The Clean Development Mechanism
A Field Guide for Transport Projects

Through the Clean Development Mechanism, developing countries can sell certified emission reductions (CERs) or carbon credits to developed countries. A standard-sized project (reducing about 200,000 tCO2 per year) that does not need a new methodology will take about 1.5–2 years for registration and will require a budget of about $200,000. A new methodology can take more than 3 years and will need a budget of over $300,000. While the CER income will not cover investment costs, it can be quite attractive and can make a project more sustainable, financially attractive, and less prone to stalling.

About the Asian Development Bank

ADB’s vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region’s many successes, it remains home to two-thirds of the world’s poor: 1.7 billion people who live on less than $2 a day, with 828 million struggling on less than $1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.
The Clean Development Mechanism
A Field Guide for Transport Projects
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Note: In this publication, “$” refers to US dollars.

The ADB South Asia Operational Knowledge Working Paper Series is an avenue for sharing operational knowledge on policies and processes relevant to the implementation of ADB technical assistance, programs and projects. This series is a new knowledge product that consolidates knowledge of operational rules, guidelines, conventions, and experiences with a view to inform and improve the preparation, implementation, management, and delivery of development assistance, programs, and projects.

Titles under this Series could subsequently be revised for publication as articles in professional journals or chapters in books. The Series is maintained by the South Asia Department. The Series is made available on the ADB website and on hard copy.
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Strategy 2020 and Sustainable Transport Initiative of the Asian Development Bank (ADB) acknowledge the role of transport sector in climate change and vice-versa in transport. The Clean Development Mechanism of the United Nations Framework Convention on Climate Change (UNFCCC) uses project formulation and implementation to combat climate change by providing additional finance to encourage the reduction of carbon dioxide (CO2) emissions. While the transport sector currently contributes more than 20% of emissions, a figure projected to increase rapidly in the next few decades, only 0.3% of the Clean Development Mechanism projects are in the transport sector. This is mainly due to methodological intricacies, costly data requirements, complex procedures, and weaker capacity in the sector. These are not readily available or easy to understand in the UNFCCC website. Therefore, this field guide has been developed to share the basic ideas and concepts of the application, development, and approval process of the Clean Development Mechanism for transport projects. Through this field guide, the hope is that it makes a contribution to expanding the limited knowledge and encourages more transport projects to take advantage of this mechanism, thus helping to create more sustainable transport projects.

I would like to thank Ms. Susan Lim, former Transport Specialist for the South Asia Transport and Communications Division (SATC) of ADB and Dr. Jurg Grütter, a consultant from Grütter Consulting, who initiated this study, and Ms. Karma Yangzom, Environment Specialist of SATC for completing the study and bringing it to the final form. I am also thankful to the Transport CoP and the Regional and Sustainable Development Department (Technical Support Facility) for providing technical guidance and helping to make the paper more meaningful.

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### ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
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<tr>
<td>BRT</td>
<td>bus rapid transit</td>
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<td>CDM</td>
<td>Clean Development Mechanism</td>
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<tr>
<td>CDTA</td>
<td>capacity development technical assistance</td>
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<tr>
<td>CER</td>
<td>certified emission reduction</td>
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<tr>
<td>CoP</td>
<td>community of practice</td>
</tr>
<tr>
<td>DNA</td>
<td>designated national authority</td>
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<tr>
<td>DOE</td>
<td>designated operational entity</td>
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<tr>
<td>EB</td>
<td>Executive Board</td>
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<tr>
<td>GHG</td>
<td>greenhouse gas</td>
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<td>HSR</td>
<td>High Speed Rail</td>
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<tr>
<td>MRTS</td>
<td>Mass Rapid Transit System</td>
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<tr>
<td>PDD</td>
<td>project design document</td>
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<tr>
<td>PIN</td>
<td>project identification note</td>
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<tr>
<td>PoA</td>
<td>program of activities</td>
</tr>
<tr>
<td>RETA</td>
<td>Regional Technical Assistance</td>
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<td>SATC</td>
<td>South Asia Transport and Communications Division</td>
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<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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I. INTRODUCTION

1. Climate change is one of the greatest environmental challenges. Accelerated emission of greenhouse gases\(^1\) (GHG) from human activities has been found to be one of the main causes. In recognition of this challenge, countries signed an international environmental treaty, the United Nations Framework Convention on Climate Change (UNFCCC), in 1992. The Kyoto Protocol, an international agreement linked to the UNFCCC, was adopted five years later and came into force in 2005. Under the protocol, industrialized nations—those the UNFCCC refers to as Annex I\(^2\) countries—committed to reduce emissions by an average of 5% of the levels in 1990, and to do so from 2008 to the end of 2012. This allowed for mechanisms such as “Emission Trading”, the “Clean Development Mechanism”, and “Joint Implementation” to help Annex I countries fulfill their emission-reduction targets.

2. The Clean Development Mechanism (CDM) provides a route for developing/underdeveloped countries, or non-Annex I, countries to sell certified emission reductions (CERs), or carbon credits, to industrialized countries. A 1 ton equivalent\(^3\) of carbon dioxide\(^4\) (CO\(_2\)) is equal to 1 CER. Carbon credits can be generated from projects that contribute to decreasing emissions and meet UNFCCC criteria for CDM registration and CER issuance. Therefore, the mechanism fosters projects that reduce GHG, playing a significant role in the field of renewable energy, energy efficiency improvement and specific industrial emissions. Projects in the energy sector have been most active in the mechanism due to the existence of a clear and fairly straightforward baseline and monitoring methodology for calculating emission reductions from project activity. Currently, around 4,985 projects have been registered with the Clean Development Mechanism. Only 18 projects, amounting to about 0.3%, were in the transport sector. This is mainly due to methodological complexity, costly data requirements, complex procedures for accessing carbon finance, and a general lack of interest from project developers in taking up the benefits of CDM in view of high investment costs when compared with the potential revenue generated by carbon credits.

3. Transport accounts for a significant share of energy-related overall CO\(_2\) emissions. Projections suggest that transport will comprise the most rapidly growing source of emissions over the next 30 years, especially in developing countries. Some forecasters predict the developing world’s share of GHG emissions derived from transport will increase from about 35% in 2000 to 52%–63% by 2030.\(^5\) Efforts are therefore required to reduce carbon dioxide and other GHG emissions in the sector. A number of options exist, such as the promotion of vehicles using cleaner technology and fuel, managing demand, more efficient public transport systems, and shifting to cleaner modes of transport.

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\(^1\) Greenhouse gases (GHGs) can absorb and emit infrared radiation that result in the retention of more heat in the earth’s atmosphere. The major portion of GHG is water vapor. The main GHGs identified as responsible for Global Warming and Climate Change are carbon dioxide, methane, nitrous oxide, hydrofluorocarbon, perfluorocarbon (CFC), and sulphur hexafluoride.

\(^2\) Annex I countries include 37 developed/industrialized countries, including European Union countries and others whose economies are in transition and committed to reduce carbon emission.

\(^3\) A quantity of a GHG (other than carbon dioxide) that emits heat, measured in relation to the quantity of heat emitted by CO\(_2\). This is usually the unit used for GHG accounting.

\(^4\) Carbon dioxide (CO\(_2\)) is a gas produced through natural as well as human-induced processes. Plant and animal respiration, ocean-atmosphere exchange, and volcanoes are some natural phenomena that result in the generation and absorption of CO\(_2\). The burning of fossil fuels such as coal, oil and gas and industrial processes is the most significant human-induced source of CO\(_2\).

4. Transport projects that contribute to reductions in GHG emissions, and have potential for CDM finance, include improved public transport (bus rapid transit, metros, light rail transit), electric and hybrid vehicles (e.g., electric scooters), inter-urban rail infrastructure (including double-tracking, new freight lines, new passenger lines, or rapid passenger trains), and electrification railways projects (depending on whether the country uses fossil fuels to generate power or not).

II. CDM ORGANIZATIONAL SET UP

5. It is important to understand the relationships of various parties involved in the preparation, approval and monitoring of a CDM project. The following figure elaborates the role and responsibilities of different organizations in a CDM transport project. This set up may be applicable for projects in other sectors too.
Figure 1: CDM organizational set up for transport projects

**UNFCCC Executive Board**
Final authority for approving all new methodologies, registration of projects and issuance of CERs

**UNFCCC Methodology Panel**
Reviews methodologies for large-scale projects, gives feedback to PP for necessary revisions/corrections, and provides recommendations to the EB for approval or rejection of the proposed methodology

**UNFCCC SSWG**
Reviews methodologies for small-scale projects and provides recommendations to the EB for approval or rejection of the proposed methodology

**DNA**
National agency designated to approve the project and issue host country approval and ensures that the project contributes to sustainable development

**DOE**
Private national/international agencies accredited by the EB to: validate PDD and request project registration; and verify monitoring reports and request EB for issuance of CERs

**CER Buyers**
Government agencies, private companies, corporations, financial institutes etc., which purchase CERs or carbon credits from the project owner

**Project Owner**
The project applicant and owner of the CDM project generating emission reductions and CERs.

**Project Developer**
An agency contracted by the project owner to prepare CDM documents; AND/OR Donor organizations, NGOs and other developing agencies supporting the CDM project; OR Private investors preparing documents required by the CDM in exchange for a share of the CERs generated.

**Trading**

**Support and coordination**

Fulfills DNA requirements

Issues host country approval

Reviews and forwards the required reports

Gives recommendations and advice

Gives recommendations and advice

Issues host country approval

Reviews and forwards the required reports

Gives recommendations and advice

Fulfills DNA requirements

Submits the required reports

Submits the required reports

Gives recommendations and advice
III. PROCESSES

A. Key Elements

6. Under the CDM, buyers receive CERs for the amount of emission reductions achieved by a project. Buying agencies generally comprise private companies, corporate agencies, financial institutions or government agencies from Annex I countries that are required to maintain emissions within limits determined by national regulations. All projects initiated since 2000 have the potential to produce CERs, and the CDM has no specific end date. The CDM market is regulated by the UNFCCC, and all projects must use a UNFCCC-approved methodology. Projects that do not fit currently approved methodologies can propose amendments or a new methodology.

7. Box 1 summarizes the key requirements for a project to qualify under the CDM.

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**Box 1: Key issues and basic requirements for Clean Development Mechanism projects**

To ensure credibility of the Clean Development Mechanism (CDM) as an instrument for reducing global greenhouse gas emissions, **proof of additionality** of the project is a crucial component. In addition to reducing emissions compared to baseline conditions, a project is treated as additional if it fulfills any one of the following criteria:

- For micro-scale project activity in a Least Developed Country, the project is automatically treated as additional.
- If the project is “first of its kind” (e.g. first metro in the country), it is treated as additional.
- Financial additionality: i.e. in absence of the CDM, the project is not financially feasible.
- The positive financial impact of the CDM on operational costs.
- Additionality based on “barrier analysis”.

Calculation of the emission reductions must also include **leakage**. Leakage is defined as positive and negative change in emissions induced by project activities that occur outside the project boundaries. For example, reduced congestion created by a new urban mass transit project can create space for new traffic or additional trips in some points to and from the mass transit nodes and thus, additional emissions.

CDM projects must be voluntary and must **contribute to sustainable development**, according to the criteria established by the national climate change authority or Designated National Agency (DNA). The DNA is usually under a national environment authority, such as the Ministry of Environment, and is the designated authority for approving proposed CDM projects before submission to UNFCCC for registration. The criteria for approval generally include other national development objectives such as the project’s contribution to poverty alleviation, environment sustainability, the enhancement of investments, and introduction of new technology.

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1 Cases where a project faces risks to successful implementation due to lack of enabling policies, lack of technology, expertise/experience etc., and therefore needs additional CDM financing. The reasons may differ from one country to another.

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6 See [http://cdm.unfccc.int/methodologies/index.html](http://cdm.unfccc.int/methodologies/index.html) for a list of approved methodologies.
B. CDM Methodology

8. CDM transport methodologies include those that are both small and large in scale. Small-scale methodologies apply to projects that have been defined as small by the UNFCCC. They have the advantage of simplified modalities and procedures. The relevant threshold for small-scale CDM transport projects is annual emission reductions no greater than 60,000 tCO$_2$eq. Transport projects with emissions greater than this are treated under the mechanism as large-scale, and hence require large-scale methodology.

9. To propose inclusion in the CDM, the project participant must use an approved CDM methodology. Approved methodologies are public goods proposed by private entities. If there is no existing methodology for the proposed CDM project, the project proponent must develop a new methodology. This may entail modifying an approved methodology or developing a new one with or without similar features. Proposed new or modified methodologies are reviewed by the Small-Scale Working Group (SSWG) for small-scale methodologies, while the Methodology Panel reviews large-scale methodologies. The SSWG or Methodology Panel then prepares a report identifying problematic issues that require correction by the project proponent. Following corrections and satisfactory revisions, the SSWG or Methodology Panel recommends the methodology for approval or rejection by the UNFCCC Executive Board. The approval process averages 6 months for small-scale methodologies and around a year for large-scale methodologies. Large-scale methodologies have to be submitted by a designated operational entity (DOE), which charges for this service around 1,500 euros. The UNFCCC charges $1,000 for the revision of the methodology (only for large-scale methodologies).

10. Approved methodologies may undergo revision in response to requests from a DOE. Revision is usually requested if the project activity does not fit the methodology requirements. Such revisions usually involve minor issues (e.g., expanding applicability conditions of an approved methodology). The review process generally takes 4–6 months to reach a final decision.

11. The cost and time of methodology development and approval depends largely on the complexity of the methodology involved. Figure 2 shows the steps required for approval of new methodologies. The lower value in Figure 2 represents small-scale project emission reductions (up to 60,000 tCO$_2$ per annum), while the upper range represents large-scale project methodologies. Generally, projects under the transport sector take longer due to technical complexities of the methodology involved.

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7 Excluding afforestation and reforestation.
8 See [http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html](http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html).
9 Category III projects.
C. CDM Project Cycle

12. Figure 3 shows the cycle for project approval and CER issuance once a methodology has been approved.

1. Project Identification

13. CDM projects generally are not designed as stand-alone projects. The normal procedure involves an assessment of conventional transport projects, with those likely to result in a reduction of greenhouse gases being identified as potential CDM projects. Thus, the CDM itself is a component of a conventional transport project. A "conventional" transport project must be feasible, with merits of its own, but potentially unattractive from a technical and financial viewpoint in the absence of the CDM. The CDM improves the financial terms of sustainable transport projects and reduces implementation barriers. Therefore, the CDM can increase the attractiveness of conventional transport projects and make them more feasible. Most projects require specific technical and financial feasibility studies before CDM studies are started. Therefore, any project must have its detailed design or at least feasibility studies completed before it can be considered for CDM funding.

14. Most projects start CDM preparatory activities with a project identification note (PIN). While the PIN is not a UNFCCC requirement, the designated national authority (DNA) in most countries will need one for issuing Host Country Approval. There is no fixed format for a PIN, and it can differ depending on the respective host country’s requirements or the target audience, such as a potential project developer, financier, or CER buyer. A PIN typically includes information on the project’s magnitude in terms of GHG reductions, potential risks, and benefits. Within the context of Asian Development Bank (ADB) project cycles, the ideal time to prepare...
the PIN is after the project fact-finding stage, when the project technical, economic, financial and safeguard studies are finalized.

<table>
<thead>
<tr>
<th>Steps and Parties Involved</th>
<th>Time Frame</th>
<th>Cost $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Identification</td>
<td></td>
<td></td>
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<tr>
<td>Project Identification with preliminary assessment</td>
<td>1 week</td>
<td>0</td>
</tr>
<tr>
<td>Project Announcement – CDM consideration notification to UNFCCC &amp; DNA</td>
<td>1–2 months</td>
<td>0</td>
</tr>
<tr>
<td>Project Design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDD preparation using an approved CDM methodology</td>
<td>4–8 months</td>
<td>100,000</td>
</tr>
<tr>
<td>Validation and Registration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Host Country Approval / DNA approves the CDM project</td>
<td>3–6 months</td>
<td>50,000</td>
</tr>
<tr>
<td>Validation - UNFCCC-approved DOE approves project</td>
<td>6–12 months</td>
<td>0</td>
</tr>
<tr>
<td>Registration - UNFCCC Executive Board registers project</td>
<td>3–6 months</td>
<td>0.2 per annual CER</td>
</tr>
<tr>
<td>Monitoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring - conducted by project owner based on PDD, resulting in a monitoring report</td>
<td>For example, 1 year</td>
<td>50,000</td>
</tr>
<tr>
<td>Verification, Certification &amp; Issuance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verification - DOE verifies project monitoring using UNFCCC guidelines</td>
<td>4–8 months</td>
<td>0.1 for first 1,500 CERs &amp; 0.2 for beyond 1,500 CERs</td>
</tr>
<tr>
<td>CER Issuance - UNFCCC Executive Board certifies and issues CERs</td>
<td>3–6 months</td>
<td></td>
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CER = certified emission reduction; CDM = Clean Development Mechanism; DNA = designated national authority; DOE = designated operational entity; PDD = project design document; UNFCCC = United Nations Framework Convention for Climate Change.

**Time requirements** are based on actual experience with transport projects; time may vary depending on project type, DOE, and requests made by UNFCCC. **Costs** are based on actual charges for CDM transport projects. Costs may vary according to the project type, country, and validator.

2. Project Design

15. **Project Announcement.** Announcement of possible CDM status for a project comes through submission of the “Prior consideration of the CDM” form to the host country’s DNA and the UNFCCC secretariat within 6 months of the project start date.\(^\text{11}\) Within the ADB project cycle, this means the form must be submitted within 6 months after a contract has been signed with the contractor (for construction or supply of equipment) for the first contract award.\(^\text{12}\) This is a mandatory requirement for all projects started before a project design document (PDD) has been published for public comments, or a new or revised methodology has been proposed.

16. Submission of the form is considered an initial notification of the intention to seek CDM status in order to demonstrate that the benefits of the CDM were a decisive factor in starting the project. All submitted notifications are published on the CDM website at [http://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html](http://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html).

17. The project announcement is very simple and does not include calculations or information on commitments or costs. It is less detailed in comparison to the PIN but includes the project title, location, source of emission reductions and contact details of the project owner. Therefore, the project announcement can be prepared and submitted anytime between the feasibility study stage and within six months after a contract is signed with the construction contractor or equipment supplier. Simply stated, this step keeps the door open for CDM registration.

18. The completed “Prior Consideration of the CDM Form” should be submitted via e-mail to the UNFCCC secretariat at cdmregistration@unfccc.int and the national DNA, whose address can be found at [http://cdm.unfccc.int/DNA/index.html](http://cdm.unfccc.int/DNA/index.html).

19. **Preparation of Project Design Document.** The project owner or project proponent (e.g., a municipality wishing to develop a bus rapid transit system) controls the design phase. During this stage, a project participant prepares the PDD.\(^\text{13}\) The proposed methodology for quantifying emission reductions must adhere to the relevant UNFCCC-approved methodology and PDD format provided by the UNFCCC. Formulated in English, the newest version of the PDD is available at the UNFCCC website\(^\text{14}\) and includes guidelines for completion. The PDD for large-scale projects is more extensive than the PDD for small-scale projects.

20. Technical details of the project are required for preparing the PDD. These may include the type of technology, energy usage, traffic and passenger information, the physical project boundary (end and start points), and assessments of economic viability. Therefore in an ADB project, preparation of the PDD may be initiated when the project feasibility study is being carried out. However, it is advisable to complete the PDD after the detailed design of the project has been determined in order to produce more accurate estimates for emission reductions.

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\(^{11}\) The start date is defined as the earliest date at which either the implementation or construction or real action of a CDM project activity or PoA begins. This, for example, can be the date on which contracts have been signed for equipment or construction/operation services required for the project activity. GLOSSARY OF CDM TERMS (Version 06.0), [http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf](http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf)

\(^{12}\) Submission of the “Prior consideration of the CDM” form to the UNFCCC and DNA may also be done before contract signing of the first contract with the physical works contractor or equipment supplier.

\(^{13}\) According to the Glossary of CDM terms, a project participant is “(a) a Party involved, which has indicated to be a project participant, or (b) a private and/or public entity authorized by a Party involved to participate in a CDM project activity”
21. A specialized CDM project developer generally formulates the PDD. This may be the project owner or an agency such as a consultancy firm contracted to conduct studies and prepare documents to quantify emission reductions, and/or any other organization providing support to the project owner for PDD preparation. Before moving to the next step of validation, publication of a PDD on the UNFCCC website is required, for 1 month to enable submission of public comments.

22. Projects may opt for either a 10-year non-renewable crediting period or a 7-year crediting period that can be renewed twice. However, CDM project activities cannot exceed the expected operational life of the project. The cost of design is largely project-specific and based on already available data. In many cases, transport projects must perform specific studies to gather data required by the CDM process, potentially increasing costs. Including studies, the typical cost for an urban mass transit project PDD is around $150,000–$200,000.

3. Validation and Registration

23. **Host Country Approval.** It is a requirement for all proposed CDM projects to be approved by the respective host country, or countries for the case of cross border projects before submission to UNFCCC for registration. Host country approval is issued by the DNA. The DNA is appointed by the government of the respective country and is usually a section or division under the national environment authority such as the Ministry of Environment. Each DNA develops individualized criteria for national approval such as contribution to poverty alleviation, environment conservation, compliance to national regulations and other factors, but all DNAs must assess a project’s contribution to sustainable development. Some projects may have more than one DNA—for example, where a project is located in more than one country. Most DNA’s require completion of key project information in the form of a project information note (PIN). While the contents of a PIN differ from one DNA to another a PIN typically includes information on the project’s magnitude in terms of GHG reductions, potential risks, and benefits. The full list of DNA’s can be seen at [http://cdm.unfccc.int/DNA/bak/index.html](http://cdm.unfccc.int/DNA/bak/index.html).

24. The host country approval letter must indicate the following:

- That the country has ratified the Kyoto Protocol.
- That participation is voluntary.
- A statement from host parties that the proposed CDM project activity contributes to sustainable development (EB 16, Annex 6, paragraph 1).

25. **Validation.** Validation is the process of independent evaluation of a project activity by a designated operational entity (DOE) against the requirements of the CDM, as set out in CDM modalities and procedures and relevant decisions of the Kyoto Protocol Parties and the CDM Executive Board, on the basis of the PDD. Basically, a third-party agency cross-checks and validates the PDD to ensure quality and fulfilment of CDM requirements before submission to the CDM Executive Board. The UNFCCC definition of a DOE is “either a domestic legal entity or an international organization accredited and designated (on a provisional basis until confirmed

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15 The PDD lists the project developer as the person/organization responsible for formulating the baseline. Therefore, project owners interested in identifying or contracting project developers with relevant experience could review registered PDDs of comparable projects.
by the CMP) by the CDM Executive Board”. The project owner selects, contracts, and pays the DOE.  

26. Before starting the validation, the PDD is required to be published on the UNFCCC website for public comment for 1 month. To pass the validation process, the project participant, with support of the project developer, if it has one, must respond to public comments/inquiries, and clarify and correct issues raised by the DOE.

27. Processing of host country approval and validation of the PDD can take place simultaneously.

28. **Registration.** Registration represents the formal acceptance by the Executive Board of a validated project under the CDM, and it is a prerequisite for the verification, certification and issuance of related CERs.

29. Following DNA approval and a positive validation report, the DOE submits project details to the CDM Executive Board with a request for registration. All registered projects are listed on the UNFCCC website, along with their full documentation (i.e., PDD, validation report, and approvals).

30. The registration process includes the following steps:

   - A completeness check by the secretariat.
   - Vetting by the secretariat.
   - Vetting by the Executive Board.
   - If a Party or three members of the Executive Board request a review, then the project undergoes it, or otherwise proceeds to registration.

31. During the registration phase, the UNFCCC can request clarifications or changes before approving or rejecting the project. For all projects, including those funded by ADB, registration should ideally be achieved before project operations commence. If registration takes place only after project operations have started, any emission reductions realized by the project before registration cannot be issued with CERs and therefore are not eligible to earn income.

4. **Monitoring**

32. Following registration, the project participant is responsible for monitoring emission reductions according to the approved methodology. At this stage, implementation of the ADB investment project would have been completed and the Project Completion Report (PCR) either under process or already published. The project participant or specialized CDM consulting company prepares a monitoring report in accordance with procedures outlined in the PDD. The report must adhere to the default monitoring report format published by the UNFCCC. This will most likely require field work for taking measurements, collecting data, conducting surveys, and more. Emission reductions achieved during an owner-determined period (e.g., 1 year) are summarized in the monitoring report, then verified, certified, and sold.

---

17 See [http://cdm.unfccc.int/DOE/index.html](http://cdm.unfccc.int/DOE/index.html) for a list of DOEs.

18 A DNA representing a party or member country of the UNFCCC.

19 The Executive Board constitutes 20 members (10 active and 10 alternate members). For both active and alternate members, five are from developed countries and five from developing countries.
33. Initial CDM revenues are not immediately available because CERs can be sold only at the end of each monitoring period, after successful completion of the verification and certification process. Therefore, a very large project may opt for a shorter monitoring period, thus receiving payment more quickly, while a smaller project might opt for a longer monitoring period to reduce the (fixed) cost of verification for each report. Monitoring for transport projects often involves additional project-specific studies, resulting in potentially significant annual monitoring costs.

5. Verification, Certification, and Issuance

34. A designated operational entity verifies that emission reductions took place, in the amount claimed, and according to the approved monitoring plan.

35. **Verification** is the independent review and ex-post determination by the DOE of the monitored reductions in emissions that have occurred as a result of a project operations during the verification period.

36. **Certification** is the written assurance by the DOE that during the specified period the project activity achieved the emission reductions as verified.

37. In small-scale projects, the project owner can use the same DOE that was used for project validation, but large-scale projects must use separate DOEs for validation and verification. The UNFCCC provides a list of approved DOEs for verification of each sector on its website.\(^\text{20}\)

38. **Issuance** follows submission by a DOE of a verification report, with a request for the CDM Executive Board to issue the CERs.

39. The CER issuance process includes the following:
   - A completeness check by the secretariat.
   - Vetting by the secretariat.
   - Vetting by the Executive Board.
   - If a review is requested by a party or three members of the Executive Board then the issuance undergoes review, otherwise the issuance proceeds.

6. Time, Cost, and Risk

40. When a CDM project does not require a new methodology, the time between initiation and registration is around 1.5 to 2 years, including elaboration of any additional studies. If a new methodology is needed, this period can increase to more than 3 years, largely due to the UNFCCC’s lengthy approval process. The CDM process can and should be implemented parallel to project construction. Because credits can be earned after operations begin, registration should occur before that happens. Assuming that the project is operational immediately after registration, the time between submission of the PDD and issuance of the first CERs is around 2.5 to 4 years. Since payments are made generally upon delivery of CERs, this coincides with the time the project owner must wait for payment. Some buyers release partial contract amounts, before the actual CER issuance by UNFCCC.

\(^{20}\) [http://cdm.unfccc.int/DOE/index.html](http://cdm.unfccc.int/DOE/index.html)
41. Leading up to registration, CDM expenditures for a standard-sized transport project (i.e., around 200,000 t\( CO_2 \) reduced per annum) will total around \$200,000 where no new methodology is required. This cost is lower for a smaller, simpler project which requires no additional studies and significantly higher for complex projects where additional data collection or new methodologies are needed. The cost of development cannot be recovered if a project is rejected during either the validation or registration phase. Following the same project example, the investment from the time of submission of the PDD to issuance of the first CERs is around \$250,000--\$300,000. Based on an average net selling price of \$6/tCER, 200,000 tCERs per annum and a time-period of 10 years, transaction costs is less than 6% of income.\(^{21}\) Transaction costs are lower for larger and simpler projects with a longer crediting period and higher selling prices.

42. Core risks for CDM projects include:

- A project can be dropped during the project development stage due to: (i) lack of data, determination of non-additionality; (ii) too little, or no emission reductions; or (iii) lack of funds.
- Rejection of the PDD at the validation stage, mainly due to: (i) deficient project formulation; (ii) an erroneous application of methodology; (iii) problems with data presentation; or (iv) insufficient additionality arguments. (Around 10% of all proposed CDM projects do not pass this stage).
- CERs earned are less than anticipated in the PDD.

7. Linking CDM Activities with ADB Projects

43. The timing of the CDM project activities and its correspondence with the ADB project cycle has been mentioned in sections 2.3.1 to 2.3.6. Further elaboration on the timing is provided in the following figure.

44. For ADB projects, CDM preparatory activities can be included as a Capacity Development Technical Assistance (CDTA), which will be implemented parallel to the investment project. If the investment project includes more than one country, and emission reductions are expected to be realized from project activities in all the countries, CDM preparatory activities could be covered under a Regional Technical Assistance (RETA). Under a CDTA or RETA, the implementation period for CDM-related activities could start as early as the project design stage—particularly for projects requiring new methodology—and end at the project completion stage or earlier.

45. If the CDM project does not require preparation of a new methodology, activities and costs leading up to registration may be included in the investment loan or grant. This means that the CDM activities can be initiated after project approval. However, the implementation period must allow enough time for PDD preparation, validation and project registration. For example, for a complex and large-scale project the implementation period must be at least 2 to 3 years, to allow enough time to accomplish all preparatory activities and get the project registered before operations begin.

\(^{21}\) This includes 2% of all CERs charged by the UNFCCC as an adaptation fee.
Figure 4: CDM project cycle compared with the ADB project cycle

CDM Project Cycle

- Project Identification
  - Project Identification with preliminary assessment
- Project Design
  - Project Announcement – CDM consideration notification to UNFCCC & DNA
  - PDD preparation using an approved CDM methodology
- Validation and Registration
  - Host Country Approval / DNA approves the CDM project
  - Validation - UNFCCC-approved DOE approves project
  - Registration - UNFCCC Executive Board registers project
- Monitoring
  - Monitoring - conducted by project owner based on PDD, resulting in a monitoring report
  - Verification - DOE verifies project monitoring using UNFCCC guidelines
- Verification, Certification & Issuance
  - CER Issuance - UNFCCC Executive Board certifies and issues CERs

ADB Project Cycle

- Project Design and Preparation Stage
  - During feasibility study stage or detailed design stage
- Project Implementation Stage
- Project Operation Stage
46. In terms of internal technical and financial resources, the Carbon Market Program (CMP) under the Regional Sustainable Development Department (RSDD) can provide support to ADB projects contributing to GHG emission reduction. The support which is targeted at helping projects to benefit from carbon markets can be provided in two ways:

(i) Technical expertise for CDM-related activities under the investment project could be sought from the Technical Support Facility (TSF) of the CMP. In this case, depending on the resource availability of the TSF team, expert services for preparing the required CDM documents can be used. Costs related to technical services can be funded by RSDD. However, costs for payment of fees of DOE, UNFCC registration fees etc. will have to be borne by the project.

(ii) Technical as well as financial support can be provided for selected projects under the ADB’s Future Carbon Fund. If the fund decides to buy future CERs of the project, it can cover CDM transaction costs with the support of the TSF. These include costs for technical services for CDM preparatory activities as well as fees such as those covering UNFCCC registration. In addition, upon project registration, the fund can provide advance payments of as much as 50% for the CERs expected from the project. However, projects for support are selected only after detailed due diligence and the release of advance payments for CERs will be subjected to specific terms and conditions.

47. Together with implementing CDM preparatory activities, it is also important to build the capacity of the executing agency (EA) through training sessions, the development of guidelines, and the establishment of CDM data management systems and the like. While preparation of documents and project registration as a CDM with the UNFCCC may be carried out under a TA or investment project, the monitoring, verification, certification, and CER issuance during project operations will have to continue throughout the crediting period (10 years or 21 years). Though the EAs may utilize the services of consulting firms to help them with monitoring activities, it is important that they are aware of the key concepts and requirements of CDM projects.

IV. CURRENT STATUS OF CDM IN THE TRANSPORT SECTOR

A. Status of Transport Methodologies

48. As of April, 2012, approved methodologies for all sectors totaled 181. Of these, 103 were large-scale and 78 were classed as small-scale, and only 14 methodologies—10 small-scale and four large-scale—were for transport projects. These approved methodologies covered: BRT, MRT and cargo transport projects to enhance energy efficiency through modal shifts; the use of electric and hybrid vehicles, and vehicles with cleaner and energy efficient technologies; and the production of biofuels.

49. Table 1 provides an overview of all approved CDM transport methodologies. Table 2 shows all rejected methodologies and the main reasons for rejection. Importantly, the data does not include biofuel methodologies because they are not used exclusively for transport and are listed partially as non-transport methodologies.\(^{23}\)

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\(^{22}\) In fact, 15 methodologies were approved but two were consolidated in ACM0016.

\(^{23}\) E.g., see ACM0017 (production of biodiesel for use as fuel) listed by the UNFCCC.
Table 1: Approved transport methodologies (excluding biofuel production)\textsuperscript{24}

<table>
<thead>
<tr>
<th>Reference</th>
<th>Scope</th>
<th>Applicability</th>
<th>Developer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNFCCC approved large-scale transport methodologies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM0031</td>
<td>BRT projects</td>
<td>BRT systems integrating feeder and trunk routes</td>
<td>Grüter Consulting</td>
</tr>
<tr>
<td>ACM0016\textsuperscript{25}</td>
<td>MRTS projects</td>
<td>Urban MRTS (metro, tram, BRT, LTR)</td>
<td>Grüter Consulting</td>
</tr>
<tr>
<td>AM0090</td>
<td>Cargo modal shift road to rail/water</td>
<td>Mode shift of cargo on fixed routes</td>
<td>ArcelorMittal</td>
</tr>
<tr>
<td>AM0101</td>
<td>High Speed Rail (HSR) Methodology</td>
<td>Implementation of HSR systems</td>
<td>Grüter Consulting</td>
</tr>
<tr>
<td><strong>UNFCCC approved small-scale transport methodologies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMS-III.C</td>
<td>Electric and hybrid vehicles</td>
<td>Formerly for any low GHG-emitting vehicles but now restricted to electric and hybrid vehicles</td>
<td>UNFCCC</td>
</tr>
<tr>
<td>AMS-III.S</td>
<td>Low emission vehicles in fleets</td>
<td>Bus or truck fleets which reduce emissions</td>
<td>Mitsubishi</td>
</tr>
<tr>
<td>AMS-III.U</td>
<td>Cable cars</td>
<td>Cable cars for urban public transport</td>
<td>Grüter Consulting</td>
</tr>
<tr>
<td>AMS-III.AA</td>
<td>Retrofit technologies</td>
<td>Retrofit technologies increasing fuel efficiency for public transit vehicles</td>
<td>CaFIS</td>
</tr>
<tr>
<td>AMS-III.AP</td>
<td>Idling stop devices</td>
<td>Retrofit of idling stop devices to reduce fuel consumption in public transit vehicles</td>
<td>Climate Consulting, LLC, Almec Corporation</td>
</tr>
<tr>
<td>AMS-III.AT</td>
<td>Usage of digital tachograph systems</td>
<td>Usage of digital tachograph systems to reduce fuel consumption in commercial freight fleets</td>
<td>Mitsubishi UFJ Morgan Stanley Securities Co., Ltd.</td>
</tr>
<tr>
<td>AMS-III.AY</td>
<td>LNG buses</td>
<td>Introduction of LNG buses to fleets</td>
<td>CNOOC Gas and Power Group Ltd., Sino Carbon Innovation &amp; Investment Co., Ltd., Institute of Nuclear and New Energy Technology, Tsinghua University</td>
</tr>
</tbody>
</table>

\textsuperscript{24} As of 12 December, 2010. See \url{http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html} and \url{http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html}.

\textsuperscript{25} Two proposed methodologies were consolidated.
Table 2: Rejected transport methodologies

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title /scope</th>
<th>Core rejection reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM0052</td>
<td>Urban mass transport</td>
<td>Lack of clarity on emission-reduction calculations</td>
</tr>
<tr>
<td>NM0083</td>
<td>Liquefied petroleum gas in transport</td>
<td>Unclear baseline and problems with emission-reduction calculations</td>
</tr>
<tr>
<td>NM0128</td>
<td>Modal shift freight</td>
<td>Unclear emission-reduction calculation</td>
</tr>
<tr>
<td>NM0158</td>
<td>BRT</td>
<td>Unclear emission-reduction calculation</td>
</tr>
<tr>
<td>NM0205</td>
<td>Improved energy efficiency of buses</td>
<td>Technology is for fuel efficiency and not for GHG reduction as it increases the oxidation factor</td>
</tr>
<tr>
<td>NM0237, NM0257, SSC NM0027, SSC NM039</td>
<td>Improved bus dispatch</td>
<td>Identification of baseline and separation of non-project caused effects</td>
</tr>
<tr>
<td>NM0279</td>
<td>Transit-oriented development</td>
<td>Differentiation between effects caused by project and non-project effects</td>
</tr>
<tr>
<td>NM0287</td>
<td>Increase in MRTS passengers</td>
<td>Differentiation between effects caused by project and non-project effects</td>
</tr>
</tbody>
</table>

Small-scale transport methodologies

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title /scope</th>
<th>Core rejection reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSC-0019 and SSC-0041</td>
<td>EcoDrive (ecological driving courses)</td>
<td>CDM projects are not applicable for training or promotion projects but only for actual measured reductions</td>
</tr>
<tr>
<td>SSC-0090</td>
<td>BRT</td>
<td>Unclear baseline calculations and recommended for large-scale methodology</td>
</tr>
<tr>
<td>SSC-NM0034</td>
<td>Avoided transport through moving industrial facility</td>
<td>Baseline emissions were not taken correctly into account</td>
</tr>
<tr>
<td>SSC NM0037, SSC-0128, SSC-0156, SSC-172</td>
<td>Mode shift: rail to pipeline</td>
<td>Large-scale methodology required</td>
</tr>
<tr>
<td>SSC NM0054</td>
<td>Mode shift: road to rail</td>
<td>Large-scale methodology required</td>
</tr>
<tr>
<td>SSC NM0056</td>
<td>Mode shift: road to water</td>
<td>Large-scale methodology required</td>
</tr>
<tr>
<td>SSC NM0065</td>
<td>Efficiency improvements in motorcycles</td>
<td>Differentiation between effects caused by project and non-project effects</td>
</tr>
</tbody>
</table>

BRT = bus rapid transit; NM = new methodology; SSC = small-scale.

Source: UNFCCC website, [http://cdm.unfccc.int/methodologies](http://cdm.unfccc.int/methodologies).

50. Various CDM transport methodologies have been rejected, basically on grounds of baseline emission determination and calculations; the separation between the effects caused by the project and “business as usual” development; their scope; and inclusion of potential leakage effects.

51. Currently under discussion are:

- A methodology for rail projects: This new large-scale methodology is for the construction and operation of rail tracks for freight and/or passenger transport.
- Pipelines instead of road transport of freight goods (large-scale methodology).
- Small-scale methodology for efficient fleets.
B. Status of Transport CDM Projects

52. Table 3 lists all CDM transport projects registered with the UNFCCC or in the validation or registration stage as of April 2012.

Table 3: Clean Development Mechanism transport projects\(^{26}\)

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Country</th>
<th>Size</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>TransMilenio Bogota</td>
<td>BRT, urban transport</td>
<td>Colombia</td>
<td>Large-scale</td>
<td>5(^{th}) issuance of CERs</td>
</tr>
<tr>
<td>Cable car Medellin</td>
<td>Cable car, urban transport</td>
<td>Colombia</td>
<td>Small-scale</td>
<td></td>
</tr>
<tr>
<td>BRT Barranquilla</td>
<td>BRT, urban transport</td>
<td>Colombia</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>DMRC Delhi</td>
<td>Metro, urban transport</td>
<td>India</td>
<td>Large-scale</td>
<td>1st issuance 2012</td>
</tr>
<tr>
<td>Regenerative brake energy DMRC</td>
<td>Energy efficiency in metro</td>
<td>India</td>
<td>Small-scale</td>
<td></td>
</tr>
<tr>
<td>Metro Mumbai Line One</td>
<td>Metro, urban transport</td>
<td>India</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>Road to rail for cars</td>
<td>Freight mode shift</td>
<td>India</td>
<td>Small-scale</td>
<td></td>
</tr>
<tr>
<td>BRT Edomex</td>
<td>BRT, urban transport</td>
<td>Mexico</td>
<td>Large-scale</td>
<td>1st issuance 2012</td>
</tr>
<tr>
<td>BRT Metrobus Insurgentes</td>
<td>BRT, urban transport</td>
<td>Mexico</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>BRT Chongqing</td>
<td>BRT, urban transport</td>
<td>People’s Republic of China</td>
<td>Large-scale</td>
<td>1st issuance 2012</td>
</tr>
<tr>
<td>BRT Zhengzhou</td>
<td>BRT, urban transport</td>
<td>People’s Republic of China</td>
<td>Large-scale</td>
<td>1st issuance 2012</td>
</tr>
<tr>
<td>Vegetable oil plant</td>
<td>Vegetable oil production and usage in transport</td>
<td>Paraguay</td>
<td>Small-scale</td>
<td></td>
</tr>
<tr>
<td>BRT Cali</td>
<td>BRT, urban transport</td>
<td>Colombia</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>BRT Medellin</td>
<td>BRT, urban transport</td>
<td>Colombia</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>BRT Guadalajara</td>
<td>BRT, urban transport</td>
<td>Mexico</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>Metro Mexico Line 12</td>
<td>metro, urban transport</td>
<td>Mexico</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>BRT Metrobus</td>
<td>BRT, urban transport</td>
<td>Mexico</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>BRT Quito</td>
<td>BRT, urban transport</td>
<td>Ecuador</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>BRT Pereira</td>
<td>BRT, urban transport</td>
<td>Colombia</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>Metro Mumbai Line Two</td>
<td>Metro, urban transport</td>
<td>India</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>EKO electric vehicles</td>
<td>Electric vehicles</td>
<td>India</td>
<td>Small-scale</td>
<td></td>
</tr>
<tr>
<td>Electrotherm electric vehicles</td>
<td>Electric vehicles</td>
<td>India</td>
<td>Small-scale</td>
<td></td>
</tr>
<tr>
<td>Lohia electric</td>
<td>Electric vehicles</td>
<td>India</td>
<td>Small-scale</td>
<td></td>
</tr>
</tbody>
</table>

\(^{26}\) [http://cdm.unfccc.int/Projects/Validation/index.html](http://cdm.unfccc.int/Projects/Validation/index.html)
<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Country</th>
<th>Size</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lohia electric vehicles</td>
<td>Electric vehicles</td>
<td>India</td>
<td>Small-scale</td>
<td></td>
</tr>
<tr>
<td>BRT Guatemala</td>
<td>BRT, urban transport</td>
<td>Guatemala</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>Metro Buenos Aires</td>
<td>metro, urban transport</td>
<td>Argentina</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>Metro Gurgaon</td>
<td>Metro, urban transport</td>
<td>India</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>Bharathi freight</td>
<td>Freight road to rail</td>
<td>India</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>BRT Lanzhou</td>
<td>BRT, urban transport</td>
<td>China</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>Metro Daegu</td>
<td>metro, urban transport</td>
<td>Republic of Korea</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>Metro Busan</td>
<td>metro, urban transport</td>
<td>Republic of Korea</td>
<td>Large-scale</td>
<td></td>
</tr>
<tr>
<td>Metro Incheon</td>
<td>metro, urban transport</td>
<td>Republic of Korea</td>
<td>Large-scale</td>
<td></td>
</tr>
</tbody>
</table>

BRT = bus rapid transit.

53. Overall, some 27 CDM transport projects are in the process of validation or registration (as of December 2012). Among these, 19 are registered, four are undergoing review and 4 are in the process of registration.

54. Figure 5 shows the distribution of projects in active validation (i.e., not rejected or in registration). The majority are for mass urban transit systems, largely because the first methodologies were implemented in this area. Three methodologies have been approved, and a significant number of urban transit projects exist worldwide.

**Figure 5: Clean Development Mechanism project types**

Based on CDM transport projects in registration or active validation as of December 2012.
Source: Grütter Consulting.
C. Rail Projects Potential

1. Types of Projects

Under rail, there are two basic types of projects:

- Urban rail projects for passenger transport including metros, light rail transit, trams, or suburban rail systems that serve as mass rapid transit systems in urban or peri-urban settings. Such projects can be realized using the approved CDM methodology, ACM0016. Two rail projects using this methodology have been registered (Metro Mumbai One and Metro Delhi) and several others projects are in validation, including various metros in the Republic of Korea, Metro Mexico Line 12, Metro Mumbai Line 2, Gurgaon Rapid Metro, Metro Buenos Aires, and LRT Tunis.

- Interurban rail projects involving either freight or passenger transport. Freight projects can use the approved CDM methodology, AM0090, albeit with restrictions. For High Speed Rail systems, the UNFCCC has recently approved the HSR methodology based on the KTX, Korea. Also, a new Rail Methodology for freight and passenger transit is currently under discussion at the UNFCCC.

Metro Mumbai One, India

- Elevated heavy duty metro
- Currently under construction
- Operational start: January 2013
- 11.4 km of rail
- Daily >600,000 passengers
- Registered as CDM project
- Annual emission reductions around 200,000 tCO₂

Metro Delhi, India

- Heavy duty metro
- Project is Phase II
- Operational start phase II was July 2011
- 102 km of rail
- Daily 1.1 million passengers
- Registered as CDM project
- Annual emission reductions around 500,000 tCO₂
- First monitoring report submitted

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27 However, if a project does not fit the methodology, the methodology can be adjusted.
56. The following sections analyze the core elements of CDM rail methodologies including: applicability conditions; the determination of additionality; baseline/project/leakage emissions and their resulting emission reductions; and the most important data requirements.

2. Applicability Conditions of Rail Methodologies

57. Applicability conditions describe the aspects that must be fulfilled to use the approved methodology. If any conditions are not fulfilled, the project proponent must propose either an amendment to the methodology or a new methodology. Table 4 lists the most relevant applicability conditions for existing and newly proposed rail methodologies.

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Applicability Conditions</th>
</tr>
</thead>
</table>
| ACM0016 for MRTS                         | • New infrastructure must be constructed (includes extensions but not upgrading of existing rail lines)  
• Only for urban and/or suburban passenger trips |
| AM0090 for freight                       | • Investment in new facilities (tracks, handling areas etc.) and/or equipment (trains wagons, etc.) is required or investments in capacity expansion of existing tracks  
• The new investment must be used at least 50% by cargo included in the project  
• Origin and destinations of cargo transported are fixed for the crediting period  
• No cargo mix is allowed (i.e., only one type of cargo is transported)  
• No existing transportation demand is displaced on the existing railway infrastructure  
• The baseline mode of transport is road transport |
| AM0101 for HSR                           | • HSR new rail track with minimum speed of 200 km/h  
• Only passenger transport |
| Proposed methodology for interurban passenger rail | • New infrastructure must be constructed (includes extensions but not operational improvements of existing rail lines). Minimum 100km of new rail track  
• Only for interurban trips  
• Passenger and freight transport  
• Applicable for double tracking |

ACM = approved consolidated methodology; AM = approved methodology; MRTS = mass rapid transit system. Source: Grütter Consulting, 2012.

3. Core Data Requirements for Railway Projects

58. Certain data must be available at the time of validation, and certain data is required for the monitoring of the project. Table 5 lists the most relevant data required at the time of project presentation, and for monitoring each methodology.

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Data required at time of validation(^{28})</th>
<th>Data monitored during project execution</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACM0016 for MRTS</td>
<td>• Emissions per passenger-kilometer of baseline modes of transit (e.g., taxis, buses, cars)</td>
<td></td>
</tr>
</tbody>
</table>
|                                          | • Number of project passengers  
• Fuel/electricity consumed by project rail  
• Mode passengers would have used in absence of the project rail and trip |

\(^{28}\) At the time of validation, the data to be monitored is projected, based on transparent assumptions.
<table>
<thead>
<tr>
<th>Methodology</th>
<th>Data required at time of validation(^\text{28})</th>
<th>Data monitored during project execution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Occupation rates of buses and taxis</td>
<td>distance per mode determined through a</td>
</tr>
<tr>
<td></td>
<td>• Speed and vehicle flow on roads affected by</td>
<td>survey of project passengers</td>
</tr>
<tr>
<td></td>
<td>the MRTS</td>
<td>• Speed and number of vehicles on</td>
</tr>
<tr>
<td></td>
<td></td>
<td>affected roads (to determine rebound</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and speed effect through decongestion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of MRTS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Occupation rate of taxis and buses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(to determine leakage through passenger</td>
</tr>
<tr>
<td></td>
<td></td>
<td>shift towards MRTS)</td>
</tr>
<tr>
<td>AM0090 for</td>
<td>• Specific fuel consumption of trucks used</td>
<td>• Project trip route distance and modes</td>
</tr>
<tr>
<td>freight</td>
<td>in absence of the project</td>
<td>used per distance part</td>
</tr>
<tr>
<td></td>
<td>• Baseline freight distance trip route</td>
<td>• Amount of cargo transported per project</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Specific fuel/electricity consumption</td>
</tr>
<tr>
<td></td>
<td></td>
<td>per project mode</td>
</tr>
<tr>
<td>Proposed</td>
<td>• Emissions per passenger-kilometer for</td>
<td>• Number of project passengers</td>
</tr>
<tr>
<td>methodology</td>
<td>passenger and per ton-kilometer for freight</td>
<td>• Fuel/electricity consumed by project</td>
</tr>
<tr>
<td>rail</td>
<td>of baseline modes of transit (e.g., rail,</td>
<td>rail</td>
</tr>
<tr>
<td></td>
<td>buses, cars)</td>
<td>• Historic mode shares freight and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>passengers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For various elements default values</td>
</tr>
<tr>
<td></td>
<td></td>
<td>are provided if no data is available</td>
</tr>
</tbody>
</table>

ACM = approved consolidated methodology; AM = approved methodology; MRTS = mass rapid transit system.


4. Baseline, Project, Leakage, and Emission Reductions

59. Rail project emission reductions can be calculated by using the following formula.

\[
\text{Rail project emission reductions} = \text{Baseline emissions} - \text{project emissions} - \text{leakage emissions}
\]

60. Baseline emissions are those that would occur if passengers used conventional (non-project) modes of transit to make the same trip as they perform in project modes, or for freight if cargo were transported by existing roads rather than through rail projects. Baseline transport modes generally have higher emissions per ton-kilometer or per passenger-kilometer than project modes. However, in certain cases, this generalization might not hold true; for example, high-speed trains might generate higher emissions per passenger-kilometer than buses or passenger cars, depending on how electricity is produced in the country.

61. Project emissions represent the fuel/electricity consumed by the project unit for transporting passengers or freight. In rail projects, emissions strongly depend on the emission factor of the grid (e.g., project emissions in countries with 100% renewable electricity generation, like the Lao People’s Democratic Republic, would be 0, while the same project would generate significant emissions in the People’s Republic of China or India).

62. Projects might generate, but not directly influence, leakage emissions (e.g., by changing the occupation rate in other public transport vehicles, or through an indirect rebound as a result of additional traffic due to road congestion).
V. CONCLUSIONS AND DISCUSSION

63. Transport contributes to about 23% of global CO\textsubscript{2} emissions and is predicted to keep growing\textsuperscript{29}. Based on current trends, the world’s share of GHG emissions derived from transport could be as high as 50% by 2030. Yet, transport comprises only 0.3% of all registered CDM projects. The main reason for this is the complex and time-consuming procedures required for quantification of emission reductions and for fulfilling UNFCCC requirements. Nevertheless, there is a slow and increasing trend in the participation of transport projects, particularly those involving fleets of vehicles such as MRT, BRT, metro and monorail, where the large scale of the project makes it worthwhile for CDM participation.

64. The income generated from trading CERs can be quite attractive, based on the scale of the project, and can contribute to meeting maintenance costs. While carbon finance will not cover investment costs, it can introduce a significant inflow of money in the long run, making a project more sustainable, more financially attractive, and less prone to stalling due to funding deficits. Access to carbon finance requires time, up-front investment, and a long-term horizon. The risk of non-approval or lower-than-expected returns is omnipresent. However, some project developers cover these risks and realize projects based on a share of CERs, shouldering all up-front costs and fees, and thus effectively reducing owner-risk to zero. Technical and financial resources can also be sourced within ADB. Aside from the financial benefits, the involvement of a project in CDM helps to demonstrate clearly that the project has a low-carbon impact.

The Clean Development Mechanism
A Field Guide for Transport Projects

Through the Clean Development Mechanism, developing countries can sell certified emission reductions (CERs) or carbon credits to developed countries. A standard-sized project (reducing about 200,000 tCO2 per year) that does not need a new methodology will take about 1.5–2 years for registration and will require a budget of about $200,000. A new methodology can take more than 3 years and will need a budget of over $300,000. While the CER income will not cover investment costs, it can be quite attractive and can make a project more sustainable, financially attractive, and less prone to stalling.

About the Asian Development Bank

ADB’s vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region’s many successes, it remains home to two-thirds of the world’s poor: 1.7 billion people who live on less than $2 a day, with 828 million struggling on less than $1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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