

**ASIAN DEVELOPMENT BANK**

**TAR: OTH 34109**

**TECHNICAL ASSISTANCE**  
(Financed from the Japan Special Fund)

**FOR**

**ACTION PLANS FOR REDUCING VEHICLE EMISSIONS**

**September 2000**

## **ABBREVIATIONS**

ADB	–	Asian Development Bank
DMC	–	developing member country
TA	–	technical assistance

## **NOTE**

In this report, "\$" refers to US dollars.

## **I. INTRODUCTION**

1. Growing populations and rising incomes are placing greater strains on natural resources, including water, land, and air. Significant changes in the use of these natural resources are sometimes associated with a deterioration in their quality. The Asian Development Bank (ADB) has responded to the phenomenon of environmental stress by helping countries establish environmental policies and actions to preserve the quality of life. There have been a number of projects for improving air quality in particular. Until now, stationary sources of emissions posed the major threat to air quality. However, mobile sources of emissions from vehicles are a growing, and in some places the predominant, threat to air quality.

2. Economic growth has brought an increase in private vehicles, public transport facilities, and the movement of goods. Several countries have started to tackle the problem of vehicle emissions, but without limiting economic growth. This regional technical assistance (TA) is designed to promote sustainable growth and improve the quality of life by helping selected developing member countries (DMCs) of ADB to develop action plans for controlling and reducing vehicle emissions. A TA framework is given at Appendix 1.<sup>1</sup>

## **II. BACKGROUND AND RATIONALE**

3. Air quality has become a major focus of world attention in the last decade. Changes in quality are not uniform. They occur in some places, and at some times, to a greater extent than others. To some extent, a decline in air quality can be compensated by natural forces that disperse detrimental effects and renew the resource by natural means. However, the concentration of effects threatening air quality has reached a degree that also threatens the quality of life. The focus of projects relating to air quality has been on reducing and dispersing emissions from stationary sources, the most important being large manufacturing plants, electricity generation, and home heating. Increasingly, however, attention has shifted to reducing and dispersing emissions from motor vehicles. Vehicles have varied ownership and varied uses. A reduction in emissions from vehicles presents a new challenge for environmental management.

4. The increase in vehicle emissions is an unavoidable side effect of the increased mobility of people and greater accessibility of goods and services. The number of motor vehicles in the world has grown 15 times in the last 50 years. Including trucks, buses, passenger cars, motorcycles, and motorized three-wheeled vehicles, there are now about 700 million vehicles in the world. These vehicles emit large quantities of carbon monoxide, hydrocarbons, nitrogen oxides, and other toxic substances such as fine particles and lead. The growth in the number of vehicles has been matched by the growth in the number of vehicle-kilometers (km) driven. The increasing diversity of goods, services, and markets has led to a greater use of road transport. Improvements to road networks can lead to a reduction in travel times and cost, but an increase in the vehicle-km driven.

5. Vehicle emissions tend to be geographically concentrated. Many cities in the Asian and Pacific region suffer from poor air quality, and emissions from vehicles contribute significantly to the air pollution. Vehicle emissions are at street level, where people live and work, and are difficult to disperse. The quantity of vehicle emissions increases and the quality of air deteriorates with a rise in the number of motorized two- and three-wheeled vehicles, common in

---

<sup>1</sup> The TA first appeared in *ADB Business Opportunities* (Internet version) on 12 May 2000.

much of the region. The primary effect is on people's health. Vehicle emissions contribute to respiratory problems, the aggravation of asthma, neurodevelopmental problems (especially from lead), and carcinogenesis. In particular, the fine particles associated with vehicle emissions penetrate deep into lung tissue causing respiratory problems and cardiovascular complications. Many emitted substances also harm plants, soil, and water. Carbon emissions from the transport sector pose an increasing threat of climatic change.<sup>2</sup>

6. Poor people in particular suffer. Many live and work close to traffic, including vulnerable groups such as the young and the old who have limited mobility. Vehicle emissions affect the proprietors and goods of small enterprises located by the road side for business reasons. The value of property is diminished in highly polluted areas, and the cheaper accommodation attracts the poor. Poor people in general have lower levels of health and nutrition, so they suffer more from pollution.

7. Twenty percent of all vehicles, about 140 million, are in the Asian and Pacific region. There are about 120 vehicles for every 1,000 people in the world, but only 19 per 1,000 in the region, excluding Japan. However, the number of vehicles is increasing rapidly. Several countries in Asia produce vehicles, and the number of vehicles is growing by between 10 and 15 percent per year. Moreover, the growth rate of motorization, the number of vehicles and vehicle-km per head of population, in Asia is increasing. The accelerating expansion of vehicle numbers and vehicle-km driven will affect air quality everywhere, especially in urban areas. The high proportion of motorized two- and three-wheeled vehicles with two-stroke engines makes matters worse.

8. Several factors affect the level of emissions from vehicles apart from the extent to which they are used. These include the type and quality of fuels that are used, emission control technologies installed during production, vehicle maintenance practices, and the age and rate of turnover of the vehicle fleet. In several countries of the region steps have been taken to reduce the level of vehicle emissions. Generally, these actions have focused on incorporating emission control standards and technologies at the production stage, changing the type and quality of fuels, and improving maintenance regimes. Vehicle inspection programs can improve maintenance levels for vehicles and bring about a higher turnover of vehicles. Less attention has been paid to local area transport planning, including promotion of the use of demand management techniques such as taxation or road pricing, traffic management, and the use of public transport and nonmotorized modes of transport, as a means of reducing vehicle use.

9. There are inherent difficulties in designing policies that allow increases in welfare through greater mobility and access to goods and services while reducing the level of vehicle emissions. Several stakeholders are involved. Although governments are responsible for the legal and regulatory framework, achievements depend upon changes in the behavior of individuals and firms. The private sector will need to invest in changing the supply mix of fuels and adapting to new vehicle production standards. Transport companies may be resistant to mandated changes in fuel prices, vehicle standards, and restrictions on vehicle use. Individual vehicle owners may be reluctant to change their travel habits. Nongovernment organizations have become involved in highlighting the detrimental effects of vehicle emissions, and pleading the case for specific and sometimes competing groups.

---

<sup>2</sup> The Global Environment Facility, which has just established a new Operational Program for the Transport Sector, estimates that transport contributes 15 percent of all carbon emissions at present, but 50 percent of the increases forecast in carbon emissions in the next ten years.

10. Influencing the level of emissions from mobile sources is a complex task. National policies need to be combined with local actions. Several countries in the region are importers rather than producers of fuels and vehicles, including second-hand vehicles. Effective reductions in vehicle emissions require the harmonization of standard and enforcement regimes on a regional basis, in support of national policies. As mobility increases, the consequences of inaction will become more severe. Sharing information on technologies, planning approaches, policies, and implementation experience can help to build a consensus in favor of change.

11. Accessibility to goods, services, and jobs, and the mobility this requires, are key components in the reduction of poverty. At the same time, clean environment is an essential component of a high quality of life. Strategies for poverty reduction, ADB's overarching objective, need to be accompanied by policies and actions that enhance the quality of the environment.<sup>3</sup> Actions to deal with vehicle emissions, including enhancement of fuel quality, distribution of alternative fuels, assistance with vehicle inspection systems, and road infrastructure investments, have been included as components of selected loan and TAs, under ADB financing at the municipal and national levels. However, these actions have not always achieved their objectives. The Air Quality Management Project for the Metro Manila area in the Philippines has attempted to reduce vehicle emissions in a comprehensive manner and on a large scale.<sup>4</sup> A recently approved TA for Bangladesh will prepare a pollution control action plan focused on vehicle emissions for major cities, principally Dhaka.<sup>5</sup>

12. Other agencies are providing assistance to countries in the region. This includes the transport working group of the Asia Pacific Economic Cooperation organization, seeking harmonization of standards among five countries of the region; initiatives by the World Bank in Dhaka, Bangladesh, in conjunction with ADB, and Bangkok, Thailand, and elsewhere; assistance with fuel and vehicle technologies and air quality monitoring for selected countries provided by the United States Environment Protection Agency; and specific interventions in air quality monitoring and policy and in air quality components of transport projects by bilateral agencies from Austria, Denmark, Germany, Sweden, Switzerland, and the United Kingdom. However, currently there are very few large-scale projects dealing with vehicle emissions reductions in a comprehensive manner. The action plans to be developed under the proposed regional TA will provide a focal point for coordination of these various interventions.

### III. THE TECHNICAL ASSISTANCE

#### A. Objectives

13. The goal of the TA is to help DMCs promote sustainable growth and people's health and well-being by controlling and reducing vehicle emissions. Several countries in the Asian and Pacific region and elsewhere have adopted policies and taken steps to try and reduce vehicle emissions. There are different forms of vehicle emissions and different means of reducing them. Generally, different actions are required that are best undertaken together, but may be undertaken separately to address particular issues. The objectives of this regional TA are to (i) collate and disseminate information on policies and actions that can be undertaken to reduce vehicle emissions; (ii) share experiences between countries in the region especially relating to

<sup>3</sup> Fighting Poverty in Asia and the Pacific: The Poverty Reduction Strategy of the Asian Development Bank, November 1999.

<sup>4</sup> Loans 1663-PHI, 1664-PHI, and 1665-PHI: *Metro Manila Air Quality Improvement Sector Development Program*, for \$296 million, approved on 16 December 1998.

<sup>5</sup> TA 3297-BAN: *Urban Transport and Environmental Improvement*, for \$645,000, approved on 16 November 1999.

the difficulties of implementing such policies and actions, and how they can be overcome; (iii) assist selected countries to develop action plans for reducing vehicle emissions; and (iv) identify opportunities for public and private sector investments and actions for implementing such action plans.

## **B. Scope**

14. The scope will include (i) preparation of background papers on measures to reduce vehicle emissions; (ii) organization of three regional workshops on (a) fuel quality and alternative fuels; (b) vehicle standards, and inspection and maintenance regimes; and (c) traffic management and urban transport planning; (iii) collation and presentation of information, including on a web site, on country and city level experiences relating to the legal, policy, and institutional framework for reducing vehicle emissions; and (iv) presentation of selected action plans for vehicle emissions reduction, and policy and investment options for their implementation, at a final workshop at ADB headquarters for senior decision makers. A key focus will be on addressing the concerns of the diverse set of stakeholders involved in the process of vehicle emissions reduction to arrive at practical solutions. The action plans will include a set of measures for implementation and opportunities for investment. The action plans should have the support of the appropriate authorities in each of four selected countries, and components should be identified for possible external assistance.

## **C. Cost Estimates and Financing Plan**

15. The TA will be financed by ADB on a grant basis from the Japan Special Fund, funded by the Government of Japan. The total cost of the TA is estimated at \$900,000 equivalent (Appendix 2). The costs will cover international and domestic consulting services; preparation of, and participation in, the thematic workshops and the final workshop for presentation of action plans; establishment of an information resource and a web site; and preparation and publication of materials.

## **D. Implementation Arrangements**

16. ADB's Transport and Communications Division (East) will be responsible for the overall coordination and day-to-day implementation of TA activities. The TA will involve ADB-wide coordination through a working group. Information on vehicle emissions reduction policies and actions will be collected from DMCs and other countries. Four countries will be selected to be assisted through the TA activities to prepare action plans for vehicle emissions reduction, and in which coordinating committees will be established to bring different public, private, and nongovernment agencies together. The selection of countries for the action plans will be based on the number and growth of vehicles, including the number and growth of two and three-wheeled motorized vehicles in specific cases. Participants from South and East Asia, and selected countries in the Pacific and Central Asian regions will attend the workshops to share experiences in formulating and implementing vehicle emissions reduction policies. It is expected that the regional and final workshops will involve representatives of private commercial enterprises, especially from the fuels and vehicles sectors, and of nongovernment organizations concerned with air quality and sustainable transport.

17. TA activities will commence in October 2000 and last 17 months. The regional and final workshops will be held at quarterly intervals during 2001. The TA will be completed in February 2002. The TA will require about 14 person-months of international consulting services. Eleven person-months will be allocated to two consultants for preparing background papers, identifying

appropriate locations and resources for workshops, facilitating the workshops, reporting on TA activities, and advising on and revising the action plans. These consultants should have considerable knowledge of technological and institutional issues relating to the reduction of vehicle emissions, and experience of policy implementation, particularly in the Asian and Pacific region. Three person-months will be allocated to additional resource persons for presentations at the workshops. The TA will also require 50 person-months of domestic consulting services to (i) help the four assist selected countries prepare materials for each workshop and draft vehicle emissions reduction action plans, (ii) establish and maintain a web-site, and (iii) provide administrative support for TA activities. The domestic consultants in particular will be responsible for documenting examples of actions already being taken in the region that will have an impact on vehicle emissions, and that could be replicated in other countries or cities. Consultants will be selected on an individual basis, and engaged in accordance with ADB's *Guidelines on the Use of Consultants*, and other satisfactory arrangements for the engagement of domestic consultants. Equipment procured under the TA will be provided in accordance with ADB's *Guidelines for Procurement*. An outline terms of reference for consulting services is given in Appendix 3.

18. The work of the consultants and ADB staff will be complemented by networking with relevant technical institutions, policy makers, advocacy groups, and commercial enterprises in the DMCs, to build awareness and support for the TA outputs. ADB staff and the consultants will maintain contact with other multilateral and bilateral aid agencies helping to address issues of air quality relating to the transport sector. The United States-Asian Environmental Partnership, in conjunction with the United States Environmental Protection Agency, has agreed to provide additional resources in kind in the form of international resource speakers and participants from countries of the region for the workshops. The French Agency for Environment and Energy Management and other bilateral agencies aid agencies are considering providing similar inputs.

#### **IV. THE PRESIDENT'S DECISION**

19. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance, on a grant basis, in an amount not exceeding the equivalent of \$900,000 for the purpose of Action Plans for Reducing Vehicle Emissions, and hereby reports such action to the Board.

## TECHNICAL ASSISTANCE FRAMEWORK

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<b>Goal</b> To promote sustainable growth including accessibility of goods, services, and jobs  To promote well-being of the population	Arresting or reversing the deterioration in air quality in areas with heavy traffic  Health status of poor and vulnerable groups, and general population  Total carbon emissions from transport	Plans for air quality monitoring programs for emissions from vehicle sources Air dispersion models for measuring carbon and other emissions  Plans for monitoring health effects associated with vehicle emissions	Government commitment to action plans and resources  Government and nongovernment commitment to monitoring process  Commitment of resources and upgrading of skills
<b>Purpose</b> Enhanced ability to control and manage pollution from vehicle sources  Identification of key stakeholders and conditions for improved implementation  Identification of investment and policy opportunities	Increased harmonization of emissions, vehicle, and fuel standards among countries  Clearly stated schemes for stakeholder participation Finalization of four action plans  Confirmation of four action plans	Standards and workshop reports  Workshop outputs  Final workshop outputs  Final workshop outputs	Government commitment to harmonization of standards  Successful facilitation of workshop process Commitment of selected countries  Commitment of stakeholders
<b>Outputs</b> Recommendations on fuel quality and alternative fuels, new vehicle standards, and vehicle inspection and maintenance regimes  Recommendations on approaches to transport planning and management  Collation and dissemination of vehicle reduction policy and action information	Fuel quality and fuel changes Vehicle standards at production Vehicle testing results  Modal choices and travel times  Establishment of information collection mechanism and web site	Fuel production and consumption data National legislation and regulations Plans for vehicle inspection systems  Plans for urban travel surveys  Progress reports	Inclusion in national statistics Commitment to emission reductions Resources available  Coordination of agencies  Information provided by government and nongovernment sources



<b>Design Summary</b>	<b>Performance Indicators/Targets</b>	<b>Monitoring Mechanisms</b>	<b>Assumptions and Risks</b>
Action Plans formulated for four countries	Countries and cities for action plans identified by 15 December 2000 Draft plans available by September 2001 Plans discussed in Manila workshop in late 2001	Report on fact-finding  Workshop reports	Coordination with other development agencies Condition of government agencies in each selected country
Vehicle emissions impact on poor population	Study completed June 2001	Progress reports	Cooperation of municipal agencies
<b>Activities</b> Prepare background papers Establish resource person inputs Prepare and conduct workshops Prepare workshop summaries and conclusions Establish web site Facilitate action plans	Project outputs Workshop plans  Project outputs  Draft papers and publications  Web site operation Project outputs	Progress reports Consultant reports  Progress reports  Consultant reports  Web site use Progress reports	Adequate consultant inputs and workshop participation
<b>Inputs</b> 14 person-months of international consulting services 50 person-months of domestic consulting services International and regional resource persons Government, nongovernment, and commercial workshop participation ADB staff supervision and contributions	Consultant timesheets  Consultant timesheets  Workshop activities  Workshop activities  Staff schedules	Progress reports  Progress reports  Commitment letters from agencies  Progress reports  Progress reports	Engagement of appropriate consultants Engagement of appropriate consultants Commitment by other agencies  Broad dissemination of workshop purposes and activities  Staff availability

**COST ESTIMATES AND FINANCING PLAN**  
(\$'000)

<b>Item</b>	<b>Foreign Exchange</b>	<b>Local Currency</b>	<b>Total Cost</b>
<b>Asian Development Bank Financing (Japan Special Fund)</b>			
1. Consultants			
a. Remuneration and Per Diem			
i. International Consultants	290	0.0	290
ii. Domestic Consultants	175	0.0	175
b. International and Local Travel	75	0.0	75
c. Reports and Communications	7	0.0	7
2. Equipment <sup>a</sup>	3	0.0	3
3. Workshops, Seminars, and Conferences	228	0.0	228
4. Miscellaneous Administration and Support Costs	2	0.0	2
5. Contingencies	120	0.0	120
<b>Total</b>	<b>900</b>	<b>0.0</b>	<b>900</b>

<sup>a</sup> Computer and appropriate software and accessories.  
Source: Staff estimates.

## **OUTLINE TERMS OF REFERENCE FOR CONSULTANTS**

### **A. International Consultants**

#### **1. Main consultants**

1. The terms of reference of the two international consultants to work with the Asian Development Bank (ADB) in implementing the technical assistance (TA) will include but not necessarily be limited to the following:

##### **a. Planning**

- (i) Identify sources of information in ADB's developing member countries (DMCs) and among external funding agencies on vehicle emissions reduction policies and actions.
- (ii) Help identify the four DMCs for which national vehicle emissions reduction action plans are to be prepared under the TA. Identify the main agencies to be involved in the action plans. Identify appropriate domestic consultants to help prepare the action plans.
- (iii) Identify the best locations for the TA workshops, and domestic consultants and institutions to help conduct the workshops.
- (iv) Advise on the collation of information on vehicle emissions reduction policies and actions, and on the preparation of an information sharing system and web site.
- (v) Prepare an inception report outlining the full structure of the regional workshop program, the subjects to be covered, the participation of other resource persons and agencies, and the arrangements for preparing country action plans and sharing information among countries and agencies.

##### **b. Regional Workshops**

- (vi) Identify appropriate specialists to be invited as resource persons for each workshop. These specialists should include those with technical expertise relating to vehicle emissions and institutional expertise in dealing with stakeholders and action plans. Identify the presentations and materials they will provide.
- (vii) Identify government, nongovernment, and commercial agencies from other DMCs to be invited to each workshop to share their experience in implementing vehicle emissions reduction policies and actions. Identify the presentations and materials they will provide.
- (viii) Prepare a background paper and presentations for selected topics for each of the workshops, according to the themes of the workshop and the expected contributions by other resource persons.

- (ix) Help to prepare and conduct each workshop, in coordination with the domestic consultants organizing the workshop.
- (x) Prepare for ADB a report on each workshop, the main items of discussion, and conclusions. Prepare a set of materials for each workshop containing the main presentations and points of discussion in a form suitable to be considered for publication. The materials should include the vehicle emissions reduction action plans for the selected countries, as presented at the workshop.
- (xi) Prepare and commission a study of the impact of vehicle emissions on poor people in a municipal area in a selected country. Assess the role of vehicle emissions reduction policies and actions in improving the quality of life for poor people.

#### **c. Final Workshop**

- (xii) Help draft the vehicle emissions reduction action plans, facilitate the process of coordination between different agencies, and finalize the action plans.
- (xiii) Help conduct the final workshop, and advise on the steps required to implement the action plans, including any related policies and investments. Prepare a report of the final workshop and the agreements reached.
- (xiv) Prepare a final report on the TA, identifying actions to be taken and the form any proposed ADB-financed activities should take. Prepare workshop and other materials for publication, as appropriate.

### **2. Resource Persons**

2. A number of resource persons will be recruited for 1-2 weeks each to make a presentation on specific topics at the appropriate workshop, and to finalize their presentation documentation after the workshop.

## **B. Domestic Consultants**

### **1. Preparation of Action Plans, Organization of Workshop Activities, and Poverty Study**

3. A domestic consultant will be recruited for up to 8 person-months, spread over the implementation period of the TA, in each of the four selected countries to:

- (i) identify studies and actions at the national and local level relating to the reduction of vehicle emissions;
- (ii) draft a vehicle emissions reduction action plan and assist in its finalization;
- (iii) help domestic agencies in preparing presentations for the workshops;
- (iv) help conduct meetings to promote coordination among government agencies and among government, nongovernment, and commercial organizations;
- (v) finalize the action plan in conjunction with relevant parties, and produce an implementation schedule, with identified responsibilities for the action plans.

4. For each of the workshops to be held outside Manila, the concerned domestic consultant will assist the international consultants to:

- (i) identify an appropriate location for the workshop;
- (ii) arrange accommodation for the participants, including resource persons, consultants, and DMC participants;
- (iii) liaise with resource persons and help consolidate presentation materials;
- (iv) help review and collate background materials;
- (v) help with other logistical matters before, during, and immediately after the workshop.

5. In one of the selected countries, the domestic consultant will organize and implement a brief survey of the available information on the impact of vehicle emissions on poor people, and the potential impact of vehicle emissions reduction policies on them. Two person-months of consultancy will be provided for this study.

## **2. Technical Assistant**

6. A domestic consultant will be recruited for nine person-months intermittently in the Philippines to provide technical support for the implementation of the TA. The consultant should have some experience with air quality issues and be familiar with ADB operations. Working with the main international consultants and under the supervision of ADB staff, the consultant will perform the following tasks:

- (i) help prepare background papers and presentation materials for each workshop;
- (ii) help prepare and conduct the workshop that will be held in Manila and a summary report for ADB on that workshop;
- (iii) help collect, screen, and consolidate relevant information on vehicle emissions reduction policies and actions for the web site;
- (iv) provide research support to concerned staff and international consultants and general administrative support;
- (v) provide logistics inputs to enable DMC participants, resource persons, and others to attend the workshop;
- (vi) help collect, collate, and consolidate the national vehicle emissions reduction action plans for each of the selected countries.

## **3. Preparation of Web site**

7. A domestic consultant will be recruited in the Philippines for nine person-months on an intermittent basis to work with the other consultants and under the supervision of ADB staff to establish and operate a web site on vehicle emissions reduction policies and actions. The domestic consultant will perform the following tasks:

- (i) help collect relevant information on vehicle emissions reduction policies and actions;
- (ii) help design the web site;
- (iii) code the application programs for the web site;
- (iv) participate in the testing of the application programs for the web site;
- (v) provide technical documents of all the application programs written for the web site;

- (vi) help the daily operation of the web site during the period of the TA, including maintaining the web site, collecting, screening, and consolidating information on the Internet and from other sources, and regularly updating the web site;
- (vii) provide training to ADB staff on maintaining and further developing the web site in:
  - (a) updating existing documents,
  - (b) incorporating new documents into the system,
  - (c) compiling and disseminating articles for periodical news service,
  - (d) searching for information, and
  - (e) other topics as agreed between ADB and the consultant.