

**For discussion on
19 December 2016**

**LEGISLATIVE COUNCIL
PANEL ON ENVIRONMENTAL AFFAIRS**

**Proposals to Tighten Emission Standards for
Newly Registered Vehicles**

PURPOSE

This paper consults Members on our revised proposal to tighten the statutory emission standards for newly registered motor vehicles (except diesel private cars) to Euro VI in phases, and for newly registered diesel private cars to California LEV III, starting from 1 July 2017, to improve roadside air quality.

BACKGROUND

2. To improve roadside air quality and protect public health, our standing policy is to tighten motor vehicle fuel and emission standards in line with international developments when there is an adequate supply of compliant fuels and vehicles in Hong Kong. With the support of Advisory Council on the Environment (ACE) and approval of the Legislative Council, we have been tightening the emission standards for newly registered vehicles as follows, having regard to the prevailing standards at that time :

Vehicle Class	Emission Standard	Implementation Date for Newly Registered Vehicles
Private car (diesel)	California LEV II	1 January 2006
Motor cycle and tricycle	Euro III	1 January 2007
Private car (petrol) and taxi	Euro V	1 June 2012
Goods vehicle (except diesel light goods vehicle with design weight not more than 3.5 tonnes), light bus and bus	Euro V	1 June 2012
Diesel light goods vehicle with design weight not more than 3.5 tonnes	Euro V	31 December 2012

3. The European Union (EU) started tightening emission standards for newly registered vehicles (**except motor cycles and tricycles**) in phases to Euro VI on 31 December 2013, according to the following timetable :

Category of Vehicles	Commencement Date	
	Euro VI OBD Phase A/B	Euro VI OBD Phase C
Heavy Duty Vehicle ^[1]	31 December 2013	31 December 2016
	Euro 6b ^{[2][3]} OBD Euro 6-1	Euro 6c ^[4] OBD Euro 6-2
Light Duty Vehicle (passenger car)	1 September 2015	1 September 2018
Light Duty Vehicle (goods vehicle)	1 September 2016	1 September 2019

4. The initial phase of the tightening was 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)^[5] system, etc. The subsequent phases mainly involve tightening in stages of the requirements for the OBD system.

5. A table showing the Euro V and Euro VI emission standards is at **Annex A**. Compared with their Euro V counterparts, Euro VI heavy duty diesel vehicles emit about 80% less nitrogen oxides (NO_x) and 50% less respirable suspended particulates (RSP) while Euro VI light duty diesel vehicles emit about 55% less NO_x. Petrol light duty vehicles are subject to the same emission limits for both Euro V and Euro VI emission standards except for those petrol vehicles equipped with direct injection engines. In recent years, direct injection petrol engines are gaining popularity in Europe because of better fuel economy and some Japanese vehicle manufacturers have also started developing such engines. However, since they also emit PM_{2.5} like diesel engines, EU introduced in the Euro VI standard a Particle Number (PN) limit for them as in the case of their diesel counterparts.

¹ EU defines heavy duty vehicles as vehicles of design weight more than 3.5 tonnes, irrespective of their fuel types. Smaller vehicles are called light duty vehicles.

² By now, Euro 6a has been superseded by Euro 6b. Vehicles in compliance with Euro 6a can no longer register in EU.

³ Euro 6b adopts a revised measurement procedure for particulate matters and a preliminary particle number standard for petrol vehicles with direct injection engines.

⁴ Euro 6c adopts a final particle number standard for petrol vehicles with direct injection engines.

⁵ Definition of 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".

6. In Asia, Korea was the first economy to implement Euro VI emission standards for newly registered vehicles (except motor cycles and tricycles) which took effect from January 2015. The next one will be Singapore, which plans to do so in September 2017.

7. For **motor cycles and tricycles**, EU will implement Euro IV emission standards in January 2017. Compared with their Euro III counterparts, Euro IV motor cycles emit about 60% less NO_x and 50% less volatile organic compounds (VOC) from the tailpipes. EU will also introduce control on evaporative emission of VOC and requirements for OBD system to further reduce their emissions. A table showing the standards of Euro III and Euro IV for motor cycles and tricycles is at **Annex B**. Taiwan plans to follow EU's timetable to implement Euro IV standards for motor cycles and tricycles.

The Initial Proposal

8. According to our consultation with vehicle suppliers^[6], all major vehicle suppliers would be able to put on the local market Euro VI private cars and taxis, starting from September 2016; and Euro VI commercial vehicles starting from January 2017, except bus with design weight not more than 7 tonnes and light bus with design weight more than 3.5 tonnes, for which their major suppliers are still working on Euro VI models. We thus consulted this Panel at its meeting on 27 November 2015 (LC Paper CB(1)180/15-16(03)) about adopting Euro VI standards for newly registered vehicles in steps – private car & taxi from 1 September 2016; bus (double-decker) from 1 January 2018; and remaining classes (except bus of design weight not more than 7 tonnes and light bus of design weight more than 3.5 tonnes) from 1 January 2017. We undertook to report back to this Panel after consulting other relevant stakeholders. We also informed Members that we would review the control regarding new registration of diesel private cars, having regard to their emissions when in use on road and their impact on our local air quality, local market situations, technological developments, and other relevant considerations.

9. With the support of this Panel, we then consulted the relevant trades (including the transport trades and vehicle maintenance trade) in December 2015 on adopting Euro VI standards and embarked on the review on diesel private cars. We

⁶ The consultation involved the Motor Traders Association of Hong Kong (MTA), whose members are local representatives of major motor vehicle manufacturers; the Automotive Council of European Chamber of Commerce in Hong Kong (EuroCham), whose members are European vehicle manufacturers; the Right Hand Drive Motor Association (Hong Kong) Limited (RHDA), which represents parallel importers; the Hong Kong Bus Suppliers Association (HKBSA), whose members are bus manufacturers; and the Hong Kong Trucks Merchants Association Limited (HKTMA), which represents truck merchants.

also continued our dialogue with motor cycle and tricycle suppliers with a view to developing a proposal to tighten the emission standards for newly registered motor cycles and tricycles to Euro IV standards as soon as possible.

CONSULTATION WITH THE TRADES

The Transport Trades

10. We have consulted the relevant transport trades including operators of taxi, truck, non-franchised bus and franchised bus about the initial proposal on adopting the Euro VI standards. The transport trades asked for deferring the proposed implementation timetable for diesel trucks and non-franchised buses by at least one year (i.e. 1 January 2018) to allow more Euro VI vehicle models on the local market and more time for vehicle mechanics to pick up the maintenance skill for these vehicles of advanced engine design.

The Vehicle Maintenance Trade

11. We have consulted the Hong Kong Commercial Vehicle Maintenance Association, Environmental Vehicle Repairers Association and the Hong Kong Vehicle Repair Merchants Association, all of which represent the local vehicle maintenance trade, particularly those not associated with the authorized local agents of vehicle manufacturers. They do not object to the proposal and are proactive in helping us organize vehicle maintenance seminars in conjunction with Vocational Training Council and vehicle manufacturers to disseminate maintenance information for diesel commercial vehicles of advanced engine design. We will continue holding these seminars to help the vehicle maintenance trade master the skill to repair diesel vehicles of advanced engine design.

Motor Cycle and Tricycle Suppliers

12. According to the motor cycle and tricycle suppliers^[7], the supply of Euro IV motor cycles is still limited in the local market, and the availability timing remains unclear at this stage.

DIESEL PRIVATE CARS

⁷ The consultation involved Hong Kong Motorcycle Association and Hong Kong Motorcycle Chamber of Commerce which comprise representatives of major motor cycle manufacturers and parallel importers.

The Review Findings

13. In the case of diesel private cars, which generally emit more NO_x and RSP than petrol cars, the standing policy is to adopt the most stringent emission standards to discourage registration of these vehicles. To this end, we have adopted the emission standard of California of the United States for diesel private car since 1998. In 2015, the State of California tightened its vehicle emission standards to LEV III. A comparison of the California LEV II and LEV III standards is at **Annex C**. California's emission standard remains the most effective means to control the emissions of diesel private cars.

14. Since 2010, more diesel cars have joined the private car fleets. The number of registered diesel private cars tripled in six and a half years from 2 066 in December 2009 to 6 741 in September 2016, much faster than the corresponding growth of petrol private cars (32%). These diesel private cars were allowed first registration even though they did not meet the California LEV II standard, because they could comply with the prevailing statutory EU emission standards for petrol private cars as certified by the relevant laboratory test.

15. In recent years, evidence^[8] has emerged that diesel private cars emit much more NO_x on road than during testing in an emission certification laboratory. Their on road emissions of NO_x are also higher than those of petrol private cars.

16. Furthermore, unlike petrol cars, whose gross emitters could be identified by the Environmental Protection Department's (EPD) roadside remote sensors, the emission monitoring technology for diesel vehicles is still rudimentary, which makes effective identification of poorly maintained diesel vehicles with excessive NO_x emissions difficult. **If the growth of diesel private cars is unchecked, we expect they will continue to grow quickly, thereby posing a significant risk to our roadside air quality.** At present, diesel (which is used mostly by commercial vehicles) does not have fuel duty but petrol has a fuel duty of \$6.06/litre. The preferential fuel duty for diesel will continue to incentivize the locals to buy diesel private cars, leading to their continuous growth.

17. In view of the above, we consider it necessary to tighten the emission

⁸ i) Vicente Franco, Francisco Posada Sanchez, John German, and Peter Mock (2014). Real-World Exhaust Emissions from Modern Diesel Cars. The International Council on Clean Transportation
ii) The Department for Transport of United Kingdom (2016). Vehicle Emissions Testing Programme. The Department for Transport of United Kingdom
iii) Transport & Environment (2016). Dieselgate: Who? What? How? Transport & Environment

standards for newly registered diesel private cars to California LEV III, starting from 1 July 2017, and will not accept diesel private cars meeting Euro VI petrol car standards.

Diesel Private Car Suppliers

18. Some diesel private car vendors argued that the Euro VI emission standards applicable to petrol private cars, rather than the California LEV III, should be adopted by the Government for diesel private cars despite the fact that diesel private cars are currently subject to control of California LEV II. They opined that the adoption of California LEV III would discourage first registration of diesel private cars and reduce choices for car buyers. Their key arguments are that (a) the emissions of diesel private cars should be evaluated holistically because they have the edge over petrol ones for emissions except higher NO_x; (b) EPD's proposed legislation changes for diesel private cars was given in short notice that time was insufficient for the manufacturers to react and (c) the relatively small population of diesel private cars is unlikely to create as much adverse impact to roadside air quality as diesel commercial vehicles.

19. We do not agree to the arguments of diesel private car vendors. Our roadside air quality has been and is still suffering from high NO_x levels. As explained in paragraphs 15 and 16 above, the higher level of emissions of diesel private cars during real driving coupled with the lack of an effective means to catch poorly maintained diesel private cars with excessive emissions for repair will continue to pose significant risk to our roadside air quality, particularly in terms of NO_x emissions. Furthermore, since diesel, the dominant fuel for commercial vehicles, is not subject to fuel duty, the failure to adopt California LEV III standards will continue to tip the balance in the favour of diesel private car owing to potential fuel cost saving. Unless actions are taken, the number of diesel private cars will continue to grow at a pace much faster than petrol private cars in the local market as in the past few years, thereby creating more serious roadside air pollution. We consider that the California standards remain to be the most effective means and the more stringent California LEV III should be adopted. Our proposal to start implementing the California LEV III standard from 1 July 2017 has already allowed some eight months (counting from the date we informed the vehicle supplier trade in October 2016) for diesel private car vendors to plan ahead.

THE REVISED PROPOSAL

20. Having regard to feedback received during the consultation, we recommend

the following implementation timetable for the **Euro VI** emission standards :

Light Duty Vehicles with Design Weight not more than 3.5 Tonnes

Vehicle Class	Proposed Commencement Date	
	<i>Euro 6b</i> <i>OBD Euro 6-1</i>	<i>Euro 6c</i> <i>OBD Euro 6-2</i>
Private Car (petrol) and Taxi	1 July 2017	1 September 2019
Light bus and Goods Vehicle	1 January 2018	1 September 2020

Heavy Duty Vehicles with Design Weight more than 3.5 Tonnes

Vehicle Class	Proposed Commencement Date	
	<i>Euro VI</i> <i>OBD Phase A/B</i>	<i>Euro VI</i> <i>OBD Phase C</i>
Bus (design weight more than 9 tonnes) and Goods Vehicle	1 January 2018	1 April 2019
Bus (design weight not more than 9 tonnes ^[#]) and Light Bus	Awaiting an adequate supply of Euro VI models on the local market	

Notes: # Revised from “not more than 7 tonnes” to “not more than 9 tonnes” at the advice of the Hong Kong Bus Suppliers Association

21. As for bus (design weight not more than 9 tonnes) and light bus (design weight more than 3.5 tonnes), we will continue to monitor closely their supplies with a view to tightening their emission standards to Euro VI as soon as practicable.

22. In tightening the emission standards, we will maintain the current practice of accepting Japan and US standards which are not inferior to the Euro VI requirements.

23. We will continue to work with **motor cycle and tricycle** suppliers on a practicable timetable to tighten as soon as possible the relevant emission standards to Euro IV.

24. For newly registered **diesel private cars**, we will tighten the emission standards to California LEV III, starting from 1 July 2017, and will not accept diesel private cars meeting Euro VI petrol car standards.

CONSULTATION WITH ADVISORY COUNCIL ON THE ENVIRONMENT

25. We consulted the ACE on 14 November 2016. The ACE endorsed the proposal and urged the Government to implement the new standards as soon as possible.

PUBLIC REACTIONS

26. The public is expected to support the proposal, which will help further reduce the emissions of motor vehicles and improve roadside air quality.

ADVICE SOUGHT

27. Members are invited to support the revised proposal set out in paragraphs 20 to 24 above to tighten the emission standards for newly registered vehicles.

Environmental Protection Department
December 2016

Euro V and Euro VI Emission Standards for Motor Vehicles

Design Weight	Vehicle Class	Durability (km)	Emission Limits							
			Nitrogen Oxides		Volatile Organic Compounds (Hydrocarbons)		Respirable Suspended Particulates		Particle Number	
			Euro V	Euro VI	Euro V	Euro VI	Euro V	Euro VI	Euro V	Euro VI
Not more than 3.5 tonnes	Private Car (Petrol)	160,000	60	60	100	100	4.5	4.5	Not	$6 \times 10^{11} \wedge \#$
	Taxi (Petrol/LPG)		(mg/km)	(mg/km)	(mg/km)	(mg/km)	(mg/km)	(mg/km)	Applicable	(#/km)
	Goods Vehicle (Petrol)		82	82	160	160	4.5	4.5	Not	$6 \times 10^{11} \wedge \#$
	Light Bus (Diesel)		280	125	Not Applicable		4.5	4.5	6×10^{11}	6×10^{11}
	Goods Vehicle (Diesel)									
More than 3.5 tonnes	Goods Vehicle (weight not more than 16 tonnes)	300,000	2,000	400	460	130	20	10	Not	8×10^{11}
	Goods Vehicle (weight more than 16 tonnes)	700,000								
	Bus (weight more than 9 tonnes)	700,000								

Remark: \wedge For direct injection engine only.

Preliminary PN limit 6×10^{12} (#/km) for Euro 6b; and final PN limit 6×10^{11} (#/km) for Euro 6c

Euro III and Euro IV Emission Standards for Motor Cycles & Tricycles

Vehicle Class	Emission Limits			
	Nitrogen Oxides (mg/km)		Volatile Organic Compounds (mg/km) (Hydrocarbons)	
	Euro III	Euro IV	Euro III	Euro IV
Motor Cycle & Motor Tricycle (Petrol)	220	90	330	170

California LEV II and LEV III Standards for Private Cars

California Standards	Durability (km)	Emission Limits		
		Non Methane Organic Gas (mg/km)	Nitrogen Oxides (mg/km)	Respirable Suspended Particulates (mg/km)
LEV II	193,200	56	43	6.21
LEV III	241,500	99		6.21