# VEHICLE EMISSION TESTING PROGRAM IN SRI LANKA

## A BEST PRACTICES CASE STUDY

## Summary

**V**ehicle Emission Testing (VET) program in Sri Lanka has been developed as a nationwide program with the main objective of controlling air pollution in Colombo and other urban cities. This program adopts a comprehensive strategy comprised of (i) development of effective monitoring, regulatory & enforcement mechanisms and policies, (ii) establishment and strengthening of institutional structure, (iii) development of sustainable program for capacity building, training and skill development, (iv) mass awareness and education.

Several actions and initiatives have been implemented during the last decade for managing urban air quality, including (i) Preparation of Clean Air Action Plans (2000, and 2007), (ii) Establishment and enforcement of vehicle emission, fuel quality and vehicle importation standards, (iii) Establishment of ambient air quality monitoring stations, (iv) Establishment of Air Resource Management Center (AirMAC) as a stakeholder partnership, (v) Carryout training and capacity building programs for all stakeholder groups, (vi) Awareness and education programs for school children, vehicle drivers and owners, and general public, including preparation of awareness materials. In particular, phase out of lead in gasoline and reduction of sulfur in diesel could be considered as major achievements in the fuel quality improvement program. The unique feature of the overall urban air quality management program is the effective contribution and continual participation of all stakeholders through AirMAC.

The enforcement of vehicle emission standards through implementation of Inspection & Maintenance (I/M) of in-use vehicles is the key component of the VET Program in Sri Lanka. With the objective of identifying gross polluting vehicles and reducing their emissions, a simple I/M program is adopted that includes Two speed idle test of CO and HC on gasoline vehicles and smoke opacity test on diesel vehicles. Strong administrative, quality control and auditing procedures are incorporated to minimize the corruption practices. Emission testing and certification function is to be carried out by two or three private companies with international partnership through a centralized system nationwide. The establishment of testing centers is to be commenced within this year and a comprehensive awareness; training and capacity building program is in progress to facilitate the successful implementation of the VET program.

## Key Dates

| | |
|---|---|
| 1992, October | Published Clean Air 2000 Action Plan |
| 1994, December | Gazetted National Ambient Air Quality Regulations |
| 1996, December | Commenced Ambient Air Quality Monitoring at Colombo Fort station |
| 2000, March | National Policy on Air Quality Management |
| 2000, June | Gazetted Mobile Air Emission, Fuel and Vehicle Specification Standards for Importation |
| 2001, June | Establishment of Air Resource Management Center (AirMAC) |
| 2002, June | Phasing out of Lead in Gasoline |
| 2003, June | Gazetted revised Mobile Air Emission, Fuel and Vehicle Specification Standards for Importation |
| 2004, January | Introduced Low Sulphur diesel (3000ppm) |
| 2004 | Clean Air 2007 Action Plan |
| 2004, December | First National Symposium on Air Resource Management in Sri Lanka |
| 2006, March | Second National Symposium on Air Resource Management in Sri Lanka |
| 2007, January | Prohibit import of three Wheelers powered by two stroke petrol engines with effect from 1st January 2008 and prohibit import of spare parts for such engines with effect from 1st January 2011. |
| 2007, September | Third National Symposium on Air Resource Management in Sri Lanka |
| 2008, November | Implementation of VET Program |
| 2009, November | Indoor Air Pollution Workshop |
| 2009, December | VET Forward Workshop |
| 2010, March | Fourth National Symposium on Air Resource Management in Sri Lanka |
| 2012, March | Fifth National Symposium on Air Resource Management in Sri Lanka |

## Situation Before the Initiative Began

Ever increasing use of vehicles in transport sector without proper monitoring, controlling and regulation of emissions together with low quality fuels, lack of standards and inadequate national interest have resulted in deterioration in air quality in main cities, especially in Colombo. This has caused adverse health conditions and poor quality of life. Therefore it was evident that immediate interventions are needed to reverse the deterioration in air quality and its accompanying adverse health effects from exposure to fine particles, lead and other vehicle emissions.

## Establishment of Priorities

The rapid increase in the vehicle fleet in Sri Lanka at present is mainly due to importation of two & three wheelers and used vehicles. As a result, older vehicles or vehicles with little or no functioning emission controls are the major source of emissions. Further, low quality fuels cause higher emissions and also could result malfunctioning of emission control devices. Several technical options have identified to control the emission from in-use vehicles, which include Inspection & Maintenance (I/M), Retrofit, Accelerated Retirement, Import Restrictions and Alternative Fuel Conversion and Fuel Quality Improvements. Especially, it has been recognized that implementation of a simple but effective I/M program could reduce vehicle emissions significantly. In addition, introduction of cleaner fuels is identified as an essential integral component of the program since it is not only necessary to reduce or eliminate certain pollutants directly but also as a precondition for the introduction of many important pollution control technologies.

## Formulation of Objectives and Strategies

The main objectives of the Urban Air Quality Management Program are

(i) Development of a co-coordinating body for all air quality improvement and management activities with stakeholder partnership.

(ii) Reduce the emission of harmful and toxic air pollutants to air by a greater percentage through implementation of regulatory program in association of the stakeholders.

(iii) Capacity building on Air Quality Management and reduction of Air Pollution.

(iv) Create public awareness.

The excessive emissions from vehicles related to many factors: both technical and non-technical factors, and therefore reduction and control of vehicular emissions require comprehensive strategy. The overall strategy adopted in the VET program in Sri Lanka includes appropriate emissions standards for new vehicles, cleaner fuels, emissions standards for in use vehicles and inspection & maintenance program for in-use vehicles, vehicle importation policies, traffic & demand management measures; and also institutional development, awareness, education and training.

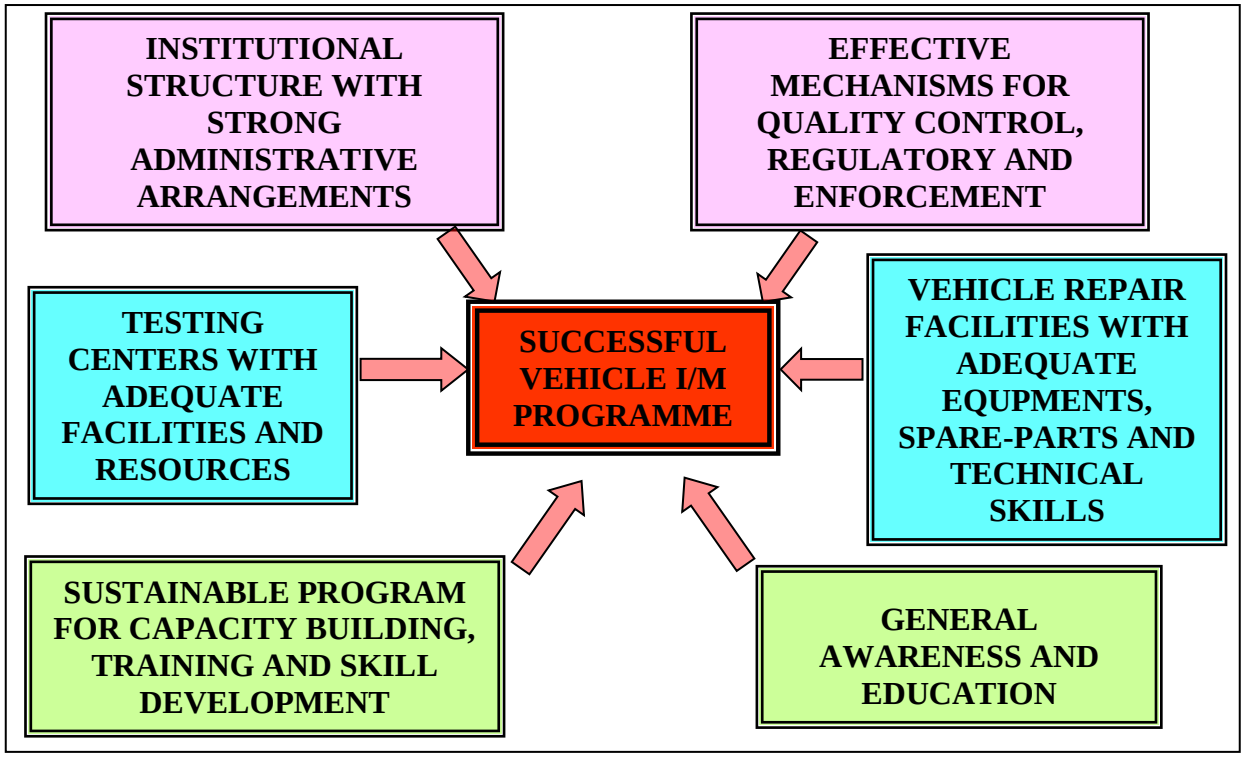


**Figure 1: Overall Strategy of the VET program**

## Mobilization of Resources

Development and successful implementation of VET program need multi-sectoral partnership and adequate resources including technical, financial and human. With this regards, AirMAC was established informally as an outcome of Clean-Air 2000 with key stakeholder partnership including Ministry of Environment & Natural resources, Central Environmental Authority, Ministry of Transport, Highways & Civil Aviation, Department of Police - Traffic Police Division, Department of Motor Traffic, National Building Research Organization, Industrial Technology Institute, Universities and Technical Colleges, Department of Meteorology, and Colombo Municipal Council.

Several subcommittees were appointed to cover the wide range of activities of the overall strategy, through which the resources and expertise of different stakeholder organizations were effectively used. In particular, resource personnel from key

stakeholder organizations have been involved with capacity building & mobilization activities through several training and awareness programs. For examples, roadside emission testing programs, technician training programs, teacher training program and awareness programs for school children and bus owners/drivers are some of these activities.

## Process

As discussed above, there were several essential elements in the overall program. One of the first steps taken was the establishment of AirMAC to facilitate stakeholder participation, which in fact became the hub of the overall program. Several activities were initiated by AirMAC, some of which have already been implemented. These include Urban Air Quality Management Project (World Bank), Clean-Air Initiative Project (USAID-USAEP), Air Quality Program (EA1P), Crash Program on Emission Standards Implementation (EA1P/WB), Awareness Program (USAID/EA1P), Technician Training Program (World Bank), Capacity Building (USAID), Preparation of the National Action Plan, Preparation of National Policy on Air Quality Management, Development of the Web site, Preparation of awareness materials (UNDP/GEF/SGP) & (USAID), Organizing of National Symposium on “Air that We Breath” as an annual event.

The activities carried out through AirMAC contributed significantly to achieve several milestone of the Air Quality Management Program. Phase out of lead in gasoline and reduction of sulfur in diesel are important achievements in the fuel quality improvement program. Establishment of appropriate testing procedures and emission standards, development of a centralized testing program and selection of competent private sector companies with experienced international collaboration for the establishment of testing centers could be considered as major achievements in the VET program.

Another key event of the implementation process is related to capacity building and awareness creation. A comprehensive training program was implemented, covering all the officials and other stakeholders, who would be directly involved in the VET program. For the awareness creation and education, different mechanisms and modes of media were used.

The main area that needs further attention is the vehicle repair sector in the country. Majority of vehicle repair centers / garages are operated as small scale informal business entities, without adequate equipment, tools or technical expertise. Successful implementation of VET program essentially needs the availability of adequate number of vehicle repair centers having well-equipped repair facilities together with well-trained technicians, skill mechanic and access to quality spare parts. Such infrastructure and resources are needed to maintain a good quality vehicle fleet in the country. Further, it is important to establish a mechanism to evaluate and control the quality of vehicle repair facilities, which should include a formal procedure to rank and accredit them for the purpose of vehicle repairs related to emission. A research project is being implemented at present to address these issues.

## Results Achieved

In essence, the main results achieved during the project include phase out of lead in gasoline and reduction of sulfur in diesel in terms of fuel quality, policy level developments including establishment of standards for vehicle emissions and Clean Air Action Plan, development of institutional structure, capacity building and training of stakeholders, and awareness raising. The specific achievements are listed below.

## 1. Formulation of the Clean Air 2007 Action Plan

AirMAC identified the importance of compiling and adopting a comprehensive action program on prioritized basis in the air quality management. One basic measure taken was to develop the Clean Air 2007 Action Plan through stakeholder consultation. AirMAC conducted two stakeholder consultation workshops in preparing the draft Clean Air 2007 Action Plan and the final draft was presented to the stakeholders for discussion and finalization, under the patronage of Ceylon Petroleum Corporation through Clean Air Sri Lanka.

## 2. Training of technicians on vehicle emission reduction

Having identified the importance of training technicians to cater for the demand increase to repair vehicles with the implementation of VET Program, AirMAC implemented a comprehensive training program for technicians and mechanic. AirMAC hired the capacity of the University of Moratuwa to prepare a Training Manual for training the technicians on vehicle emission reduction. A two-day residential training workshop was also held for a group of selected technicians.

## 3. Awareness Creation

### *3.1. Awareness programs for private bus owner's*

AirMAC conducted several awareness workshops for the private bus owners and drivers in seven districts. The rest of the Districts were covered under the World Bank funded urban air quality management project. The objectives of the programs were to create awareness among private bus owners on the health and economic benefits of maintaining their vehicles properly and to obtain their commitment to implement the VET program successfully. All the participants supported the move and expressed their willingness to comply with the standards and improve the environmental quality.

| No. | Districts | No. of Participants |
|---|---|---|
| 1 | Badulla | 45 |
| 2 | Ampara | 35 |
| 3 | Vavuniya | 22 |
| 4 | Trincomalee | 26 |
| 5 | Matara | 25 |
| 6 | Hambantota, Tangalle | 36 |
| 7 | Batticaloa | 60 |
| | **Total** | 249 |

### *3.2. Teachers training workshop*

The involvement of school teachers in the awareness creation among children on the adverse impacts of air pollution is essential, since they are the most competent group to send the message to the children effectively. It is also noted the importance of having a resource person within a school in organizing the school seminars successfully. Therefore, AirMAC selected a group of twenty-four teachers, one each from main schools in Colombo and given a two-day training on air pollution, its impacts and mitigation. At the end of the workshop certificates were awarded.

### *3.3. School awareness program*

Using the expertise of trained teachers, AirMAC conducted ten school programs. One guest lecture was conducted in each program by an expert representing AirMAC. These programs were very successful, and active participation of school children was observed.

The attendance of children and teachers in the program are as follows.

| No. | Name of the School | No. of Students | No. of Teachers |
|---|---|---|---|
| 1 | St. Jone's College | 212 | 08 |
| 2 | Gurukula Maha Vidyalaya | 175 | 07 |
| 3 | Museus College | 205 | 06 |
| 4 | Dharmapala Vidyalaya, Kottawa | 68 | 03 |
| 5 | Anula Vidyalaya, Nugegoda | 148 | 14 |
| 6 | Thirstan College | 185 | 08 |
| 7 | Josepvaas College | 209 | 14 |
| 8 | Janadhipathi Vidyalaya, Maharagama | 251 | 11 |
| 9 | Buwaneka Maha Vidyalaya, Maharagama | 98 | 06 |
| 10 | Lumbini Maha Vidyalaya, Colombo5 | 267 | 05 |
| | **Total** | 1818 | 82 |

*3.4. Public Awareness*

AirMAC noted the importance of the use of electronic media to pass the message to the general public on adverse impacts of air pollution and the vehicle emission-testing program. In this regard, the AirMAC produced a video documentary and a video clip in order to telecast at the commencement of vehicle emission testing program. In addition activities given in next sections were carried out to facilitate information dissemination.

*3.5. Redesign of the website and Training for Continuation*

The AirMAC website was redesigned to make it more dynamic and attractive to the viewers and make an arrangement to update daily in order to provide the updated information. In particular, 15 new web pages were added, which include Home page, About AirMAC, Committees, Partners, What's New, Policies, Programs, Projects, Publications, Vehicle Certification Program, Air Monitoring, Challenges, Out Reach, Research, Inventory & Modeling etc.

*3.6. Other Publications*

Several publication materials have been prepared for awareness and education programs. These include

- Video tape
- Newsletter

- Video clips
- Stickers

## 4. Consultancies

A number of consultancy projects related to urban air quality management were coordinated by AirMAC, including the following:

- Preparation of the report to the parliament on "Three wheelers with 2-stroke engines & its probable public health impact"
- Preparation of the training manual for technician training programs
- Finalization of the Clean Air 2007 Action Plan

## 5. Enhancement of Physical Resources

This is essential for the successful implementation of different activities related to the project. The items and equipment acquired for effective functioning of AirMAC include:

- 2 Laptop computers
- CD writer & UPS
- Furniture
- Digital camera

# Sustainability

Sustainability of the overall program is a crucial factor for achieving the key objectives. Most of the programs and activities of the Urban Air Quality Management Project have been devised with consideration of this aspect. Both development and implementation stages, active participation of the relevant stakeholder organizations were obtained. In fact, the responsibilities were assigned to these organizations and the programs were conducted as their institutional activity in collaboration with AirMAC. Further, specific training, educational and awareness programs have also been conducted to enhance the human resources, with the objective of training trainers who could contribute to the future programs. Such approaches lead to necessary capacity building for continuation of the programs. For example, number of technical colleges conducts technician training programs, for which the resource personnel were initially trained by the Training of Trainers Program of AirMAC.

Further, during the recent past, information and materials on air pollution and related issues have been included in the curricula of several formal educational programs

including primary & secondary educations in schools, automobile technical education and undergraduate education. This would facilitate the sustainable awareness and education in large scale.

In the case of vehicle inspection & maintenance program, a Project Office is to be established under the Department of Motor Traffic to oversee the specific issues related to the project. A certain percentage of the income of the testing centers will be credited to the Project Office, which will be used not only to maintain of the unit but also to conduct capacity building and awareness programs. Further, its mandatory for the private companies who conduct the testing and certification to conduct regular awareness programs for vehicle owners and general public.

## Lessons Learned

One of the most important lessons learned during the initial stage of the VET program is related to the emission standards for in use vehicles specified in the previous gazette notification. The values used for the emission standards were based on the standards of developed countries and therefore were very stringent. The detailed pilot emission testing carried out under the VET program indicated that most of the vehicles would not be able to meet the requirements and thus would be out of the fleet, if the standards were implemented. Such circumstances would lead to huge protest from public against the VET program, and also would affect the economy of the country. Therefore, the technical committee of AIrMAC, with the guidance of foreign experts, revised the emission standards, where the values are set in stages starting from relaxed standards. In fact, the pilot test results indicate that very few poorly maintained vehicles (gross polluters) contribute to the major portion of emissions and identification of them could contribute to significant reduction in emissions with least effort and cost. In fact, the VET program was developed based on this concept.

Another key feature of the VET program in Sri Lanka is the incorporation of centralized testing program. The local and international experiences on similar applications indicate the ineffectiveness of decentralized testing programs, which usually lead to fraud and corruption practices. For example, the present vehicle fitness certification is done by so called ‘registered garages’ without any form of monitoring or quality control, and therefore became very ineffective. Centralized testing program could be monitored and subjected to quality control and auditing easily. Further, it could deliver a good service to the customers. Further, selection of three parties for the activity would create a healthy competition leading to a successful VET program.

Importance and effectiveness of a proper awareness program is also identified. For example, at the inception of the project, the main opposing group for the VET program was private bus owners. However, after implementing island-wide awareness program (where the information on health and financial benefits were presented) together with international exposure tour, they have become partners of AirMAC and also one of the key supporting groups.

## Transferability

The VET program in Sri Lanka is developed as a nationwide program involving different stakeholder organizations and social groups. The activities of the programs have been devised by incorporating view of all the stakeholders and therefore represent visions and of several key organizations and their own activities. Therefore both the VET

program and the stakeholder institutes were benefited through effective transfer of experience and knowledge. For example, in technician training programs, the resource personnel from local technical colleges offered their expertise for the development of the curriculum and training materials. On the other hand, the training program developed, and the technicians trained have become resources for the technical colleges to conduct similar program by themselves.

Another important aspect that many appreciated and rated highly is the institutional structure of AirMAC. Multi-sector participation and responsibility sharing that lead to successful development of policies and implementation of several important programs indicate clearly that AirMAC is a perfect model to be followed. In fact, in the energy sector a similar unit has been proposed to look after the issues in renewable energy development, named as Renewable Energy Cell, establishment of which was guided by the experience of AirMAC.