Pilot Training on Climate Financing Tracking

Transport Sector

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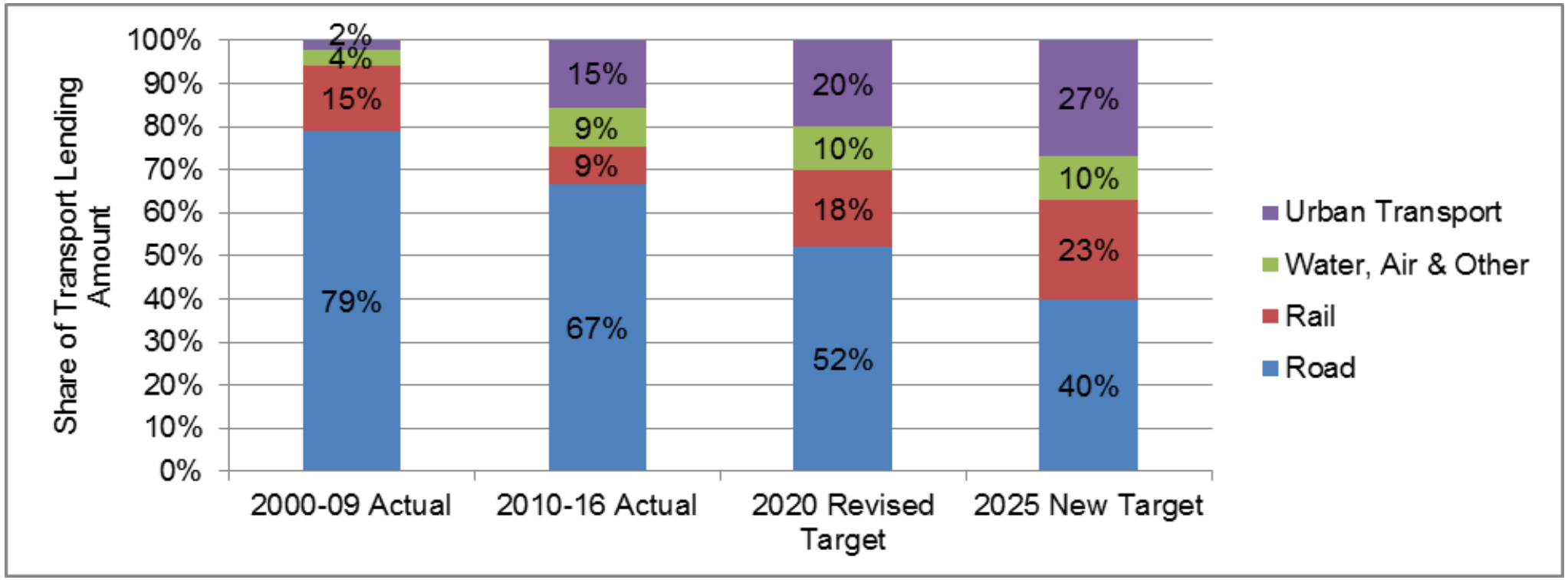
I. The sectoral needs in the region and ADB's strategy.

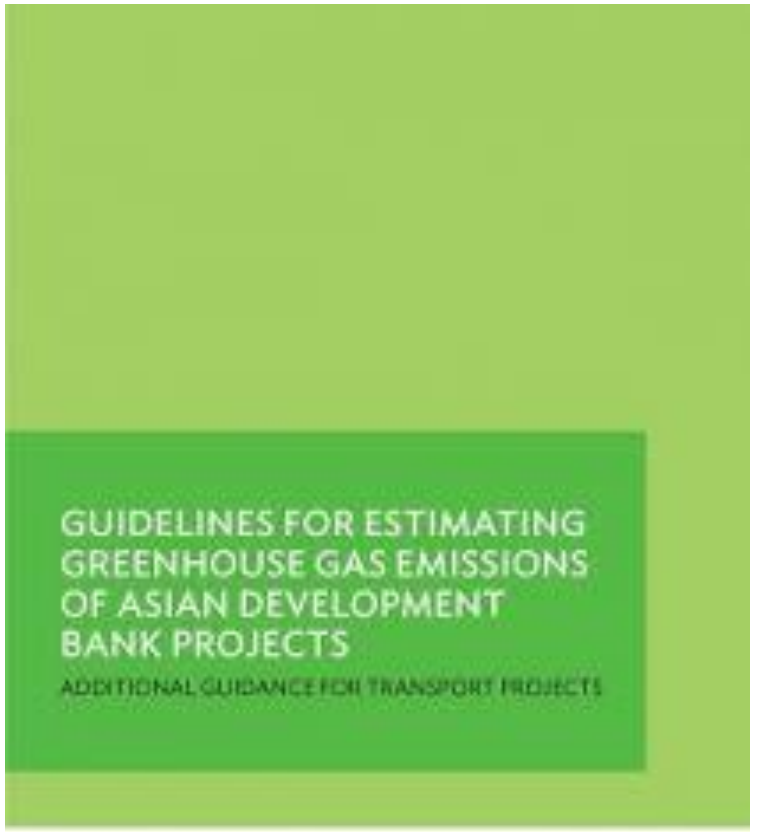
MTR recommendations

1. **STI-OP remains valid but needs some adjustment of resources in order to meet targets**
2. **Revise the STI-OP lending targets: they should be ambitious but achievable**



Note: Targets for 2025 to be taken into account when formulating next operational plan to align transport with Strategy 2030

References of the Training



II. MDB climate finance tracking approach

The Joint Report on Multilateral Development Banks' Climate Finance is an annual collaborative effort to make public MDB climate finance figures for developing and emerging economies, together with a clear explanation of the methodologies for tracking this finance.

Download this report at:
www.ebrd.com/2017-joint-report-on-mdbs-climate-finance

Download the infographic summary at:
www.ebrd.com/2017-joint-report-on-mdbs-climate-finance-infographic

JOINT MDB CLIMATE FINANCE 2017

In 2017, the MDBs committed **US$ 35,219 million** in climate finance in developing and emerging economies.

TOTAL MDB CLIMATE FINANCE BY ACTIVITY

ADAPTATION FINANCE US$ 7,352 million

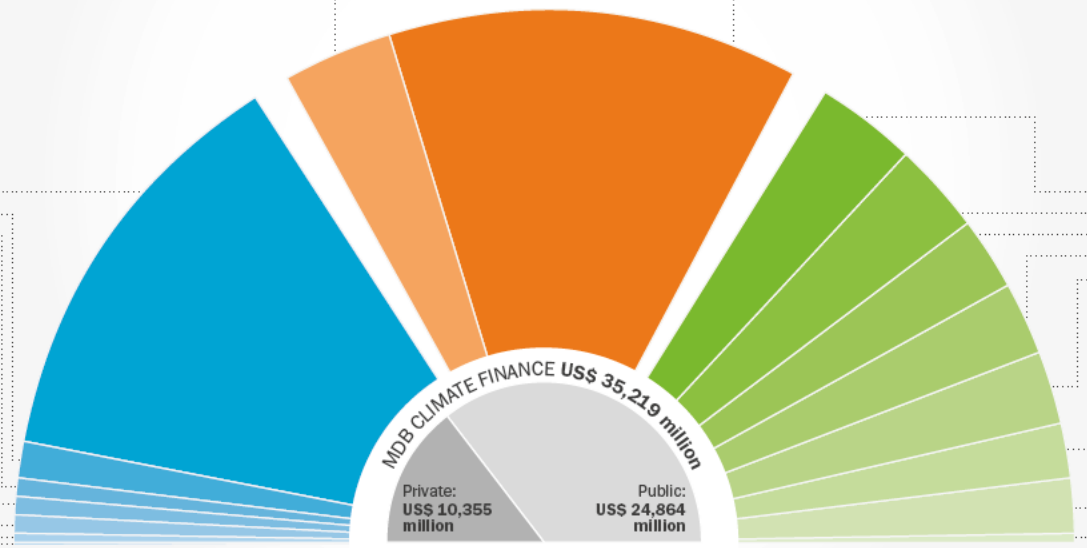
- 35% Water and wastewater systems **US$ 2,600 million**
- 26% Energy, transport and other built environment and infrastructure **US$ 1,938 million**
- 12% Other agricultural and ecological resources **US$ 871 million**
- 11% Crop and food production **US$ 798 million**
- 8% Institutional capacity support or technical assistance **US$ 598 million**
- 5% Cross-cutting sectors **US$ 357 million**
- 1% Coastal and riverine infrastructure **US$ 88 million**
- 1% Information and communications technology **US$ 53 million**
- 1% Financial services **US$ 43 million**
- 0.1% Industry, manufacturing and trade **US$ 6 million**

MITIGATION FINANCE US$ 27,868 million

- 33% Renewable energy **US$ 9,213 million**
- 29% Transport **US$ 8,114 million**
- 14% Energy efficiency **US$ 3,943 million**
- 9% Lower-carbon and efficient energy generation **US$ 2,644 million**
- 6% Agriculture, forestry and land-use **US$ 1,557 million**
- 4% Waste and wastewater **US$ 1,189 million**
- 3% Cross-cutting issues **US$ 893 million**
- 1% Low-carbon technologies **US$ 288 million**
- 0.1% Non-energy GHG reductions **US$ 15 million**
- 0.04% Miscellaneous **US$ 12 million**

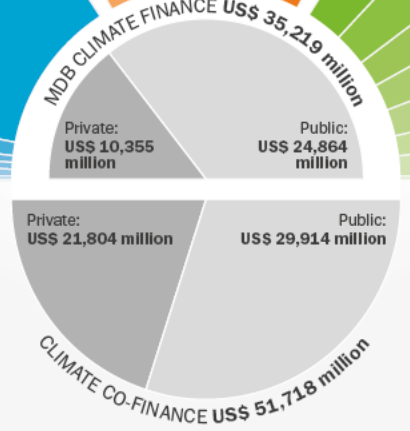
TOTAL MDB CLIMATE FINANCE BY INSTRUMENT

- 81% Investment loan **US$ 28,433 million**
- 6% Policy-based lending **US$ 2,014 million**
- 4% Guarantee **US$ 1,506 million**
- 4% Grant **US$ 1,425 million**
- 3% Line of credit **US$ 960 million**
- 2% Equity **US$ 590 million**
- 1% Other **US$ 291 million**



TOTAL MDB CLIMATE FINANCE BY REGION

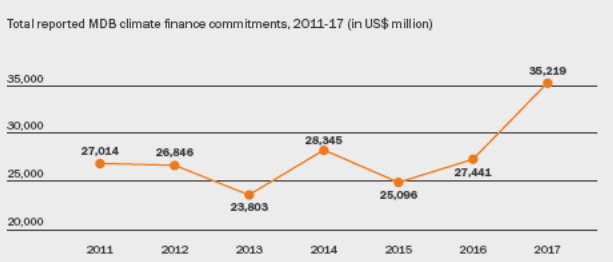
- 20% Latin America and the Caribbean **US$ 7,174 million**
- 16% Sub-Saharan Africa **US$ 5,712 million**
- 14% East Asia and the Pacific **US$ 5,101 million**
- 14% South Asia **US$ 4,848 million**
- 13% Non-EU Europe and Central Asia **US$ 4,748 million**
- 10% EU-12 **US$ 3,615 million**
- 10% Middle East and North Africa **US$ 3,521 million**
- 1.4% Multi-regional **US$ 500 million**



The segments above show total MDB climate finance for 2017 by instrument, by regional allocation and by type of climate change activity (adaptation and mitigation). Contributions from each MDB were as follows:

- **African Development Bank** US$ 2,347 million
- **Asian Development Bank** US$ 5,234 million
- **European Bank for Reconstruction and Development** US$ 4,601 million
- **European Investment Bank** US$ 5,477 million
- **Inter-American Development Bank Group** US$ 4,348 million
- **World Bank Group** US$ 13,213 million

IsDB climate finance commitments are not included in total reported MDB climate finance for 2017. IsDB climate finance was estimated to be US$ 644 million, of which US$ 339 million was for climate change mitigation and US$ 305 million for climate change adaptation.



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1

OVERVIEW OF MDB METHODOLOGIES FOR TRACKING CLIMATE FINANCE

- The tracking of MDB climate finance is based on the harmonized principles and jointly agreed methodologies detailed in Annexes B and C.

- The term "MDB climate finance" refers to the amounts committed by MDBs to finance climate change mitigation and adaptation activities in the development projects they undertake in developing economies and emerging economies in transition.

- See Annex G for details of the report's geographic coverage.

- MDB climate finance includes commitments from the MDBs' own accounts, and from external resources channelled through and managed by the banks.

- Climate co-finance includes the amount of financial resources contributed by external resources alongside MDB climate finance. These may include entities from both the private (commercial) and public (non-commercial) sectors.

OVERVIEW OF MDB METHODOLOGIES FOR TRACKING CLIMATE FINANCE

1.1. FINANCE FOR ADAPTATION TO CLIMATE CHANGE

- Aims to reduce the risks or vulnerabilities posed by climate change and to increase resilience.

- Identification of climate change adaptation finance is a result of a three-step process and thus, for a project to be counted either fully or partially towards MDB adaptation finance, it must:

  a. set out the project's context of vulnerability to climate change
  b. make an explicit statement of intent to address this vulnerability as part of the project, and
  c. articulate a clear and direct link between the vulnerability and the specific project activities.

- The MDB methodology for tracking climate change adaptation finance follows a context- and location specific, conservative and **granular approach.** It tracks MDB financing only for those components (and/or subcomponents) or elements or proportions of projects that directly contribute to or promote adaptation.

1.2. FINANCE FOR THE MITIGATION OF CLIMATE CHANGE

Climate change mitigation reduces, limits, or sequesters greenhouse gas (GHG) emissions to mitigate climate change. However, not all activities that reduce GHGs are eligible to be counted towards MDB mitigation finance, which is based on a list of activities that are compatible with low-emission pathways.

The joint methodology for tracking climate change mitigation finance recognizes the importance of long-term structural changes, such as the shift in energy production to renewable energy technologies, and the modal shift to low-carbon modes of transport.

The joint methodology for tracking climate mitigation finance is contained in Annex C of this report.

OVERVIEW OF MDB METHODOLOGIES FOR TRACKING CLIMATE FINANCE

Table 1. Comparison of methodologies for tracking adaptation and mitigation finance

	Climate change activity	
Item	**Adaptation**	**Mitigation**
General scope of qualifying activity	The activity is typically a component or element of a project, and in certain circumstances an entire project, contributing to resilience (including socio-economic resilience) or adaptation to climate change.	This is typically a project (or component thereof) that avoids, reduces or sequesters GHG emissions, or promotes efforts to achieve these goals.
Basis for tracking	The basis for tracking is incremental or component based; it only takes into account those activities that specifically address vulnerability to climate change. Eligible components are usually parts of a larger project, for example, water-saving equipment that is part of a larger capital expenditure (CAPEX) investment in an area vulnerable to increased risk of drought.	The basis for tracking is project- or component-based. *Project-based:* The whole project is considered to be a mitigation activity, for example, a typical renewable energy project or a project dedicated to improving the energy efficiency of an existing facility. *Component-based:* Mitigation activity in a project, such as energy efficiency equipment that is part of a larger CAPEX investment.
Granular approach to finance tracking	The adaptation finance methodology is intended to capture only the value of those activities within the project that are aimed at addressing specific climate vulnerabilities. It is not intended to capture the value of the entire project that is made more climate resilient as a consequence of specific adaptation activities within the project.	A granular approach is used. Climate finance is intended to capture only the value of the project or its components that avoid, reduce, limit, sequester or promote the avoidance, reduction, limitation or sequestration of GHG emissions.
Scale of impact	Project or climate risk specific to local, regional, national or global levels	Global
Single indicator to quantify and compare the physical outcomes of projects	Single indicators are not used for tracking adaptation finance. Different indicators are needed; the intended physical outcomes depend on the nature of the project.	Single indicators are used for tracking mitigation finance. Ultimately, all mitigation projects can be compared on the basis of their GHG impact, either direct or indirect (for example, systems for monitoring GHG that lead to better usage of energy systems).
Qualification for climate finance	Qualification is based on a three-step assessment process, taking into account the climate change vulnerability context and the specific project intent to reduce climate vulnerabilities.	Based on a "positive list" of activities that qualify for mitigation finance and a set of specific qualification and exclusion criteria.
Climate finance tracking	Following the three-step assessment process, finance for those project components that are clearly linked to the climate vulnerability context and contribute to climate change resilience.	Following the positive-list approach, finance for qualifying projects or project components is tracked.

ANNEX B: JOINT METHODOLOGY FOR TRACKING CLIMATE CHANGE ADAPTATION FINANCE

The MDB methodology for tracking adaptation finance consists of the following key steps:

- setting out the climate-change vulnerability context of the project
- making an explicit statement of a project's intent to reduce climate vulnerability
- articulating a clear and direct link between specific project activities and the project's objective of reducing vulnerability to climate change.

The identification and estimation of adaptation finance is limited solely to those project activities (that is, projects, project components, or elements or proportions of projects) that are clearly linked to the context of climate vulnerability.

Table A.B.1. Case studies in tracking adaptation finance

Sector	Energy, transport and other built environment and infrastructure
Project activities linked to reducing climate vulnerability	The activities include structural measures – such as increased drainage capacities, reinforced road embankments and altered bridge designs – to avoid worsening erosion and increased frequency and severity of landslides. Non structural measures such as the adoption of a climate-change adaptation strategy will underpin ongoing maintenance activities and systematic integration of climate resilience measures across the road network.
Climate vulnerability context	The country is projected to experience temperature rises and greater variability in precipitation levels, including an increased frequency of heavy precipitation events. More variable precipitation may alter river hydrology and result in more frequent extreme weather events such as flash floods, increasing the risk of erosion and landslides.
Statement of purpose or intent to reduce climate vulnerability	The project aims to increase the climate resilience of the road network by incorporating climate change adaptation measures into the road rehabilitation and upgrade.
Project activities linked to reducing climate vulnerability	The activities include structural measures – such as increased drainage capacities, reinforced road embankments and altered bridge designs – to avoid worsening erosion and increased frequency and severity of landslides. Non-structural measures such as the adoption of a climate-change adaptation strategy will underpin ongoing maintenance activities and systematic integration of climate resilience measures across the road network.
Type of financial instrument	Any
Estimation of adaptation finance	The total MDB finance for this project is €40 million, split into three investment tranches over the period 2017-19. Of the first €10 million tranche, 66 per cent qualifies as adaptation finance, because these measures include the rehabilitation and strengthening of highly climate-vulnerable road sections (including upward and downward slopes and drainage) and supporting walls, as well as the rehabilitation and strengthening of vulnerable bridges by improving protection against scouring, for example. The second and third investment tranches will be provided in 2018 and 2019, respectively. Adaptation finance will be assessed and attributed as each tranche is provided.

ANNEX C: JOINT METHODOLOGY FOR TRACKINGCLIMATE CHANGE MITIGATION FINANCE

The 2017 tracking of mitigation finance is based on the Common Principles for Climate Change Mitigation Finance Tracking, referred to in this report as the Common Principles. The Common Principles were developed by the joint climate finance group of MDBs and by the IDFC (International Development Finance Club), based on their experience of the topic and with the intention of sharing them with other institutions that are seeking **common approaches** to tracking and reporting.

1. Additionality: Like the Common Principles, this approach is activity-based. It focuses on the type of activity to be executed, and not on its purpose, the origin of the financial resources or the results.

2. Timeline: Project reporting is ex-ante project implementation at Board approval or at the time of financial commitment.

3. Conservativeness: Where data is unavailable, any uncertainty must be overcome taking a conservative approach, where under-reported rather than over-reported climate finance is preferable.

4. Granularity: The tracking only covers mitigation activities that are to be disaggregated from non-mitigation activities as far as reasonably possible. If such disaggregation is needed and not possible using project-specific data, a more qualitative or experience-based assessment can be used to identify the proportion of the project that covers climate mitigation activities, consistent with the principle of conservativeness. This applies to all categories, but is of particular significance for energy efficiency projects.

ANNEX C: JOINT METHODOLOGY FOR TRACKINGCLIMATE CHANGE MITIGATION FINANCE

7. Eligibility: Climate mitigation promotes efforts to reduce, limit or sequester GHG emissions to reduce the risk of climate change. Mitigation finance is based on a list of activities that are compatible with **low-emission pathways.** As a consequence, not all activities that reduce GHGs in the short term are eligible to be counted towards MDB mitigation finance.

8. Exclusions: The methodology assumes that care will be taken to identify projects that are included in the typology list but do not mitigate emissions due to their specific circumstances (for example, hydropower plants with high methane emissions from reservoirs exceeding GHG reductions associated with the plant's use of renewable energy; geothermal power plants with high CO2 content in the geothermal fluid that cannot be reinjected; or biofuel projects with net high emissions taking into account production, processing and transportation).

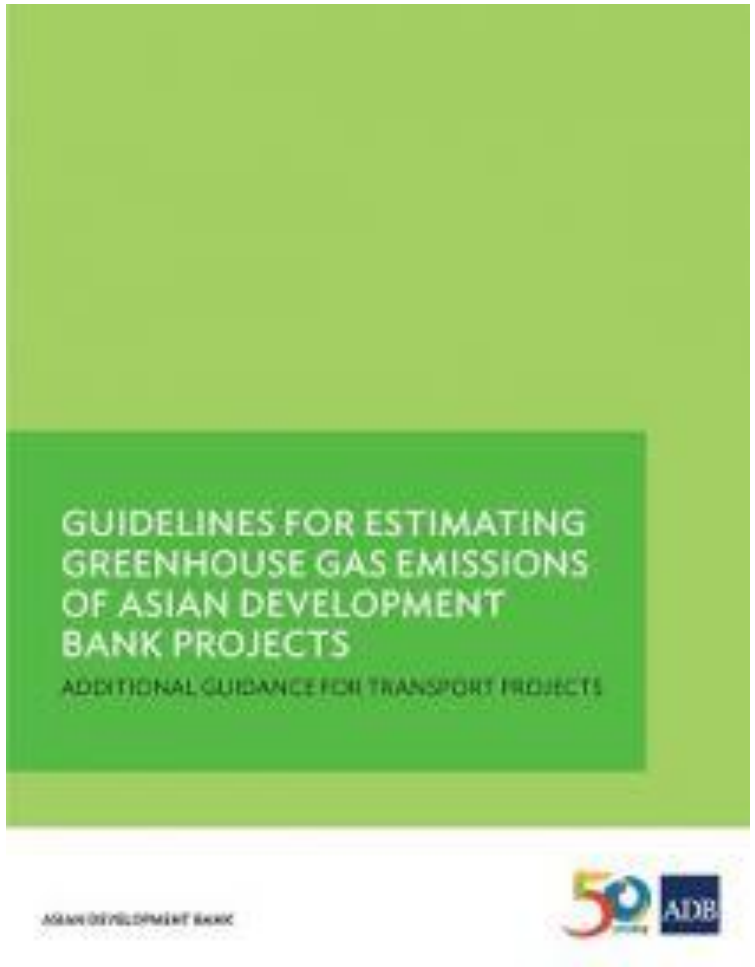
9. Avoiding double-counting: Where the same project, sub-project or project element contributes to mitigation and adaptation, an MDB's individual processes will determine what proportion is counted as mitigation or as adaptation, so that the actual financing will not be recorded more than once. Some MDBs are reporting projects where the same components or elements contribute to both mitigation and adaptation as a separate category. The MDBs are working on the best reporting method for projects where the same components or elements contribute to both mitigation and adaptation.

Table A.C.1. List of activities eligible for classification as climate mitigation finance

7. Transport[21]	7.1. Urban transport modal change	Urban mass transit
		Non-motorised transport (bicycles and pedestrian mobility)
	7.2. Transport-oriented urban development	Integration of transport and urban development planning (dense development, multiple land-use, walking communities, transit connectivity, and so on), leading to a reduction in the use of passenger cars
		Transport and travel demand-management measures dedicated to reducing pollutant emissions, including GHG emissions (such as high-occupancy vehicle lanes, congestion charging or road pricing, parking management, restriction or auctioning of licence plates, car-free city areas, low-emission zones)[22]
	7.3. Inter-urban transport	Railway transport ensuring a modal shift of freight and/or passenger transport from road or air to rail (improvement of existing lines or construction of new lines)
		Waterway transport ensuring a modal shift of freight and/or passenger transport from road or air to waterways (improvement of existing infrastructure or construction of new infrastructure)
		Bus passenger public transport ensuring a modal shift from a higher-carbon mode of transport
	7.4. Infrastructure for low-carbon and efficient transport	Charging stations and other infrastructure for electric vehicles, hydrogen or dedicated biofuel fuelling
		Digital solutions and programmes dedicated to reducing GHG emissions[23]

GUIDELINES FOR ESTIMATING GREENHOUSE GAS EMISSIONS OF ASIAN DEVELOPMENT BANK PROJECTS

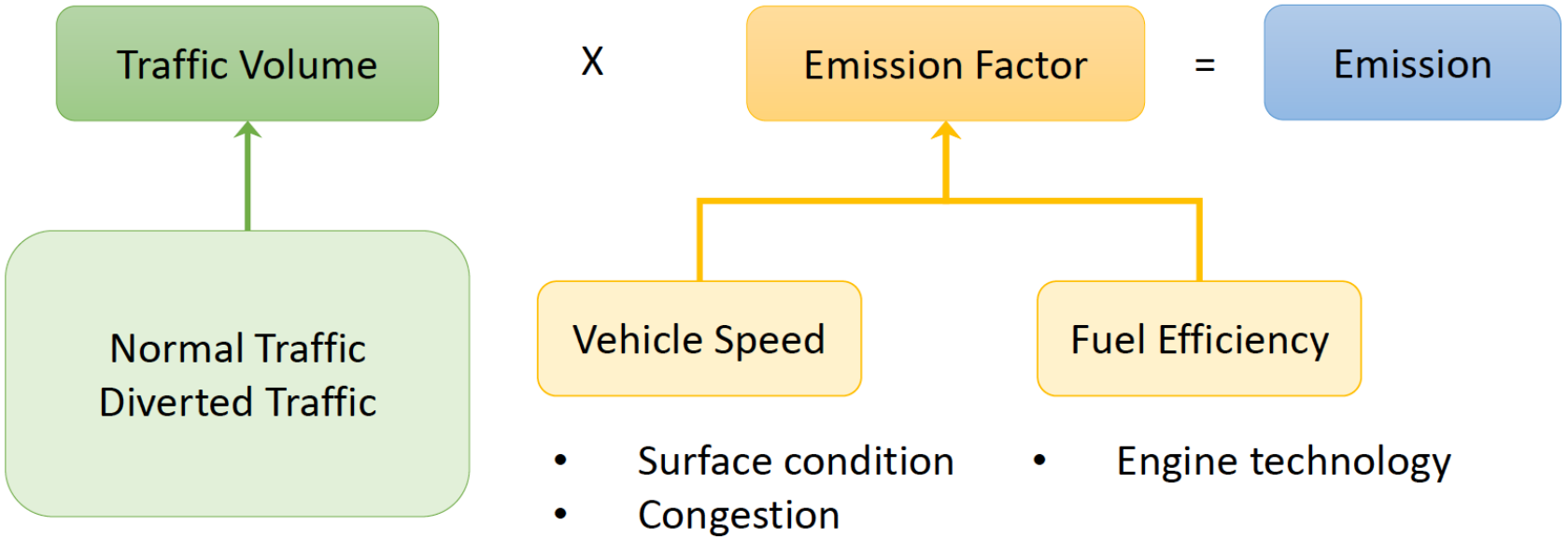
ADDITIONAL GUIDANCE FOR TRANSPORT PROJECTS 2016



Contents

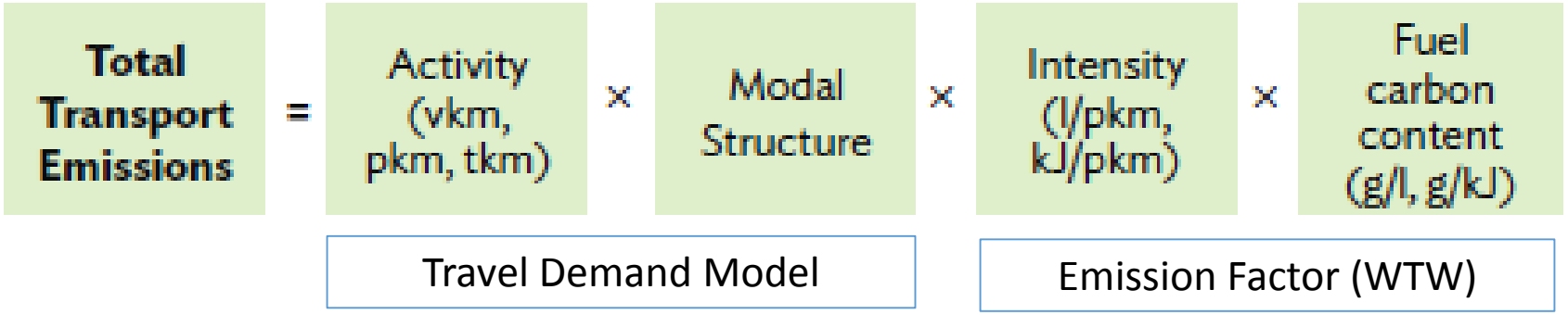
GHG ACCOUNTING: CALCULATION

- Gross Emission = Emission **with**-project
- Net Emission = Emission **with**-project - Emission **without**-project



Basic Construct of Transport Emissions

Transport GHG emissions are calculated as a product of level of activity, modal structure, intensity of fuel use, and fuel carbon content (ASIF):



whereby

(i) Activity reflects travel demand. This is usually expressed in trips and is driven by external factors, including geographical characteristics, land-use patterns, and economic growth. This can be estimated as vehicle-kilometer (vkm) for road users, train-kilometer (train-km) for rail users, and ton-kilometer (tkm) for freight carried by a mode of transport. Passenger-kilometer (pkm) is also commonly used and can be converted to vkm using known vehicle occupancy rates.

(ii) Structure reflects mode share. This is the proportion of trips on the different transport modes, including road users, rail users, and bus passengers.

(iii) Intensity is the fuel efficiency of the considered mode, as measured in liters per passenger-kilometer, or kilojoules per passenger kilometer. Intensity depends notably on load factors.

(iv) Fuel carbon content is the GHG emissions per unit of fuel used or electricity consumed, usually expressed in grams per liter (g/l) or grams per kilojoule (g/kJ). This is also determined by vehicle composition and fuel efficiency

C. Forecasting Activity (Travel Demand) and Modal Structure

The same information on transport activity and modal structure used in the traffic forecast for economic analysis should be used for estimating GHG emissions.

D. Estimating Intensity and Fuel Carbon Content

These should be matched to the relevant local context of the project and may take into account

(i) vehicle characteristics,
(ii) speed (potentially affected by congestion and safety considerations),
(iii) vehicle loading,
(iv) driving cycles, and
(v) driver behavior.

Priority should be given to using project-specific data on intensity and fuel carbon content where possible. If these are not available, project teams should rely on authoritative sources, for example, the Intergovernmental Panel on Climate Change (IPCC).

A. Road Transport (Nonurban)

a. Road Transport: Available Tools

- **Highway Development and Maintenance Management Model (HDM-4):** HDM-4 is a software package and associated documentation which is an industry-standard tool for the analysis, planning, management, and appraisal of road maintenance, improvements, and investment decisions in developing countries. ADB, among other partners, was one of the contributors to the development of HDM-4. Licenses are available to ADB teams through the Transport Sector Group (TSG) Secretariat. Available at http://www.hdmglobal.com/
- **Motor Vehicle Emission Simulator (MOVES):** The United States Environmental Protection Agency (US EPA) has developed the MOVES. This emission modeling system estimates emissions for mobile sources covering a broad range of pollutants and allows multiple scale analysis. Available at http://www.epa.gov/oms/climate/measuring.htm
- **Transport Emissions Evaluation Model for Projects (TEEMP):** The TEEMP Road Model allows the evaluation of emissions (carbon dioxide [CO_2], particulate matter [PM], and oxides of nitrogen [NOx]) impacts of three types of roads—expressways, rural roads, and urban roads. Available at http://cleanairasia.org/portal/TEEMPTool (consult the TSG Secretariat for the most recent version)

b. Road Transport: Additional References

- **Methodology for Estimating Carbon Footprint of Road Projects: India Case Study:** This is a pilot study to derive a carbon footprint methodology for road projects in India. Available at https://www.adb.org/publications/methodology-estimating-carbon-footprint-road-projects-case-study-india
- **Estimation of Greenhouse Gas Emissions from Land-Use Changes due to Road Construction in the Republic of Korea:** This 2013 study quantified GHG emissions and sequestration from land-use changes due to road construction. Following the guidelines of IPCC, this study developed a framework to estimate GHG emissions for land-use changes. Eighteen cases involving a typical highway construction project in the Republic of Korea were selected for this study. Available at http://ascelibrary.org/doi/abs/10.1061/(ASCE)CO.1943-7862.0000620
- **Greenhouse Gas Emissions Mitigation in Road Construction and Rehabilitation:** This is a study carried out by the World Bank to look at different construction and labor practices and their respective GHG emissions. Available at http://siteresources.worldbank.org/INTEAPASTAE/Resources/GHG-ExecSummary.pdf

B. Rail Transport (Nonurban)

a. Rail Transport: Available Tools

- **Railway Handbook:** The International Union of Railways (UIC), in partnership with the International Energy Agency, publishes handbooks containing information on rail energy use and emissions statistics that can be used as references when estimating railway CO_2 emissions. Available at http://www.uic.org/IMG/pdf/iea-uic_railway_handbook_2016.pdf
- **Emission Factors for Locomotives:** The US EPA has established emission standards for NOx, hydrocarbons (HC), carbon monoxide (CO), PM, and smoke for newly manufactured and remanufactured locomotives. Available at https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-emissions-locomotives
- **Rail Carrier Partner 2.0.15 Tool:** This is US EPA's SmartWay 2.0.15 Rail Tool with technical documentation of methods to calculate emissions, fuel consumption, and comparison metrics based on data provided by railway companies to the Department of Transportation's Federal Railroad Administration. Available at https://www.epa.gov/smartway/smartway-rail-carrier-tools-and-resources

b. Rail Transport: Additional Reference

Recommended Practice for Quantifying Greenhouse Gas Emissions from Transit: This provides guidance to transit agencies for quantifying their GHG emissions, including both emissions generated by transit and the potential reduction of emissions through efficiency and displacement. Available at http://www.apta.com/resources/hottopics/sustainability/Documents/Quantifying-Greenhouse-Gas-Emissions-APTA-Recommended-Practices.pdf

C. Urban Transport (Urban Roads and Traffic Management, Urban Public Transport)

Urban Transport: Available Tools

- **Propriety macrosimulator tools and software:** These are available from several vendors, for example, EMME2, PTV Visum, CUBE, and TransCAD. These models are often used by transport agencies and financiers to conduct appraisal of urban transport projects. They often include a module that allows for the estimation of GHG emissions or fuel consumption. Available at:
  - » http://vision-traffic.ptvgroup.com/en-us/products/ptv-visum/
  - » http://www.caliper.com/tcovu.htm
  - » http://www.inrosoftware.com/en/products/emme/new-in-emme-4-2/
- **Clean Development Mechanism (CDM) AM0031: Bus rapid transit projects – version 5.0.0:** This is the registered methodology for BRT projects which are eligible for crediting under the CDM. The methodology is applicable to project activities that reduce emissions through the construction and operation of a new BRT system or lane(s) for urban road-based transport. It is also applicable to the construction and operation of the extension of bus lanes of existing BRT systems. The methodology requires that passengers be able to realize their entire trip on the project system and is best used for BRT systems with feeder-trunk routes. It is very data intensive due to the requirement for verification of progress during the lifetime of the project. Up-front costs for data collection are high so it is not suitable for smaller-scale BRT projects. Available at https://cdm.unfccc.int/methodologies/DB/GBFY1EP0Q2XUZQY9HJLL5BP9DOM0QW
- **CDM ACM0016: Mass rapid transit projects – version 3.0.0:** This is the registered consolidated methodology for mass rapid transit (MRT) projects which are eligible for crediting under the CDM. It covers rail-based systems such as subways and metros, light rail transit (LRT) systems including trams, or suburban heavy duty rail systems or road-based bus systems. For the purpose of this methodology, road-based MRT systems are bus systems using bus lanes, which can also be called BRT systems. It is very data intensive due to the requirement for verification of progress during the lifetime of the project. Up-front costs for data collection are high so it is not suitable for small-scale projects. Available at https://cdm.unfccc.int/methodologies/DB/8PBZENI1PK0QIJW8RJ5LEDXV6WX60O
- **CDM Tool 18: Baseline emissions for modal shift measures in urban passenger transport – version 1.0:** This tool provides methodological guidance to estimate baseline emissions for transport projects implementing modal shift measures in urban passenger transport. It is applicable to project activities in urban passenger transport that implement a measure or a group of measures aimed at a modal shift to urban public transit such as metro, BRT, light rail, and trams. Available at https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-18-v1.pdf
- **CDM Tool 17: Baseline emissions for modal shift measures in inter-urban cargo transport – version 1.0:** This tool provides methodological guidance to determine baseline emissions for transport projects implementing modal shift measures in interurban cargo transport. It is applicable to project activities in interurban cargo transport that implement a measure or a group of measures aimed at a modal shift from road to waterborne (using barges or domestic ships) or rail transport. Available at https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-17-v1.pdf
- **TEEMP BRT Model:** This model can be used in estimating the emissions impact of a BRT project. It takes into account the emissions generated through the operations of BRT buses, as well as the emissions associated with the construction of the BRT facilities. The tool utilizes a hypothetical business-as-usual scenario which the user can define. Business-as-usual emissions are estimated based on the vehicles that would have been used by the BRT riders in the absence of the project. Available at http://cleanairasia.org/portal/TEEMPTool (consult the TSG Secretariat for the most recent version).
- **TEEMP MRT Model:** This model is similar in approach to the aforementioned TEEMP BRT model. It enables users to consider the energy characteristics of electricity generation used to power electrified trains. Available at http://cleanairasia.org/portal/TEEMPTool (consult the TSG Secretariat for the most recent version)

D. Water Transport (Ports and Inland Waterways)

a. Water Transport: Available Tool

Carbon Footprinting for Ports: This guidance document prepared by the Carbon Footprint Working Group of the World Ports Climate Initiative serves as a resource guide for ports wanting to develop or improve their GHG emission inventories. Available at http://wpci.iaphworldports.org/data/docs/carbon-footprinting/PV_DRAFT_WPCI_Carbon_Footprinting_Guidance_Doc-June-30-2010_scg.pdf

b. Water Transport: Additional References

- **Third International Maritime Organization GHG Study 2014:** This study provides updated GHG emission estimates for ships. Available at http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Greenhouse-Gas-Studies-2014.aspx
- **Shipping Emissions in Ports:** This International Transport Forum paper provides useful data on shipping emissions in ports across the world. Available at http://www.internationaltransportforum.org/jtrc/DiscussionPapers/DP201420.pdf
- **Inland Waterway Transport Toolkit (draft):** This paper provides basic information to assist the formulation of inland waterway projects. Available from the Transport Sector Group Secretariat.
- **Contribution to Impact Assessment of Measures for Reducing Emissions of Inland Navigation:** This research project by the European Commission outlines key issues affecting emissions from inland waterway transport and measures to reduce them. Available at http://ec.europa.eu/transport/modes/inland/studies/doc/2013-06-03-contribution-to-impact-assessment-of-measures-for-reducing-emissions-of-inland-navigation.pdf
- **Emissions by the Transport Sector – Rail and Inland Waterways:** This is the ongoing research by Eurostat on identifying and evaluating suitable data and methods for assessing the impact of railway and inland waterways transport on GHG emissions. Available at http://emisia.com/content/emissions-transport-sector-%E2%80%93-rail-and-inland-waterways

E. Air Transport (Airports)

a. Air Transport: Available Tools

- **International Civil Aviation Organization (ICAO) Carbon Emissions Calculator:** The ICAO has developed a methodology to calculate the CO_2 emissions from air travel which applies the best publicly available industry data to account for various factors such as aircraft types, route specific data, passenger load factors, and cargo carried. Available at http://www.icao.int/environmental-protection/Pages/Tools.aspx
- **Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories:** This report for the United States Federal Aviation Administration provides detailed methodologies for accounting for airport emissions. Available at http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_011.pdf

b. Air Transport: Additional Reference

Airport Carbon Accreditation: This is an institutionally endorsed carbon management certification standard used by major airports across the world. Available at http://www.airportcarbonaccreditation.org/

F. Multimodal Projects and/or Transport Policy

a. Multimodal Projects/Transport Policy: Available Tool

For Future Inland Transport Systems (ForFITS) Model: This is primarily focused on CO_2 emissions from inland transport, including road, rail, and inland waterways, and predicts future emissions based on current patterns. CO_2 emissions from aviation and maritime transport are also covered by ForFITS, but in a simplified manner in comparison to the other transport modes. The model is suitable for the analysis of transport systems having a regional, national, and/or local dimension, with a primary focus on national systems. Available at http://www.unece.org/?id=19273

b. Multimodal Projects/Transport Policy: Additional References

- **Strategies to Reduce GHG Emissions from Road Transport: Analytical Methods** This publication aims to (i) clarify what steps are being taken by road transport in the way of policies or measures to reduce or stabilize transport GHG emissions, (ii) scope out existing evaluation frameworks, and (iii) consider future trends in GHG emissions from transport. Available at http://www.itf-oecd.org/sites/default/files/docs/02greenhousee.pdf
- **Assessment of GHG Analysis Techniques for Transportation Projects:** This study for the American Association of State Highway and Transportation Officials (AASHTO) provides (in the US context) a useful analysis of methodologies available at the state and/or national level for the conduct of GHG estimation. Available at http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/25-25(17)_FR.pdf

Recommendations:

1. Anticipate carbon tracking if any of the project components fall in the the eligibility classification of the MDB Report 2017:
   -> Prepare the TRTA (PPTA) accordingly : Demand forecast, EIA, or CC
   -> Prepare short note on CC in addition to project description, economic analysis, EIA.

2. Use of TOOLS
   Setting up a **demand forecast model** is recommended for economic analysis, option analysis and carbon tracking. Utilize the model exist.

3. Identify components which has clear impact on CC mitigation :
   isolate the component for carbon calculation

4. Search for emission factors : UNFCCC, NAMA study, Country database, reports, and etc.

Three questions from upper floors:

1. Shandong Trolleybus Demonstration Project (EATC) : Verification of CO2 reduction
2. Peshawar BRT (CWUW) : Bus fleet choice change from CNG to Diesel
3. Indian Railway Electrification (PSOD) : Impact on CO2 reduction

Thanks You

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