

For discussion on
26 March 2018

**LEGISLATIVE COUNCIL
PANEL ON ENVIRONMENTAL AFFAIRS**

**Proposal to Tighten Emission Standards for
Non-Road Vehicles under the
Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation**

PURPOSE

The Government proposes to tighten the emission standards for newly approved non-road vehicles under the Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation (Cap 311Z) (the Regulation) in line with the tightening of the emission standards for newly registered road vehicles. This paper briefs Members on the proposal.

BACKGROUND

2. To improve air quality and protect public health, the Government enacted the Regulation on 1 June 2015 to control emissions from non-road mobile machinery (NRMM) (including “non-road vehicles”¹ and “regulated machines”²). Except for pre-existing NRMMs which were exempted at the time of enacting the Regulation, owners of NRMMs must submit applications for approval and relevant documents to the Environmental Protection Department (EPD) to prove that the emissions of the NRMM comply with the emission standards stipulated in the Regulation. When an NRMM is used at specified locations (including airport restricted areas, container terminals and backup facilities, construction sites, designated waste disposal facilities, etc.), a valid approval label issued by EPD must be affixed to it. At present, the statutory emission standards for “non-road vehicles” are Euro V standards (or its equivalent standards) (see paragraph 10 below), and the statutory emission standards for “regulated machines” are EU Stage IIIA standards (or its

¹ Non-road vehicle means a private car, goods vehicle, bus, light bus, motor cycle, motor tricycle or special purpose vehicle that is powered by an internal combustion engine; not licensed under the Road Traffic (Registration and Licensing of Vehicles) Regulations (Cap 374 sub. leg. E); and intended to be used only at specified locations.

² Regulated machine means any mobile machine or transportable industrial equipment (other than a vehicle of a class specified in Schedule 1 to the Road Traffic Ordinance (Cap. 374)) that is powered by an internal combustion engine with a rated engine power output that is greater than 19kW but not greater than 560kW.

equivalent standards).

3. In 2015, NRMMs emitted 7050 tonnes of nitrogen oxides (NO_x) and 570 tonnes of respirable suspended particulates (RSP), which accounted for about 8% and 10% of the total emissions respectively in Hong Kong³. By the end of February 2018, there were more than 45 900 NRMMs (including 11 915 "non-road vehicles" and 34 000 "regulated machines") in Hong Kong.

4. The proposed tightening of emission standards is related to "non-road vehicles". As for "regulated machines", only very few models in the market can comply with the EU Stage IV emission standards. EPD will continue to keep in view the supply of regulated machines that can meet the emission standards and prepare a detailed timetable for tightening their emission standards in due course.

NON-ROAD VEHICLES

5. It is the Government's standing policy to adopt the same prescribed emission standards to "non-road vehicles" and road vehicles as far as practicable, so as to prevent the transfer of old road vehicles, which are no longer road worthy, into non-road applications. Therefore, the prevailing emission standards of all non-road vehicles under the Regulation were the same as those stipulated under the Air Pollution Control (Vehicle Design Standards) (Emission) Regulation (Cap. 311J) when the Regulation was enacted in 2015.

6. Out of the 11 915 "non-road vehicles", there were about 9 240 special purpose vehicles⁴; and 2 675 other vehicles ("other non-road vehicles") which included buses, goods vehicles, light buses and private cars. Both special purpose non-road vehicles and special purpose road vehicles are required to comply with the same statutory smoke emission standard. Therefore, the emission standard of the former does not need to be changed. As for the 2 675 other non-road vehicles (i.e. that target group for the current emission standards tightening exercise), over 80% of them are goods vehicles operating in the airport and container terminals, while the remaining ones are mostly petrol private cars, diesel buses and diesel light buses operating in airport restricted areas. Detailed breakdowns are set out in Table 1.

³ EPD is compiling the emission inventory for 2016.

⁴ Special purpose vehicle means a motor vehicle designed, constructed or adapted primarily for a use other than the carriage of goods, the driver or passengers. Most of the special purpose non-road vehicles are forklifts operating in goods and cargo storage areas. Other examples of special purpose non-road vehicles include pump trucks and crane trucks, etc.

Table 1: Breakdown of other non-road vehicles as of 28 February 2018

Location	Goods Vehicle	Private Car	Bus	Light Bus	Total
Airport	757**	291	69	33	1 150
Container Terminals	1 052**	14	6	9	1 081
Construction Sites	43	45	-	6	94
Others Locations*	294	46	6	4	350
Sub Total	2 146 (80%)	396 (15%)	81 (3%)	52 (2%)	2 675 (100%)

* Other locations include power plants or waste disposal facilities.

** Over 70% (around 1 300) of the 1 809 goods vehicles at the airport and container terminals are heavy duty vehicles (design weight over 3.5 tonnes).

7. At present, EPD processes about 150 new applications for approval of other non-road vehicles a year (see Table 2).

Table 2: No. of new approval applications for other non-road vehicles processed by EPD (up to 28 February 2018)

Year	Goods Vehicle	Private car	Bus	Light bus	Total
2015(June to December)	104	80	-	13	197
2016	89	34	-	11	134
2017	153	23	-	5	181
2018 (Jan to Feb)	14	3	-	1	18
Sub-total	360	140	-	30	530

PROGRESSIVE TIGHTENING OF EMISSION STANDARDS FOR ROAD VEHICLES

8. The Legislative Council approved the amendment to the Air Pollution Control (Vehicle Design Standards) (Emission) Regulations (Cap 311J) on 13 April 2017. The emission standards for newly registered road vehicles have been progressively tightened since 1 July 2017. The implementation timetable is set out in Table 3 below.

Table 3: Implementation timetable of tightened emission standards for road vehicles⁵

Vehicle Class	Commencement Date	
	<i>Euro 6b On Board Diagnostic (OBD)⁶ Euro 6-1⁷</i>	<i>Euro 6c OBD Euro 6-2⁸</i>
Private Car (petrol) and Taxi	1 July 2017	1 September 2019
Light bus and Goods Vehicle (both of design weight not more than 3.5 tonnes)	1 January 2018	1 September 2020
	<i>Euro VI OBD Phase A/B⁷</i>	<i>Euro VI OBD Phase C⁸</i>
Bus (design weight more than 9 tonnes) and Goods Vehicle (design weight more than 3.5 tonnes)	1 October 2018	1 April 2019
	<i>California LEV III</i>	
Diesel private cars	1 October 2017	

9. Compared with their Euro V counterparts, Euro VI heavy duty diesel vehicles emit about 80% less nitrogen oxides (NOx) and 50% less respirable suspended particulates (RSP), while Euro 6 light duty diesel vehicles emit about 55% less NOx.

THE PROPOSAL

10. In line with the standing policy in paragraph 5 above, we propose to tighten the

⁵ There are no changes to the smoke emission standard which applies to special purpose vehicles. For newly registered buses with a design weight of not more than 9 tonnes and light buses with a design weight of more than 3.5 tonnes, Euro V emission standards continue to apply for the time being as there is yet to have supply of Euro VI models in the local market.

⁶ On Board Diagnostic (OBD) as defined in EU Commission Regulation 582/2011 is “a system on board a vehicle or connected to an engine which has the capability of detecting malfunctions, and, if applicable, of indicating their occurrence by means of an alert system, of identifying the likely area of malfunction by means of information stored in computer memory, and of communicating that information off-board”.

⁷ The initial phase of the tightening involve the introduction of more stringent emission standards in the certification emission test as well as other requirements such as new testing procedures for heavy duty vehicles, more comprehensive checking on emissions by the On Board Diagnostic (OBD) system, etc.

⁸ The subsequent phases mainly involve the tightening in stages of the requirements for the OBD system.

emission standards of newly approved other non-road vehicles under the Regulation from 1 January 2019 to bring them in line with the latest statutory vehicle emission standards for newly registered road vehicles. The details are set out in Table 4 below.

Table 4: Proposed tightening of emission standards for newly approved other non-road vehicles and the implementation timetable

Vehicle Class ⁹	Prevailing Emission Standard	Proposed Emission Standards and Implementation Timetable	
		<i>Euro 6b</i> <i>OBD Euro 6-1</i> ¹⁰	<i>Euro 6c</i> <i>OBD Euro 6-2</i>
Private Car (petrol)	Euro V	1 January 2019	1 September 2019
Light bus and Goods Vehicle (both of design weight not more than 3.5 tonnes)	Euro V	1 January 2019	1 September 2020
		<i>Euro VI</i> <i>OBD Phase A/B</i> ¹⁰	<i>Euro VI</i> <i>OBD Phase C</i>
Bus (design weight more than 9 tonnes) and Goods Vehicle (design weight more than 3.5 tonnes)	Euro V	1 January 2019	1 April 2019
Diesel private car	California LEV II	<i>California LEV III</i> 1 January 2019	

BENEFIT

11. Although the number of applications for approval for other non-road vehicles is only over a hundred per year and hence the associated emission reduction due to the

⁹ The current proposal only applies to other non-road vehicle classes where the emission standards of the road vehicles counterparts have been/will be tightened in accordance with Table 3 above. See Footnote 5 for road vehicles where there are no change to the emission standards.

¹⁰ While the proposed implementation date for Euro 6b OBD Euro 6-1 and Euro VI OBD Phase A/B in respect of other non-road vehicles are later than those for their road counterparts (ranging from three months to more than one year), it is not envisaged that the gap will create a loophole for used road vehicles which are not road worthy to become non-road vehicles. Vehicle emission test is required for a used road vehicle to demonstrate the compliance with the prescribed emission standards under the Regulation when applying for approval to be used as a non-road vehicle.

tightening of the emission standards is not significant, there is a need to align the emission standards for "non-road vehicles" and road vehicles, so as to prevent old road vehicles which are no longer suitable for road use from being converted into non-road applications. In addition, the proposal can gradually reduce the emissions from non-road vehicles, which will help improve the air quality in the vicinity of the airport, container terminals and construction sites.

CONSULTATION WITH THE TRADES

12. We have consulted the relevant NRMM stakeholders including vehicle suppliers¹¹, regulated machine suppliers, Hong Kong Construction Association, and operators at the airport and container terminals on our proposal. Vehicle suppliers have confirmed that the supply of Euro VI vehicles will phase in the market with the progressive tightening of road vehicle emission standards. During the consultation, the main issue of discussion centered on the regeneration process of diesel particulate filter¹² (DPF).

13. To comply with the stringent Euro VI emission standards on RSP, Euro VI diesel vehicles are equipped with DPF. DPF is a mature emission reduction technology which can reduce over 90% of RSP emission from diesel vehicles. DPF has been widely adopted by various Japanese vehicle manufacturers starting from their Euro IV vehicles (such as light buses, coaches and goods vehicles etc.) since 2006. In recent years, European vehicle manufacturers have started to adopt DPF in their Euro VI vehicles in order to comply with the stringent Euro VI emission standard of RSP.

14. Under normal operations (such as normal on road applications), the temperature of engine exhaust gas passing through the DPF should be high enough to burn off the trapped RSP. However, when operating at slow speed or idling for a prolonged period, the temperature of engine exhaust gas may not be high enough to burn off the trapped RSP. Manual re-generation¹³ of DPF is therefore required for this type of operation to remove the trapped RSP which would otherwise clog the DPF, rendering the vehicles inoperable.

15. Of the 2 231 non-road vehicles operating at the airport and container terminals, over 80% (1 809) are goods vehicles, including over 70% (1 300) being heavy duty vehicles (design weight over 3.5 tonnes). Most of these heavy duty vehicles are catering trucks at the airport and heavy duty trucks at the container terminals. A few airport operators have

¹¹ The Hong Kong Motor Traders Association (MTA) was consulted; whose members are local representatives of major motor vehicle manufacturers.

¹² Diesel particulate filter is a device to capture RSP generated from fuel combustion inside the engine. Collected RSP will be oxidized and removed from the filter.

¹³ Manual re-generation operation of DPF is a manual post-combustion fuel injection process to raise the operating temperature of the DPF in order to burn away the trapped RSP.

already been using Euro VI catering trucks, supplied by a European vehicle manufacturer, at the airport restricted area. Owing to the speed limit at airport restricted area (i.e. 30 km/hr) and long idling time for catering truck operation, manual regeneration of DPF is required at an interval from once a week to once a month, depending on the daily routine operations of the catering trucks. While indicating no objection to the proposal, a major airport operator advised that it would need to make effort to adapt to the operational requirement of its Euro VI vehicles supplied by this European vehicle manufacturer by scheduling manual DPF regeneration on a regular basis. At our request, the European vehicle manufacturer has further refined the manual DPF regeneration of these catering trucks with a view to lengthening the time interval required for manual DPF regeneration. The remaining airport operators did not raise objection to our proposal, either because their operation was less frequent and hence scheduling of regeneration was not a problem; or because they have been using vehicles from Japanese vehicle suppliers, and have thus got used to manual DPF regeneration¹⁴.

16. For the container terminals, some operators have conducted trial operation of Euro VI container trucks supplied by another European vehicle manufacturer. The engine of the Euro VI container truck was specially designed to suit local container terminal operations and manual regeneration of DPF was only required once a month. Container terminal operators in general were supportive of the proposal.

CONSULTATION WITH ADVISORY COUNCIL ON THE ENVIRONMENT

17. We consulted the Advisory Council on the Environment (ACE) on 5 March 2018. The ACE supported the proposal and urged the Government to implement the new emission standards as soon as possible.

LEGISLATIVE PROCESS

18. We aim at introducing the amendments of the Regulations to the Legislative Council in the fourth quarter of 2018 so that the proposal can be effective from 1 January 2019.

Environmental Protection Department
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¹⁴ During our consultation, Japanese vehicle suppliers also expressed that they did not foresee operators having problem with manual DPF regeneration for their Euro VI models, because operators have got used to manual DPF regeneration since their Euro IV models.