Is the projection based on the same procedures as used for future monitoring?		PDD B.6.3.	DR	OK	OK																		
Comments:		Yes. The same approach is used for ex-ante and ex-post calculations.																					
B.6.3.2. Are the GHG calculations documented in a complete and transparent manner?		PDD B.6.3. & Annex 3	DR	OK	OK																		
Comments:		File PDD tables Phase II.xls has been verified. An error in the emission calculation reduction has led to CAR #5. See A.4.4.2.																					

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B.6.3.5. Is possible uncertainty of data or parameters addressed and transparently documented?		PDD B.6.3.	DR	OK	OK										
Comments:	Conservative values at 95% confidence level are being used.														
B.6.3.6. Is possible sensitiveness of data or parameters addressed and transparently documented?		PDD Annex 3 A.5.	DR	OK	OK										
Comments:	Sensitivity analysis with appropriate comments.														
B.6.3.7. Is the data provided in this section consistent with data as presented in other chapters of the PDD?		PDD B.6.3.	DR, I	OK	OK										
Comments:	It has been noticed that the passenger numbers used in the additionality calculations / plausibility check (PDD B.5.) and the numbers used for the ex-ante emission reduction calculations are different. Numbers for the additionality are reduced as provided for in the methodology. For the ER calculations the originally projected passenger numbers are used. Had the same numbers been used for the ER calculations as for the additionality calculations the estimated ER results would be lower. However, the true emission reductions will be determined upon verification based on actual data.														
B.6.3.8. Are calculation tools used? If so is the data used in the tools consistent with the data stated in the PDD?		PDD B.6.3.	DR	OK	OK										
Comments:	Excel tables have been extensively checked. An error in the emission calculation reduction has led to CAR #5. See A.4.4.2.														
B.6.4. Summary of the ex-ante estimation of emission reductions															
B.6.4.1. Will the project result in fewer GHG emissions than the base-line scenario?		PDD B.6.4.	DR	OK	OK										
Comments:	Yes, the project will result in fewer GHG emissions														
B.6.4.2. Is the form/table required for the indication of projected emission reductions correctly applied?		PDD B.6.4.	DR	OK	OK										
Comments:															
B.6.4.3. Is the projection in line with the envisioned time schedule for the project's implementation and the indicated crediting period?		PDD B.6.4.	DR	OK	OK										
Comments:	DPR updates provide the evidence for timely implementation.														
B.6.4.4. Is the data provided in this section in consistency with data as presented in other chapters of the PDD?		PDD B.6.4.	DR	OK	OK										
Comments:															
B.7. Application of the monitoring methodology and description of the monitoring plan															
B.7.1. Data and parameters monitored															
Comment on at least every line in sub-checklists answered with “No”															
B.7.1.1. Is the list of parameters presented in chapter B.7.1 considered to be complete with regard to the requirements of the applied methodology?		PDD B.7.1.	DR	OK	OK										
Comments:															
B.7.1.2. Parameter Title: BTD _{p,i,y} Baseline trip distance of the cluster <i>p</i> of surveyed passengers using mode <i>i</i> in the year <i>y</i>		PDD B.7.1.	DR	OK	OK										
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Indication of accuracy provided?	Y																													
QA/QC procedures described?	Y																													
QA/QC procedures appropriate?	Y																													
List validation findings for each mode in the comments line below.																														
Comments:																														
B.7.1.3. Parameter Title: TC _{PJ,x} Total fuel of type x consumed by the project transport units		PDD B.7.1.		NA	NA																									
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QA/QC procedures described?																														
QA/QC procedures appropriate?																														
List validation findings for each fuel type in the comments line below.																														
Comments:		The project transport units run on electricity. Therefore, EC _{PJ} Electricity consumed by MRTS (trains) is used instead.																												
B.7.1.4. Parameter Title: NCV _{x,y} Net calorific value of fuel type x		PDD B.7.1.	DR	OK	OK																									
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List validation findings for each fuel type in the comments line below.																															
Comments:	Fuel categories are gasoline, diesel and compressed natural gas.																														
B.7.1.5. Parameter Title: EF _{CO2,x,y} CO ₂ emission factor for fuel type x in year y		PDD B.7.1.	DR	OK	OK																										
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QA/QC procedures described?	Y																														
QA/QC procedures appropriate?	Y																														
List validation findings for each fuel type in the comments line below.																															
Comments:	Fuel categories are gasoline, diesel and compressed natural gas.																														
B.7.1.6. Parameter Title: SFC _{i,x,y} Specific fuel consumption of vehicle category i using fuel x in the year y		PDD B.7.1.	DR	OK	OK																										
<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Y</td></tr><tr><td>Data unit correctly expressed?</td><td>Y</td></tr><tr><td>Appropriate description of parameter?</td><td>Y</td></tr><tr><td>Source clearly referenced?</td><td>Y</td></tr><tr><td>Correct value provided for estimation?</td><td>Y</td></tr><tr><td>Has this value been verified?</td><td>Y</td></tr><tr><td>Measurement method correctly described?</td><td>Y</td></tr><tr><td>Correct reference to standards?</td><td>Y</td></tr><tr><td>Indication of accuracy provided?</td><td>Y</td></tr><tr><td>QA/QC procedures described?</td><td>Y</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Y</td></tr></table>		Monitoring Checklist	Yes / No	Title in line with methodology?	Y	Data unit correctly expressed?	Y	Appropriate description of parameter?	Y	Source clearly referenced?	Y	Correct value provided for estimation?	Y	Has this value been verified?	Y	Measurement method correctly described?	Y	Correct reference to standards?	Y	Indication of accuracy provided?	Y	QA/QC procedures described?	Y	QA/QC procedures appropriate?	Y						
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QA/QC procedures described?	Y																														
QA/QC procedures appropriate?	Y																														
List validation findings for each category in the comments line below.																															
Comments:	This parameter is used for indirect project emissions. The specific fuel consumption of buses is monitored annually. For cars, taxis, motorized rickshaws and motorcycles the annual technology improvement factor (0.99) has been chosen (see PDD B.6.1 (2.2.)). This is in line with the methodology.																														
B.7.1.7. Parameter Title: DD _{PJ,x,y} Distance driven by project units using fuel type x in year y		PDD B.7.1.		NA	NA																										

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Indication of accuracy provided?																													
QA/QC procedures described?																													
QA/QC procedures appropriate?																													
<i>List validation findings for each fuel type in the comments line below.</i>																													
Comments: The project transport units run on electricity. Therefore, the parameter $DD_{PJ,x,y}$ is not used.																													
B.7.1.8. Parameter Title: DPE_y Direct project emissions in year y if the project activity transport system involves electricity based transport units As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"		PDD B.7.1. & PDD tables		NA	NA																								
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QA/QC procedures described?																													
QA/QC procedures appropriate?																													
Comments: The parameter is not used literally. The direct project emissions are calculated per "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (see file PDD tables, sheet Project Emissions).																													
B.7.1.9. Parameter Title: $IPTD_{p,i,y}$ Indirect project trip distance of the surveyed passenger using mode i in the year y .		PDD B.7.1.	DR	OK	OK																								
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Correct value provided for estimation?	Y				
Has this value been verified?	Y				
Measurement method correctly described?	Y				
Correct reference to standards?	Y				
Indication of accuracy provided?	Y				
QA/QC procedures described?	Y				
QA/QC procedures appropriate?	Y				
List validation findings for each mode in the comments line below.					
Comments:	Identical with methodology.				
B.7.1.10. Parameter Title: $OC_{i,y} / OC_{B,y} / OC_{T,y}$ Average occupation rate of vehicle category i in year y . In particular, B stands for buses, and T for taxis		PDD B.7.1.	DR	OK	OK
Monitoring Checklist	Yes / No				
Title in line with methodology?	Y				
Data unit correctly expressed?	Y				
Appropriate description of parameter?	Y				
Source clearly referenced?	Y				
Correct value provided for estimation?	Y				
Has this value been verified?	Y				
Measurement method correctly described?	Y				
Correct reference to standards?	Y				
Indication of accuracy provided?	Y				
QA/QC procedures described?	Y				
QA/QC procedures appropriate?	Y				
List validation findings for each vehicle category in the comments line below.					
Comments:	Categories are buses, taxis, motorized rickshaws.				
B.7.1.11. Parameter Title: $TDIZ_{i,y}$ Average distance driven by taxis and cars on affected roads in year y		PDD B.7.1.	DR	OK	OK
Monitoring Checklist	Yes / No				
Title in line with methodology?	Y				
Data unit correctly expressed?	Y				
Appropriate description of parameter?	Y				
Source clearly referenced?	Y				
Correct value provided for estimation?	Y				
Has this value been verified?	Y				
Measurement method correctly described?	Y				
Correct reference to standards?	Y				
Indication of accuracy provided?	Y				
QA/QC procedures described?	Y				

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QA/QC procedures appropriate?		Y				
Comments: Identical with methodology.						
B.7.1.12. Parameter Title: NIZ _{i,y} / NIZ _{C,y} / NIZ _{T,y} Number of vehicles of vehicle category <i>i</i> using affected roads. In particular, C stands for cars, and T for taxis			PDD B.7.1.	DR	OK	OK
Monitoring Checklist		Yes / No				
Title in line with methodology?		Y				
Data unit correctly expressed?		Y				
Appropriate description of parameter?		Y				
Source clearly referenced?		Y				
Correct value provided for estimation?		Y				
Has this value been verified?		Y				
Measurement method correctly described?		Y				
Correct reference to standards?		Y				
Indication of accuracy provided?		Y				
QA/QC procedures described?		Y				
QA/QC procedures appropriate?		Y				
List validation findings for each vehicle category in the comments line below.						
Comments: Identical with methodology.						
B.7.1.13. Parameter Title: P _y Total passengers transported by the project activity transport system.			PDD B.7.1.	DR	OK	OK
Monitoring Checklist		Yes / No				
Title in line with methodology?		Y				
Data unit correctly expressed?		Y				
Appropriate description of parameter?		Y				
Source clearly referenced?		Y				
Correct value provided for estimation?		Y				
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Correct reference to standards?		Y				
Indication of accuracy provided?		Y				
QA/QC procedures described?		Y				
QA/QC procedures appropriate?		Y				
Comments: Identical with methodology.						
B.7.1.14. Parameter Title: MS _{i,y} Net share of passengers using the MRTS which would have used mode <i>i</i> in the year <i>y</i>			PDD B.7.1.	DR	OK	OK
Monitoring Checklist		Yes / No				
Title in line with methodology?		Y				
Data unit correctly expressed?		Y				

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CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.																								
Appropriate description of parameter?	Y																												
Source clearly referenced?	Y																												
Correct value provided for estimation?	Y																												
Has this value been verified?	Y																												
Measurement method correctly described?	Y																												
Correct reference to standards?	Y																												
Indication of accuracy provided?	Y																												
QA/QC procedures described?	Y																												
QA/QC procedures appropriate?	Y																												
<i>List validation findings for each mode in the comments line below.</i>																													
Comments: Identical with methodology.																													
B.7.1.15. Parameter Title: $N_{i,y} / N_{B,y} / N_{T,y}$ Number of vehicles of vehicle category i circulating in the city. In particular B stands for buses, and T for taxis		PDD B.7.1.	DR	OK	OK																								
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QA/QC procedures described?	Y																												
QA/QC procedures appropriate?	Y																												
<i>List validation findings for each vehicle category in the comments line below.</i>																													
Comments: Categories are buses, taxis and motorized rickshaws.																													
B.7.1.16. Parameter Title: $V_{p,y}$ Average speed of cars and taxis on affected roads in year y and total average speed and average moving speed.		PDD B.7.1.	DR	OK	OK																								
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QA/QC procedures described?		Y				
QA/QC procedures appropriate?		Y				
Comments: Average moving speed is recorded.						
B.7.1.17. Parameter Title: P _{EL,i,y} Total passengers transported by baseline rail-system in the year y			PDD B.7.1.	DR	OK	OK
Monitoring Checklist		Yes / No				
Title in line with methodology?		Y				
Data unit correctly expressed?		Y				
Appropriate description of parameter?		Y				
Source clearly referenced?		Y				
Correct value provided for estimation?		Y				
Has this value been verified?		Y				
Measurement method correctly described?		Y				
Correct reference to standards?		Y				
Indication of accuracy provided?		Y				
QA/QC procedures described?		Y				
QA/QC procedures appropriate?		Y				
Comments: Basically identical with methodology. Some minor differences in the wording without any relevance.						
B.7.1.18. Parameter Title: TE _{EL,i,y} Total emissions from the electricity-based rail system in the year y			PDD B.7.1. & PDD tables		NA	NA
Monitoring Checklist		Yes / No				
Title in line with methodology?						
Data unit correctly expressed?						
Appropriate description of parameter?						
Source clearly referenced?						
Correct value provided for estimation?						
Has this value been verified?						
Measurement method correctly described?						
Correct reference to standards?						
Indication of accuracy provided?						
QA/QC procedures described?						
QA/QC procedures appropriate?						
Comments: The parameter is not used literally. The emissions from the baseline rail system are calculated per “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (see file PDD tables, sheet BL trip).						
B.7.1.19. Is the Global Warming Potential going to be monitored at the end of the first commitment period?			PDD B.7.1.	DR	OK	OK
Comments: See monitoring frequency as defined in the parameter tables.						
B.7.2. Description of the monitoring plan						
B.7.2.1. Is the operational and management structure clearly de- scribed and in compliance with the envisioned situation?			PDD B.7.2 & Annex 4.	DR	OK	OK
Comments: Responsibilities documented for DMRC and for Grütter Consulting AG. DMRC organization chart.						

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B.7.2.2. Are responsibilities and institutional arrangements for data collection and archiving clearly provided?	PDD B.7.2. & Annex 4	DR	OK	OK
Comments:				
B.7.2.3. Does the monitoring plan provide current good monitoring practice?	PDD B.7.2. & Annex 4	DR	OK	OK
Comments:				
B.7.2.4. If applicable: Does annex 4 to the PDD provide useful information enabling a better understanding of the envisioned monitoring provisions?	PDD Annex 4	DR	OK	OK
Comments:				
B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/ entity(ies)				
B.8.1.1. Is there any indication of a date when the baseline was determined?	PDD B.8.	DR	OK	OK
Comments:	The date is described in the PDD: 20/04/2010.			
B.8.1.2. Is this consistent with the time line of the PDD history?	PDD B.8.	DR	OK	OK
Comments:	See A.1.2. Date of PDD version 1.0 is 03/05/2010, i.e. after completion of the baseline study.			
B.8.1.3. Is the information on the person(s) / entity(ies) responsible for the application of the baseline and monitoring methodology provided consistent with the actual situation?	PDD B.8.	DR, I	OK	OK
Comments2	Yes, the respective PP (Grütter Consulting AG) representative confirmed his roles and responsibilities vis a vis present situation.			
B.8.1.4. Is information provided whether this person / entity is also considered a project participant?	PDD B.8.	DR	OK	OK
Comments:	Grütter Consulting AG is a PP.			
C. Duration of the project activity / crediting period				
C.1. Duration of the project activity				
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	PDD C.1.	DR	OK	OK
Comments:	Both the starting date and the operational lifetime are defined and reasonable.			
C.2. Choice of the crediting period and related information				
C.2.1. Is the assumed crediting time clearly defined and reasonable (renewable crediting period of max 7 years with potential for 2 renewals or fixed crediting period of max. 10 years)?	PDD C.1.	DR	OK	OK
Comments:	7 years renewable crediting period is applied. See A.4.4.2			
D. Environmental impacts				
D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts				
D.1.1. Has the analysis of the environmental impacts of the project activity been sufficiently described?	PDD D.1. & File 65	DR, I	OK	OK
Comments:	EIA has been provided.			
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, has an EIA been approved?	PDD D.1. & File 65	DR	OK	OK
Comments:	Metro infrastructure does not require an EIA according to Indian regulations. However an Environmental assessment was carried out.			
D.1.3. Will the project create any adverse environmental effects?	PDD D.1. & File 65	DR	OK	OK

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Comments:	Neither the construction nor the operation of the project has any significant adverse environmental impact.				
D.1.4. Were transboundary environmental impacts identified in the analysis?		PDD D.1. & File 65	DR	OK	OK
Comments:	Impacts beyond the project boundary are considered insignificant.				
D.2. If environmental impacts are considered significant by the project participants or the Host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the Host Party					
D.2.1. Have the identified environmental impacts been addressed in the project design sufficiently?		PDD D.2.	DR	OK	OK
Comments:	Adverse environmental impacts are marginal.				
D.2.2. Does the project comply with environmental legislation in the host country?		PDD D.2.	DR, I	OK	OK
Comments:					
E. Stakeholders' comments					
E.1. Brief description how comments by local stakeholders have been invited and compiled					
E.1.1. Have relevant stakeholders been consulted?		PDD E.1.	DR	OK	OK
Comments:	General public and persons living near construction sites.				
E.1.2. Have appropriate media been used to invite comments by local stakeholders?		PDD E.1.	DR	OK	OK
Comments:	See E.1.				
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?				NA	NA
Comments:					
E.1.4. Is the undertaken stakeholder process that was carried out described in a complete and transparent manner?		PDD E.1.	DR	OK	OK
Comments:	See E.1.				
E.2. Summary of the comments received					
E.2.1. Is a summary of the received stakeholder comments provided?		PDD E.2.	DR	OK	OK
Comments:					
E.3. Report on how due account was taken of any comments received					
E.3.1. Has due account been taken of any stakeholder comments received?		PDD E.3.	DR, I	OK	OK
Comments:					
F. Annexes 1 – 4					
F.1. Annex 1: Contact Information					
F.1.1. Is the information provided consistent with the one given under section A.3?		Annex 1	DR, I	OK	OK
Comments:	The information provided is consistent.				
F.1.2. Is the information on all private participants and directly involved Parties presented?		Annex 1	DR	OK	OK
Comments:	Yes.				
F.2. Annex 2: Information regarding public funding					
F.2.1. Is the information provided on the inclusion of public funding (if any) in consistency with the actual situation presented by the project		Annex 2	DR	CAR #6	OK

CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl.	Final Concl.
participants?					
Comments:	See A.4.5.2.				
F.2.2. If necessary: Is an affirmation available that any such funding from Annex-I countries does not result in a diversion of ODA?		PDD 4.5.	DR	CAR#18	OK
Comments:	The evidence for not having ODA associated with the project is insufficient as the JBIC/JICA funds of the Japanese Government may contain an element of ODA.				
F.3. Annex 3: Baseline information					
F.3.1. If additional background information on baseline data is provided: Is this information consistent with data presented by other sections of the PDD?		Annex 3	DR	OK	OK
Comments:	No conflicts with other information have been found upon cross-checking.				
F.3.2. Is the data provided verifiable? Has sufficient evidence been provided to the validation team?		Annex 3	DR, I	OK	OK
Comments:	Details needed.				
F.3.3. Does the additional information substantiate / support statements given in other sections of the PDD?		Annex 3	DR	OK	OK
Comments:					
F.4. Annex 4: Monitoring information					
F.4.1. If additional background information on monitoring is provided: Is this information consistent with data presented in other sections of the PDD?		Annex 3 A.8. & A.9.	DR	CAR#19	OK
Comments:	The wording of the Passenger Survey questions 4 and 6 is not precise enough. Questions 4 and 6 do not specifically refer to “the Metro you are currently using”. The surveyed passengers will be misled to describe their entire trip without a Metro while in reality they may use Metro (Phase I) for part of their trip. This would illegitimately increase the baseline emissions. Question 4 “... how would you do this trip?” does not relate to the two choices of answers which are provided.				
F.4.2. Is the information provided verifiable? Has sufficient evidence been provided to the validation team?		PDD Annex 3 A.9.	DR	FAR #1	OK
Comments:	See f.4.1. The wording of the actual Passenger Survey questions which have been used must be checked for preciseness and consistency (see CAR #1) upon verification.				
F.4.3. Do the additional information and / or documented procedures substantiate / support statements given in other sections of the PDD?		Annex 3	DR	CL #4	OK
Comments:	See A.4.4.2.				