For discussion on
11 May 2010

LEGISLATIVE COUNCIL
PANEL ON ENVIRONMENTAL AFFAIRS
SUBCOMMITTEE ON IMPROVING AIR QUALITY

A Proposal to Control Emissions of Non-road Mobile Sources

PURPOSE

This paper briefs Members of and seeks Members' views on our proposal to control emissions of non-road mobile sources. Details of the proposal are at **Annex.**

BACKGROUND

2. Non-road mobile sources include mobile machines, transportable industrial equipment and non-road vehicles powered by an internal combustion engine used primarily off the roads. These devices are commonly called "non-road mobile machinery" (NRMM), which find wide applications in airports, container terminals and construction sites.

3. NRMMs contribute to about 7% (6,800 tonnes) and 11% (600 tonnes) of the local emissions of nitrogen oxides and respirable suspended particulates respectively. These air pollutants can cause environmental pollution, nuisance and smog, and have adverse health effects, particularly on the people nearby. Besides, the dark smoke emitted by NRMMs casts a bad environmental image of Hong Kong. We should put these emission sources under control.

4. We have met with NRMM suppliers and operators to understand their operation, share with them our initial thinking on controlling NRMMs and gauge their concern.

KEY PROPOSALS

5. Having regard to the trades' initial feedback and making reference to the practices of other advanced countries, we propose to put in place a control scheme under which NRMMs imported (except those for re-export) into Hong Kong or manufactured locally for placing on Hong Kong market shall comply with a set of statutory emission standards, which are broadly in line with the emission standards of the European Union, the United States and Japan (these standards are of similar stringency).

6. As with other advanced countries, we do not propose to subject in-use NRMMs to emission control at this stage because of the lack of a database for in-use NRMMs similar to the registration database for vehicles.

CONSULTATION WITH STAKEHOLDERS

7. We launched on 3 May 2010 a two-month focused consultation targeting the following stakeholders-

(a) owners and operators of NRMMs, namely, operators in the airport, container terminals and construction sites; and

(b) suppliers of NRMMs, including authorized dealers, importers, dealers and lessors of both first-hand and used NRMMs.

8. The Advisory Council on the Environment and green groups will also be consulted.

ACTION PLAN

9. Upon conclusion of the consultation exercise on 5 July 2010, we will finalise the proposal in the light of the consultation findings towards

the second half of 2010. Our plan is to initiate the necessary legislative procedures within 2011 for implementing the proposed scheme.

ADVICE SOUGHT

10. Members are invited to provide comments on our proposal for controlling emissions of non-road mobile sources.

Environment Bureau/Environmental Protection Department
May 2010

Annex

A Proposal
to Control Emissions of Non-road Mobile Sources

INTRODUCTION

This document outlines the Government's proposal to control emissions of non-road mobile sources in Hong Kong.

BACKGROUND

The Issue in Hong Kong

2. Non-road mobile sources include mobile machines, transportable industrial equipment and non-road vehicles powered by an internal combustion engine used primarily off the roads. These devices are commonly called **"non-road mobile machinery" (NRMM)**, which find wide applications in the airport, container terminals and construction sites. The following are common examples of NRMMs -

Application	**Example of NRMM**
airport	ground service equipment such as aircraft tractors, deck loaders, etc.
container terminal	mobile cargo handling equipment such as gantry cranes, reach stackers, etc.
construction site	mobile construction equipment such as loaders, excavators, etc.

3. There are about 13,500 units of NRMMs operating in Hong Kong, among which 11,300 units are operating at construction sites, 1,600 units

at the airport and 600 units at container terminals. 70% of them are from Japan. The rest come from the US (9%), the EU (9%), the Mainland (5%) and other countries (7%). The estimated average age and average service life of these NRMMs are about 8 years and 14 years respectively.

4. Based on the information gathered from the relevant trades, most of the NRMMs in Hong Kong are imported, some being new while others used. Operators at the airport and container terminals normally acquire new NRMMs, whereas construction works contractors are more likely to acquire used ones. It is also a common practice for construction works contractors to lease from local lessors large construction equipment such as bulldozers, excavators, front-end loaders, mobile generators, etc. Moreover, construction works contractors will bring in from overseas specialist construction machinery such as tunnel-boring machines and huge excavators, which will be shipped out of Hong Kong after the completion of the relevant works.

5. Local NRMM dealers (especially dealers of used NRMMs) are also active in the business of re-exporting imported NRMMs. Some have suggested the majority (over 90%) of the imported used NRMMs would be re-exported to the Mainland, whereas the rest would be placed on the local market for sale or for lease. Unlike brand-new NRMMs, used NRMMs seldom come with certificates or catalogs that could give information on their design emission standards.

Environmental Impacts

6. At present, NRMMs do not need to comply with statutory emission standards as a prerequisite for entering the local market. They are not subject to any legislative air pollutant emission control, except that they must not cause air nuisance and the diesel-driven ones must use diesel with a sulphur content not higher than 0.005%[1].

7. The total emissions from the NRMMs in construction sites,

[1] In accordance with the air pollution abatement provisions under the Air Pollution Control Ordinance, Cap. 311, and the maximum liquid fuel oil sulphur content prescribed in the Air Pollution Control (Fuel Restriction) Regulations, Cap. 311I.

airport and container terminals contributed to about 7% (6,800 tonnes) and 11% (600 tonnes) of the local emissions of nitrogen oxides (NO_x) and respirable suspended particulates (RSP) respectively. These emissions are air pollutants which can cause environmental pollution, nuisance and smog, and have adverse health effects, particularly on the people nearby. Besides, the dark smoke emitted by NRMMs casts a bad environmental image of Hong Kong. Therefore, the environmental impacts should not be ignored. We should thus put these emission sources under control.

Control in the Mainland and Overseas Countries

8. The Mainland and overseas countries including the US, Canada, the EU and Japan have already taken steps to control NRMM emissions. NRMMs manufactured in or imported into these countries for local use, or placed on their market are required to meet certain statutory emission standards. The emission standards of the US, the EU, Japan and Canada are of similar stringency. Compared with the emission standards of the three places, the emission standard of the Mainland is less stringent. Apart from the fulfillment of emission requirement, for which approval by the relevant authorities is necessary, these countries also require labels to be affixed to the NRMMs for identification.

9. It is not a common practice to control the emission of in-use NRMMs. The reason could be the lack of their identification records, which are essential for implementing an in-use control scheme. Only California has introduced legislation to control emissions from mobile cargo handling equipment operated at ports and to reduce emissions from in-use non-road diesel vehicles[2]. To implement and enforce the scheme, California has set up a registration system for all of the 180,000 units of in-use NRMMs concerned and would monitor the retrofit status of all the NRMM fleets.

10. A summary of non-road control schemes in different countries is at **Appendix A**.

[2] The **Regulation for Mobile Cargo Handling Equipment** requires diesel cargo handling equipment, irrespective of being new or in-use, operated at California's ports to meet prevailing emission standards. The **Regulation to Reduce Emissions from In-use Off-road Diesel Vehicles** requires non-road diesel fleets operated in California to meet fleet average emission targets by exhaust retrofits, and to accelerate turnover to newer, cleaner engines.

PROPOSED CONTROL FRAMEWORK

Overall Strategy

11. Having regard to the impacts of emissions from NRMMs and making reference to the practices of other advanced countries, we propose to put in place a control scheme under which NRMMs imported (except those for re-export) into Hong Kong or manufactured locally for placing on Hong Kong market (for sale, lease or use) shall comply with statutory emission standards. The proposed requirements are as follows.

(a) Importers must obtain from the Environmental Protection Department (EPD) approval regarding emission compliance before importing NRMMs (except those for re-export); and likewise local manufacturers before placing their NRMMs on the local market (for sale, lease or use).

(b) Emission compliance means meeting relevant emission standards, which are broadly in line with the standards of the EU, the US and Japan (these standards are of similar stringency).

(c) Each piece of NRMM (except that for re-export) shall bear a durable and visible engine emission information label for identification.

NRMMs Imported for Re-export

12. As for NRMMs imported for re-export, we consider it unnecessary to require them to meet the emission compliance and labelling requirements.

In-use NRMMs

13. As with other advanced countries, we do not propose to subject in-use NRMMs to emission control at this stage because of the lack of a

database similar to the registration database for vehicles. Furthermore, the great diversity of the machinery types of NRMMs makes it technically complicated to draw up an in-use control scheme. Nevertheless, we would closely monitor overseas development in this area and examine in due course the feasibility of introducing relevant emission control measures. Meanwhile, EPD will join hands with operators to promote and speed up the application of general and practicable emission control measures, including -

- encouraging planes to switch off auxiliary power units and use ground power during stopover at the airport;

- converting diesel gantry cranes operated in container terminals to electric or hybrid ones;

- shutting down idling NRMMs; and

- encouraging and facilitating the use of hybrid, electric and clean-fuel (such as LPG) NRMMs.

Scope of Control

14. We propose to target all NRMMs imported into Hong Kong (except those for re-export) or manufactured locally for placing on Hong Kong market (for sale, lease or use) that are –

(a) driven by engines running on diesel, petrol or LPG; and
(b) within the range of power output below:

19kW < power output ≦560kW

unless they are exempted as explained in paragraphs 15-17 below.

Exemption

15. The proposed exclusion of NRMMs of engine power output not greater than 19 kW is on the consideration that they are mainly used for household applications (such as lawns and gardens) and their emission contribution is much smaller than that of large engines. NRMMs of

engine power output greater than 560kW are likely to be specialist construction equipment. In line with Japan, a key supply source of local NRMMs, we propose to exclude these NRMMs from the proposed emission control. Similar practice has also been adopted by the EU and the Mainland.

16. Non-operation NRMMs (including NRMMs in transit and transshipment goods; locally manufactured NRMMs solely for export) are exempted from the proposed emission control because they generate no emission in Hong Kong. For vehicles registered for on-road application, since they are already required to meet emission standards stipulated in the Air Pollution Control (Vehicle Design Standards) (Emission) Regulations (Cap. 311 J), they will not be further subject to the proposed NRMM emission standard.

17. The Director of Environmental Protection will be empowered to exempt a NRMM or a class of NRMM from the control if he considers it appropriate. He may also impose restrictions on their use as part of the exemption.

Emission Standards

18. We propose to implement ***within 2011*** a set of emission standards for NRMMs that are newly imported or manufactured here for placing on the local market (for sale, lease or use). We propose to accept the emission standards of the EU, the US and Japan wherever applicable. The standards of these three areas are broadly of similar stringency. Given that nearly 90% of the NRMMs are imported from the three places, we do not envisage any disruption to the supply of NRMMs on the local market after introducing the emission requirements.

19. Since some on-road vehicles (such as trucks and passenger vehicles) may be used in non-road applications, we also propose to require such NRMMs to comply with the emission standards for on-road vehicles stipulated in the Air Pollution Control (Vehicle Design Standards) (Emission) Regulations (Cap. 311 J).

20. Details of the proposed emission standards are set out below –

(A) Compression Ignition (CI) engines, i.e. those running on diesel

Machinery with engine power (P) in kW	**Proposed standards adopted (on considerations of similar stringency)**
$130 \leq P \leq 560$	EU Stage IIIA, US Tier 3 or Japan MoE Stage 2
$75 \leq P < 130$	EU Stage IIIA, US Tier 3 or Japan MoE Stage 2
$37 \leq P < 75$	EU Stage IIIA, US Tier 3 or Japan MoE Stage 2
$19 < P < 37$	EU Stage IIIA, US Tier 2 or Japan MoE Stage 2

(B) Spark Ignition (SI) engines, i.e. those running on petrol or LPG

Machinery with engine power (P) in kW	**Proposed standard adopted (on considerations of similar stringency)**
$19 < P \leq 560$	US Tier 2 or Japan MoE current standard

DETAILED LEGISLATIVE REQUIREMENTS

Import Declaration, Approval and Labelling Requirement

21. Prior to importing NRMMs or placing on the local market (for sale, lease or use) those manufactured here, the importer or manufacturer must apply for EPD's approval. The application shall include information of the importer or manufacturer (such as name, contact, business registration, etc), the particulars of the NRMMs and their engines (such as serial number, type, model, power output, target date of import or putting in commercial production, and intended usage, etc.). Materials (such as copy of certificate of conformity obtained from USEPA or the EU, certificate of compliance issued by manufacturers, etc.) shall also be provided to substantiate compliance with emission standards. The importer or manufacturer must allow at least 30 days[3] for EPD to process the application. Upon satisfaction of emission compliance, EPD will issue an ***approval*** specifying the approved NRMMs and their engines. EPD will reject the application if it fails to demonstrate emission

[3] Singapore has also a similar 30-day requirement under its control scheme.

compliance.

22. During import clearance, the importer is required to declare to the Customs and Excise Department (C&E)[4] and produce EPD's approval document for inspection upon request.

23. To facilitate inspection by enforcement officers, the importer or manufacturer must ensure that the approved NRMM is properly labelled in accordance with EPD's requirements. The label shall bear all essential information including make, type, model, unique serial or identification number of the approved NRMM and its engine, and engine emission approval information (which is specific to the overseas approving authorities). The label must be durable and readily visible. The labelling requirement will not be retrospectively applied to NRMMs imported or placed on the market in the case of locally manufactured products before implementation of the proposed control.

24. NRMMs imported for re-export are not required to meet emission standards and labelling requirements. However, they are still subject to import approval and import declaration requirements as follows.

(a) The importer must apply for EPD's approval for import and exemption from emission compliance and labelling requirements 30 days before importation. The application shall include a list of the NRMMs, including the number, models, types and unique serial or identification numbers of NRMMs imported.

(b) During import clearance, the importer is required to declare to C&E and produce EPD's approval document for inspection upon request.

[4] The Import and Export Ordinance (Cap. 60) and its Regulations require every person who imports any article other than exempted article to lodge declaration with C&E. For articles prohibited or controlled under the Ordinance or any other legislation in Hong Kong, importers need to obtain in advance import licences, permits or certificates. The control on import goods is done through inspection of documents, and where necessary, physical examination of the goods. Physical examination is conducted on a selective basis. Selected consignments will be detained for physical examination by C&E officers.

(c) After importing an NRMM, if the supplier decides not to re-export the NRMM but place it on the local market (for sale, lease or use), he must apply for EPD's approval 30 days in advance following the procedures set out in paragraphs 21. If the supplier cannot produce relevant documents to substantiate emission compliance (such as certificate of compliance issued by manufacturer), he must provide other reliable supporting documents (such as evidence of certification from overseas approving authorities) for EPD's consideration on a case by case basis. After obtaining EPD's approval for placing the NRMM on the market, the supplier must ensure that the approved NRMM could meet the labelling requirements as mentioned in paragraph 23 above.

(d) The supplier must keep proper records of the import, export and local sale/lease/use (if appropriate) for three years for EPD's inspection.

25. Construction works contractors need to apply for approval before importing specialist construction machinery (such as tunnel-boring machines and huge excavators) for short-term application. The approval will impose conditions on the machinery, the works/projects, the sites of application, and the time period allowed to operate in Hong Kong.

Offence, Penalty and Enforcement,

26. It will be an offence for a person or company to violate any of the requirements stipulated in paragraphs 21, 23, 24 and 25. Making reference to other penalties in Hong Kong and the US (reference provisions at **Appendix B**), we propose the following penalty regime.

Offence	Maximum Penalty
(a) importing into Hong Kong an NRMM not exempted under paragraphs 15-17; (b) placing a locally manufactured NRMM on the local market (for sale,	$200,000 and 6 months' imprisonment

lease or use) ; or (c) placing an NRMM which was imported for re-export on the local market (for sale, lease or use) without a valid approval document issued by EPD	
(a) importing into Hong Kong an NRMM not exempted under paragraphs 15-17; (b) placing a locally manufactured NRMM on the local market (for sale, lease or use); or (c) placing an NRMM which was imported for re-export on the local market (for sale, lease or use); without affixing a label according to the labelling requirements specified by EPD	$50,000 and 3 months' imprisonment
For an NRMM approved for import and exempted from emission compliance, not keeping proper records of the import, export and local sale/lease/use (if appropriate) for three years for EPD's inspection	$50,000 and 3 months' imprisonment
Violating the conditions imposed in an import approval (such as using a piece of specialist construction machinery approved for import for short-term application beyond the time period allowed to operate in Hong Kong)	$200,000 and 6 months' imprisonment

27. EPD will investigate any suspected offence reported from C&E during C&E's duties at all control points of Hong Kong. EPD may also

inspect premises of NRMM suppliers, manufacturers or operators to ascertain the compliance of the proposed requirements. When follow-up action is deemed necessary, EPD may approach them so as to track down the responsible importer or manufacturer[5].

ENVIRONMENTAL BENEFITS

28. According to our estimates, the emissions from NRMMs contribute to about 7% (6,800 tonnes) and 11% (600 tonnes) of the local emissions of NO_X and RSP respectively. If all of these NRMMs are replaced with ones meeting the emission standards, 4.7% (4,500 tonnes) and 9% (500 tonnes) of the local emissions of NO_X and RSP will be reduced respectively. The environmental nuisance generated at container terminals and construction sites near the urban centres could be reduced. The smoke emitted by NRMMs would also be reduced, enhancing the green image of Hong Kong.

IMPACTS OF CONROL SCHEME ON THE TRADES

29. Our initial assessment is that NRMM suppliers would need to make some administrative effort to apply for import approval and to provide evidence of emission compliance. The emission requirement would have very little impact on suppliers and purchasers of brand new NRMMs. It might, however, impinge upon some suppliers (especially those engaged in the second-hand NRMM business) because many of their imported NRMMs are for re-export. Having considered the special situation of the re-export market, we propose not to subject imported NRMMs to the emission compliance requirement if they are for re-export (paragraphs 12 and 24 above). We believe this flexible arrangement could minimize the impacts on NRMM dealers.

30. Adequate time would be allowed for the trade to get accustomed to the proposed control requirement.

[5] Section 27 of the APCO empowers EPD to request information relevant to the investigation of suspected offence.

WAY FORWARD

31. We will consult the key stakeholders including suppliers, owners and operators of NRMMs and relevant trade associations, the Advisory Council on the Environment, the Legislative Council and green groups about this proposal for its finalization. Our plan is to initiate the necessary legislative procedures within 2011 for implementing the proposed scheme.

Environment Bureau/Environmental Protection Department
May 2010

Appendix A

Summary of Non-road Control Schemes in Different Countries

Country	Scope of Engines under Control	Emission Standards	Key Features of Control Schemes
Mainland China	➢ CI engines, power rating (P) ≦ 560 kW	➢ Phased in from Stage I to Stage II standards from 2007 to 2009 ➢ Aligned with EU's Stage I/II standards ➢ On a par with US Tier 1 for power less than 18 kW	*Relevant legislation:* ➢ The national standards, GB20891-2007 *Engine approval:* ➢ Approval required prior to sale, production or import. *Labelling:* ➢ Engines attached engine emission information labels bearing approval data *In-use control:* ➢ No regulatory control program
The United States (Federal)	➢ All sizes of CI engines ➢ Large SI engines, P > 19 kW ➢ Small SI engines, P ≦19 kW	*CI engines:* ➢ phased in from Tier 1 to Tier 4 standards from 1996 to 2015 *Large SI engines:* ➢ Phased in from Tier 1 to Tier 2 standards from 2004 to 2007 *Small SI engines:* ➢ Phased in from Phase 1 to Phase 3 standards from 1997 to 2012	*Relevant legislation:* ➢ CI engine: Title 40 CFR Parts 89, 1039, 1068 ➢ Large SI engine: Title 40 CFR Part 1048 ➢ Small SI engine: Title 40 CFR Part 90 *Engine approval:* ➢ EPA approval prior to sale, introduction into commerce or import *Labelling:* ➢ required *In-use control:* ➢ No regulatory control program ➢ Incentive-based, non-regulatory programs are in place

The United States (California)	➢ Largely aligned with the Federal's scope on the non-road engines under control	➢ Largely aligned with the Federal emission standards ➢ California can impose more stringent requirement	*Control of new equipment:* ➢ Legislation, engine approval and labelling requirements prior to sale, introduction into commerce or import into California are aligned with the Federal system ➢ Required to seek CARB's approval even for the engines already possess EPA's certification. *In-use control:* Regulatory in-use control programs in place: ***Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards, COR Title 13, Section 2479*** ➢ Effective in 2006 ➢ Cover both new and in-use diesel cargo handling equipment operated at California's ports ➢ Require equipment to meet either on-road vehicle's or non-road engine's emission standards ***Regulation to Reduce Emissions from In-use Off-road Diesel Vehicles, COR Title 13, Section 2449*** ➢ Effective in 2008 ➢ Cover in-use non-road diesel vehicles used in California ➢ Require fleets to meet fleet average emission rate targets by exhaust retrofits, accelerated replacement, cleaner engines ➢ Require vehicle body to attach a

			label with a unique Equipment Identification Number assigned by CARB ➢ Incentive funding is available for retrofit of emission reduction device
Canada	➢ All sizes of CI engines ➢ Small SI engines, P ≦ 19 kW	➢ Aligned with the US standards ➢ CI engines currently adopt US Tier 2/3 standards, to be tightened to US Tier 4 standards	*Relevant legislation:* ➢ Off-road CI Engine Emission Regulations, effective in 2006 ➢ Off-road Small S-I Engine Emission Regulations, effective in 2005 *Engine approval:* ➢ Evidence of EPA or non-EPA approval required *Labelling:* ➢ Required I*n-use control:* ➢ No regulatory control program
European Union	➢ CI engines, 19 kW ≦ P ≦ 560 kW, except those used by rail traction engines and inland waterway vessels ➢ Small SI engines, P ≦ 19 kW	*CI engines:* ➢ Phased in from Stage I to Stage IV standards from 1999 to 2014 ➢ Stage III/IV are harmonized with US Tier 3/4 standards *Small SI engines:* ➢ 2 stages of emission standards phased in from 2004 to 2010	*Relevant legislation:* ➢ Directive 97/68/EC and its amendments, effective in 1999 *Type approval:* ➢ Engines are required to possess type approval certificate prior to be placed in the EU market *Labelling:* ➢ Approved engines are required to attached engine emission information labels bearing approval data ➢ Supplementary movable plate with engine emission information readily visible for engines installed into machinery *In-use control:*

			➢ No regulatory control program
Japan	➢ CI engines, 19 kW ≦ P ≦ 560 kW ➢ Large SI engines, 19 kW ≦ P ≦ 560 kW	*CI engines:* ➢ 2 stages of non-road emission standards phased in from 2003 to 2008 ➢ Current MoE standards are of similar stringency to the US Tier 3 and EU Stage IIIA standards ➢ Target to align with US Tier 4 and EU Stage IIIB/IV standards from 2011 to 2014 *Large SI engines:* ➢ Implement in 2007	*Legislation:* ➢ Act on Regulation, etc. of Emissions from Non-road Special Motor Vehicles, effective in 2006 *Engine approval:* ➢ Required *Labelling:* ➢ Required *In-use control:* ➢ Non-road mobile vehicle without Technical Conformity Marks or Special Marks are not allowed to use ➢ Responsible ministers can order non-road mobile vehicle users to make necessary repair to meet the standards Remark: Japan has also established a designation system for construction machinery. The current third construction machinery emission standards are on a par with the non-road emission standards.

Remarks:
CI engines: Compression Ignition engines, fueled by diesel
SI engines: Spark Ignition engines, fueled by petrol or LPG
EPA: The US Environmental Protection Agency
EC: Environment Canada
CARB: California Air Resources Board
MoE: Ministry of Environment, Japan

Appendix B

The Reference Penalty Provisions

Legislation	Penalty provisions
Hong Kong	
Air Pollution Control Ordinance, Cap. 311	Violation of the sale or import ban of amosite and crocidolite is liable to a fine of HK$200,000 and imprisonment for 6 months. Contravention of any term or condition of a specified process licence is liable to a fine of HK$100,000 for first offence, to a fine of HK$200,000 and imprisonment for 6 months for subsequent offence.
Air Pollution Control (Volatile Organic Compounds) Regulation, Cap. 311W	Violation of the manufacture or import ban of paint exceeding the VOC limits is liable to a fine of HK$200,000 and to imprisonment for 6 months. Failure to display product information is liable to a fine of HK$50,000 and imprisonment for 3 months. Failure to keep records or to produce records upon request is liable to a fine of HK$50,000 and imprisonment for 3 months. Illegal import of controlled product is liable to a fine of HK$200,000 and imprisonment of 6 months.
Ozone Layer Protection Ordinance, Cap. 403 & Cap. 403C	Illegal import of ozone depleting substance is liable to a fine of HK$1,000,000 and imprisonment for 2 years.
US	
U.S. Code, Title 42, Section 7524	Anyone who illegally imports an engine may be fined up to US$32,500 per engine.