

**For discussion on
16 December 1999**

**Legislative Council
Panels on Environmental Affairs and Transport**

**Control of Diesel Vehicle Emissions
Strategies to Improve Vehicle Maintenance and Reduce Smoky Vehicles**

INTRODUCTION

We briefed Members on 5 November 1999 about our plan for controlling emissions from diesel vehicles. Members requested for the following information for further discussion:

- (a) an emission picture on the whole vehicle stock in Hong Kong as reflected in the age and model of vehicles;
- (b) information on the types of diesel used by overseas countries;
- (c) information on the advantages, cost implications and difficulties associated with the import of high quality diesel to Hong Kong;
- (d) a timetable on the Administration plan to improve vehicle maintenance in Hong Kong;
- (e) information on the training programmes on vehicle maintenance to be provided by the Vocational Training Council;
- (f) our consideration of purchasing additional chassis dynamometers for use by vehicle owners;
- (g) information on the availability of Liquefied Petroleum Gas

vehicle workshops.

2. This paper sets out the information requested as well as measures being adopted to promote better vehicle maintenance as part of the programme to reduce harmful emissions from the vehicle fleet. The objective of the measures is to ensure that vehicles being used on the roads are well maintained, to reduce emission of pollutants. The approach being taken is to work with the motor trades to develop testing and training programmes to improve maintenance and also to enforce standards so as to ensure compliance by vehicle owners.

BACKGROUND

3. The ambient levels of respirable suspended particulates (RSP) in this city are a concern for public health. The high levels of RSP cause respiratory illness, increase morbidity and mortality, and aggravate lung diseases such as asthma, bronchitis and emphysema. Visible smoke from vehicles is also an eyesore and nuisance to many people.

4. Diesel vehicles are a major source of RSP and smoke in the streets. There is also growing evidence linking lung cancer with exposure to diesel particulates. In the urban area, diesel vehicles account for about half of the airborne RSP and 60% of the nitrogen dioxide in the ambient environment. The emission profile of the local fleet as reflected in the age and model of vehicles is in **Annex I**.

Emission Standards for New Vehicles

5. As part of the measures to control the emissions from diesel vehicles, the most stringent practical vehicle emission standards are being applied to all newly registered vehicles in Hong Kong. Currently these are the standards in the European Union and we intend to tighten our diesel vehicle emission standards in line with changes there. The current schedule is to start introducing Euro III standards in 2001 and the Euro IV standards in 2005.

Motor Diesel Fuel

6. To reduce emissions from diesel vehicles and support the introduction of these stringent emission standards, we have been tightening the requirements for diesel fuel to gain the full emission benefits of improved engine designs. Our requirements for motor diesel are on a par with those of the European Union. The types of motor diesel being used overseas are summarized in **Annex II**.

7. To further tighten up the diesel fuel standards, we have already agreed with the oil companies to reduce the sulphur content of motor diesel to 0.035% by 1 January 2001 to support introduction of the Euro III emission standards. In the longer term, the European Union intends to make ultra-low sulphur diesel (0.005% sulphur content) their standard motor diesel by 2005. The U.S.A. is giving consideration to lower the sulphur content of their motor diesel to a similar level by 2007. Our plan is to introduce ultra-low sulphur diesel as soon as practicable but in any case not later than the European Union in 2005. The use of this fuel can help reduce the emission of particulates and nitrogen oxides by about 10% and 5% respectively.

8. At the moment, ultra-low sulphur diesel is only produced in some European countries. Hong Kong gets its diesel oil from refineries in South-east Asia, which have yet to be equipped to produce it.

9. Due to increased production and shipping costs, the initial price of ultra-low sulphur diesel from Europe will be higher than the existing diesel price. Some initial estimates suggests an increase of about \$0.85/litre but it is too early to determine if these estimates are accurate.

10. Several oil companies are exploring the feasibility of bringing supplies of ultra-low sulphur diesel into Hong Kong. We expect more information could be available once we receive more detailed proposals from the oil companies.

Retrofit Diesel Catalysts or Particulate Traps

11. We are seeking to retrofit diesel vehicles with suitable catalysts or particulate traps. In collaboration with the Hong Kong Polytechnic University, we are putting these devices on trial. If successful, we will work out a plan to retrofit them onto pre-Euro vehicles.

Reducing Reliance on Diesel Vehicles

12. We also aim to reduce the heavy reliance on diesel vehicles. Our proposal to introduce LPG taxis on a large scale by the end of 2000 is the first step, followed by exploring the extension of the use of LPG or other clean alternatives to light buses. Meanwhile, we are also examining the feasibility of other alternative clean technologies.

Maintenance Support for LPG Vehicles

13. To provide maintenance support to LPG vehicles, the Vocational Training Council (VTC) has started their training programme in October 1998 to train up to 180 mechanics a year to service LPG vehicles. So far, they have trained 235 mechanics.

14. The Electrical and Mechanical Services Department (EMSD) is disseminating to the vehicle service trade the requirements for setting up LPG vehicle workshops. So far, 29 existing sites have been found suitable for converting into LPG vehicle workshops. EMSD has already received 11 applications to set up LPG vehicle workshops. 2 workshops have been approved for use and another 3 have been granted approval for construction. The other applications are being processed.

15. Suitable lands for the provision of LPG workshops has been made available within 4 industrial sites in Kowloon Bay, Tsing Yi, Kwai Chung and Yuen Long that are to be let in this year's Land Sales Programme. Permission will also be given to another 2 industrial sites in Sai Kung and Sheung Shui in the same programme to include the setting up of LPG workshops.

16. Most of the maintenance work of an LPG vehicle can be conducted by ordinary vehicle mechanics in existing vehicle workshops. Only the gas-related system needs to be serviced by an LPG vehicle mechanic at a vehicle workshop approved by EMSD.

VEHICLE MAINTENANCE

17. Standards of engine maintenance are a key factor in the emission performance of vehicles. A poorly maintained vehicle can emit up to 10 times the pollutants emitted by a properly maintained one. For diesel vehicles, an obvious sign of poor maintenance is the emission of black smoke. The emission of excessive smoke from a motor vehicle is a scheduled offence under the Fixed Penalty (Criminal Proceedings) Ordinance (Cap. 240).

18. In Hong Kong, diesel vehicles are primarily commercial vehicles. These are required to undergo an annual roadworthiness inspection. Hitherto, Transport Department has randomly selected 10% of the vehicles undergoing the annual roadworthiness for a strengthened smoke test. The department will extend the strengthened smoke test to all vehicles undergoing the inspection next year. The Environmental Protection Department (EPD) has prepared public education leaflets to remind drivers of the importance of maintenance and good driving habits. It has also organized courses for vehicle owners and drivers to promote these concepts with VTC and the Hong Kong Productivity Council (HKPC).

19. The Government is also running enforcement programmes to provide a deterrent effect. EPD is operating a Smoky Vehicle Control Programme that requires spotted smoky vehicles to undergo a smoke test within a specified period. To enhance the effectiveness of the programme, EPD introduced dynamometers for testing smoke for diesel vehicles below 5.5 tonnes in September this year. The more revealing test has been effective in detecting improperly maintained vehicles and helping to raise the awareness of vehicle owners to properly maintain their diesel vehicles.

20. The police have also been provided with 12 smokemeters to

help step up their enforcement work. It is a more effective and objective way of enforcement than by visual inspection in the past. The Police are issuing fixed penalty tickets for smoky vehicles caught by them as well as referring these vehicles to EPD for a follow up smoke test. In 1997, 1998 and first 10 months of 1999, EPD issued 26,659, 31,822 and 29,721 emission testing notices and the Police issued 1,085, 1,643 and 4,523 fixed penalty tickets against smoky vehicles respectively.

FURTHER ACTIONS TO REDUCE SMOKY VEHICLES

21. Despite the above efforts, there is still a considerable number of smoky vehicles on the roads. In order to tackle the problem at source, a number of initiatives have been taken to raise awareness among transport operators on the need to reduce vehicle emissions through proper vehicle maintenance and to help the vehicle maintenance trades to upgrade their standards of service.

22. Many members of the transport trades have expressed their willingness to work with the Government and the maintenance trade to help improve the maintenance standards. The following steps are being taken to assist the trades concerned to raise the awareness of proper vehicle maintenance and to improve the standards of service so as to minimize emissions:

- (a) to help the maintenance trades to better understand the operation of a dynamometer test, EPD has stationed staff at the emission testing centres to provide on the spot advice and demonstration on proper engine tuning practice to those who have failed the test. The overall passing rate of the test has now increased to nearly 80%. We will continue with actions to assist the trades to become more familiar with the requirements of the test and adopt the right approach to proper vehicle maintenance to reduce smoke emissions;
- (b) since August this year, EPD, in conjunction with HKPC and VTC, has conducted four seminars for vehicle mechanics on

proper engine repair to reduce smoke emissions. Some 300 persons attended these training sessions. EPD has held eight discussion sessions and one workshop with the transport trades and their vehicle mechanics to promote the understanding on the requirements of the dynamometer smoke test. EPD intends to organize at least another 12 seminars for around 1,000 members of the trades over the next 6 months on how to properly maintain vehicles to prevent smoke emission and to understand the dynamometer smoke test. If necessary, more seminars could be held to allow all vehicle workshops that are interested to send at least one of their mechanics to attend them;

- (c) in addition, the VTC also plans to organize short courses for vehicle mechanics on the use of dynamometer for better vehicle maintenance in addition to their existing vehicle mechanics programmes, which are described in **Annex III**. We will seek the widest participation in these courses by members of the trade, and publicize its attendance certificate, which can help vehicle owners choose vehicle mechanics to rectify the smoke emission problems of their vehicles;
- (d) in response to concerns about the availability of service manuals we are asking all vehicle suppliers to make available their vehicle service manuals which are necessary for maintenance purposes;
- (e) to raise awareness among vehicle operators of the importance of preventive maintenance to reduce smoke emissions, the Transport Department conducted in late September 1999 a four-week programme to provide free smoke emission tests at its Kowloon Bay vehicle examination centre. A local oil company, in conjunction with a green group, is also providing free smoke emission tests at three petrol filling stations from October to December 1999. The operator of the existing vehicle emissions testing centres is offering the use of their dynamometers at a fee during Sundays to the vehicle

maintenance trades for tuning of vehicle engines. We will continue to encourage these initiatives to promote preventive care of vehicles; and

- (f) all smoky vehicles testing in test centres will progressively adopt dynamometer method, and at the same time the testing procedures and standards will be harmonized.

23. VTC found in a manpower survey in March 1998 that there were 5,575 vehicle mechanics. Although the survey did not provide the number of mechanics working on diesel vehicle engines, VTC opines that the number of required upgrading training is likely to be around 1,000. Our intention is to target our efforts on these mechanics and help them to raise the overall standards of service over the next 6 months.

24. Members also asked us to consider purchasing chassis dynamometers for use by vehicle owners to check the maintenance conditions of their vehicles. We estimate that the setting up of a dynamometer testing centre for this purpose is likely to require a capital expenditure of up to \$1.8M (including the costs of a dynamometer of \$0.5M to \$1M depending on its size and the other ancillary facilities of \$0.8M) if the dynamometer is installed in an existing government premises, and a recurrent cost of at least \$1.2M per annum. The capital cost will be much higher if a new centre is to be built. We believe that the most cost-effective way in using dynamometers for the purpose of promoting proper maintenance is to utilise the existing dynamometers now available in the designated emission testing centres. In the next month, the number of designated emission testing centres using dynamometer will increase from 3 to 5. There is likely to be spare testing capacity at these centres. We are considering a pilot scheme in conjunction with the existing emission testing centres to allow vehicle owners to test the smoke emissions of their vehicles on their own initiatives. Based on the findings of the pilot scheme, we will assess the need of the transport trade in this respect and consider the way forward.

25. To address the concerns about the need for long term improvement in the standards of vehicle maintenance, the government is

setting up a working group, comprising representatives from the vehicle maintenance trade and other relevant parties, to consider ways to assist the trade to raise the standards of vehicle maintenance. Raising the standards of vehicle maintenance will benefit the environment and road safety by reducing the number of smoky vehicles and improving the mechanical conditions and roadworthiness of vehicles. Issues they will consider include the possibility of a licensing/certification scheme for the maintenance trade.

FIXED PENALTY FINE FOR SMOKY VEHICLES

26. The current fixed penalty fine of \$450 was introduced in 1994. Having regard to the medical evidence that is now available on the health impacts of air pollution, and the extent to which harmful air pollutants are associated with vehicle emissions, there are grounds to increase the level of fine. At the existing fixed penalty level, a smoky vehicle offence carries the same penalty to that for some relatively minor traffic offences, for example loading/unloading goods or picking up/setting down passengers in a restricted zones. We consider that there is a case to increase the penalty for a smoky vehicle offence to a similar level as that for other traffic offences which threaten other people's safety. Currently, an overloading offence carries a fixed penalty of \$1,000. We propose to increase the fixed penalty level for smoky vehicle offences to the same level.

TRADE CONSULTATION

27. The transport trades object to the proposed increase in the fixed penalty. They feel that the substantial increase in fixed penalty would impose a heavy burden on the trades which are already experiencing financial difficulties due to the downturn in the economy. Some members of the trade consider that the vehicle maintenance trade is unable to provide proper maintenance service to prevent emission of black smoke. Some of the reasons they cited include a lack of proper training and equipment, poor trade qualifications, restricted access to engine data essential to vehicle repair work, and the absence of a licensing system for vehicle mechanics. Some also reckon the recent introduction of the advanced smoke test by

means of a chassis dynamometer has obviated the need for increasing the fixed penalty as vehicle owners will have to spend thousands of dollars to repair the smoky vehicles, if caught.

PUBLIC VIEWS

28. Numerous representations have been made from members of the public, calling for reduction in vehicle emissions to protect public health and improve the environment for pedestrians at street level. Calls have been made for even more enforcement action and increasing the penalties for smoky vehicle offences.

THE WAY FORWARD

29. We have considered the trade's arguments and public views carefully. The merits of upgrading existing training and trade qualifications, unrestricted access to vehicle maintenance data and a licensing system for mechanics are noted. The Administration welcomes the commitment from many in the motor trade to improve the maintenance standard of their vehicles, and as noted above will work together with the trade to raise awareness, provide training and resolve particular concerns.

30. Public concerns about threats to health from air pollution are justified, and emissions from local vehicles are a major contributor to overall air pollution levels in Hong Kong. Increasing the level of fine for smoky vehicles to that for other vehicle related offences that put other people at risk is justified. It will convey a clear message to all vehicle owners of their responsibility to ensure proper maintenance of their vehicle to reduce the effect its emissions have on others. This will reinforce the message that it is always better to prevent a vehicle from emitting smoke rather than repairing it afterwards.

31. To provide a reasonable time for the trade to improve their maintenance arrangements and for the maintenance trade to upgrade their standards of service, but at the same time to ensure that action will be taken,

we propose to enact the legislation to increase the fixed penalty fine for smoky vehicles but to bring it into effect 6 months after the enactment of the necessary amendments.

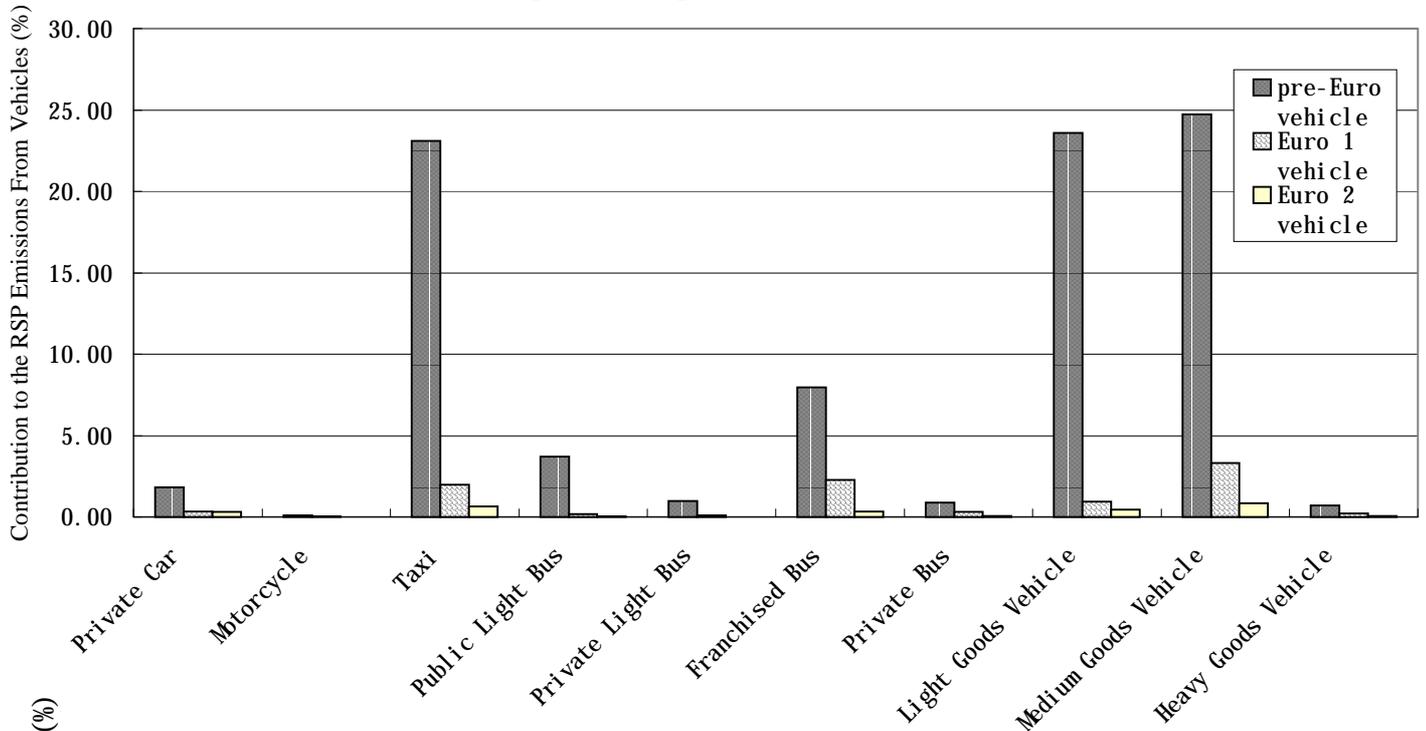
32. Subject to the views of Members, we intend to introduce a resolution to the Legislative Council by next month to amend the Schedule to the Fixed Penalty (Criminal Proceedings) Ordinance to give effect to the proposed increase in fixed penalty for smoky vehicles. We will table the corresponding amendment Regulations at the Legislative Council directly after the resolution is passed. Both the resolution and the amendment Regulations will be brought into effect 6 months after the enactment of the resolution. Details of the proposed amendment are set out at **Annex IV**.

33. Raising the level of fixed penalty for smoky vehicles by itself will not eradicate the problem of smoky vehicles. It will be necessary to work in partnership with the transport and vehicle maintenance trades to tackle the problem at source by upgrading the standards of vehicle maintenance service and to raise the awareness among the transport trades the importance of preventive maintenance. With the support of the community, we consider that the package of measures as set out in this paper will help the parties concerned achieve rapid improvement in maintenance standards and reduction of vehicle smoke emissions.

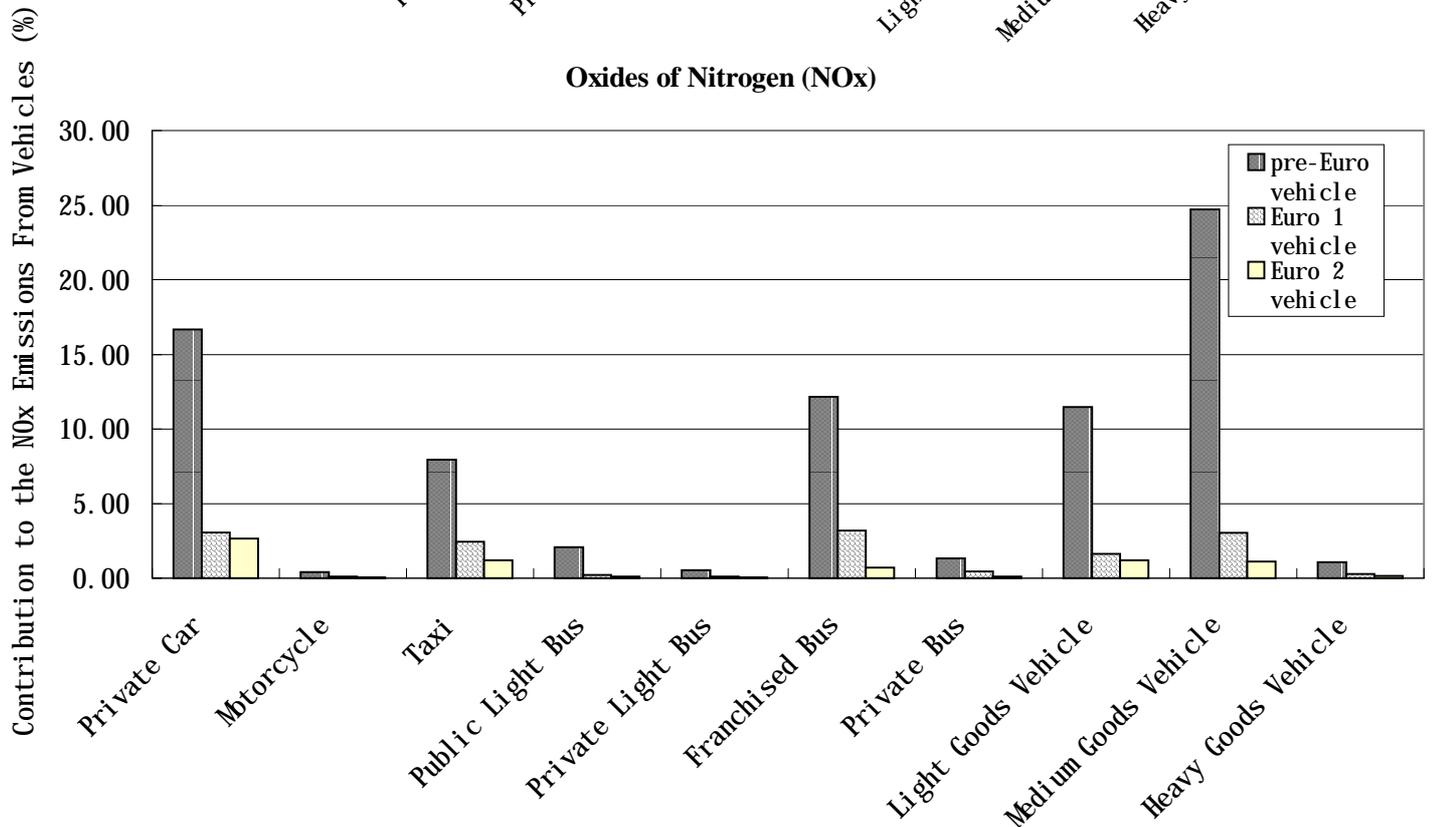
Planning, Environment and Lands Bureau
December 1999

The Emission Profile of the Local Fleet as Reflected in the Age and Model of Vehicles

Respirable Suspended Particulate (RSP)



Oxides of Nitrogen (NOx)



Annex II

The Types of Motor Diesel being used Overseas

Countries	Maximum Limit of Sulphur in Diesel (%)	The Year of Introduction
European Union	0.05	1996
U.S.A.	0.05	1993
Japan	0.05	1997
Singapore	0.05	1999
Taiwan	0.05	1998
Malaysia	0.2	1997

(Note : Motor diesel of sulphur content not more than 0.05% was introduced to Hong Kong in April 1997. We were among the first places in Asia to introduce motor diesel of such a low sulphur content.)

**Vocational Training Council
Training Programmes for Vehicle Mechanics**

The Vocational Training Council (VTC) attaches great importance to the training of automobile workers. It has set up in 1985 the Automobile Industry Training Centre to provide pre-employment training to new entrants as well as upgrading training to in-service automobile workers. The Centre is adequately equipped and staffed by qualified instructors to ensure that high standards of training are maintained. Details of the various training courses offered by the Centre are given in **Appendix A**.

In addition, the Institute of Vocational Education (IVE) of VTC also offers various technical educational courses in automobile engineering at both craft and technician levels. A list of the courses offered by IVE is at **Appendix B**.

LPG Vehicle Servicing

Following Government's introduction of LPG taxis in October 1997, the Training Centre, jointly with the Gas Industry Training Centre, launched in 1998 the LPG vehicle Servicing Course with the aim of training up sufficient mechanics to service and repair LPG vehicles. The Government estimates that the annual training demand is 180 mechanics. Up to end November 1999, a total of 235 vehicle mechanics have been trained with 600 still on the waiting list. To meet the increasing training demand from the industry, the Training Centre will increase the annual training capacity from 180 to 400 commencing January 2000. A new permanent LPG Servicing Workshop has been fitted out in the Automobile Industry Training Centre, which would greatly enhance the existing training facilities for LPG vehicle servicing.

Emission Control (diesel engine)

In improving the air quality, the Government has stepped up actions against smoky vehicles. To help the industry in tackling the emission problems, the Training Centre will introduce in early 2000 a new course on Emission Control (diesel engine). The course mainly covers diagnostic technique in emission reduction. A new dynamometer will be installed in the Training Centre in the next few weeks for this purpose. Depending on demand, more classes will be put on to meet the industry needs.

Appendix A

Automobile Industry Training Centre Course Plan for 1999/2000

	Course Title	Course Type	Course Duration	No. of Class	Class Size	Total No. of Trainees
Pre-employment Course	Basic Craft Course (BCC) in Vehicle Servicing	Full-time Long	44 weeks	14	20	280
	Fundamental in Vehicle Servicing	Full-time Short	9 weeks	3	20	60
Up-grading Course	Upgrading Vehicle Painter	Full-time Short	5 days	2	12	24
	Automobile Air-Conditioning System Servicing	Part-time Evening	10 evenings	2	12	24
	Diesel Fuel Injection System Servicing	Part-time Evening	16 evenings	1	12	12
	Automobile Testing Equipment	Part-time Evening	10 evenings	2	12	24
	Vehicle Painting	Part-time Evening	25 evenings	2	12	24
	Automatic Transmission System Servicing	Part-time Evening	10 evenings	2	12	24
	Electronic Fuel Injection	Part-time Evening	8 evenings	1	12	12
	L.P.G. Vehicles Servicing	Mixed mode	45 hours	18	10	180
Total				47		664

Appendix B

Courses offered by Institute of Vocational Education in Automobile Engineering

1. One-year full time Technician Preparatory Certificate in Motor Vehicle Engineering
2. Two-year full time Diploma in Automotive Engineering
3. Three-year part time day release Craft Certificate for Motor Vehicle Mechanics
4. Three-year part time day release Craft Certificate in Vehicle Body Repairs
5. Three-year part time day release Craft Certificate in Vehicle Body Painting
6. Three-year part time day release Craft Certificate in Motor Vehicle Electricians
7. Two-year part time day release Higher Certificate in Motor Vehicle Engineering
8. One-year part time evening Endorsement Certificate in Motor Vehicle Engineering Management
9. Three-year part time evening Higher Certificate in Motor Vehicle Engineering
10. Three-year part time evening Craft Certificate for Motor Vehicle Mechanics

**Proposed Legislative Amendments for
Increase in Fixed Penalty Fine for Smoky Vehicles**

Item 29 of the Schedule to the Fixed Penalty (Criminal Proceedings) Ordinance (Cap. 240) sets out the amount of the fixed penalty for the offence of the emission of excessive smoke from a motor vehicle under Regulation 31(1)(a) of the Road Traffic (Construction and Maintenance Vehicles) Regulations (Cap. 374, sub. Leg.). Code number 29 in the “List of offences and fixed penalty” in Form 1 in the schedule to the Fixed Penalty (Criminal Proceedings) Regulations (Cap 240, sub. Leg.) also sets out the level of the fixed penalty for the said offence. We propose to increase the fixed penalty for excess smoke from \$450 to \$1,000.

2. Under Section 12 of the Fixed Penalty (Criminal Proceedings) Ordinance (Cap. 240), the Legislative Council may, by resolution, amend the Schedule to the Ordinance. The current proposal is that the Secretary for Planning, Environment and Lands will move a resolution in the Legislative Council to amend item 29 of the Schedule for the increase in fixed penalty for excess smoke from \$450 to \$1,000.

3. Subject to the passage of the resolution as mentioned in the above paragraph, the Secretary for Transport will make the corresponding amendment to Form 1 in the Schedule to the Fixed Penalty (Criminal Proceedings) Regulation (Cap. 240 sub. leg.) pursuant to his power under Section 11 of the Ordinance.

4. The Secretary for Planning, Environment and Lands will appoint a day for both the resolution and the amendment regulation to come into operation by notice in the Gazette. The intention is to bring them into effect six months after the enactment of the resolution.