

## LCQ19: Emission of air pollutants by public transport modes

Following is a question by the Hon Chan Hak-kan and a written reply by the Secretary for the Environment, Mr Wong Kam-sing, in the Legislative Council today (September 8):

Question:

Regarding the emission of air pollutants by public transport modes, will the Government inform this Council:

(1) of the quantities of the various types of air pollutants (i.e. (i) sulphur dioxide, (ii) nitrogen oxides, (iii) carbon monoxide, (iv) respirable suspended particulates, (v) volatile organic compounds and (vi) fine suspended particulates) emitted last year by (a) buses, (b) public light buses (PLBs), (c) taxis and (d) ferries, as well as (e) the percentage of the quantity of each type of air pollutants emitted last year by such transport modes in the total emissions of air pollutants in Hong Kong (set out in the table below);

Type of air pollutants	(a)	(b)	(c)	(d)	(e)
(i)					
...					
(vi)					

(2) whether it has estimated the respective numbers of franchised buses, PLBs and taxis that will reach their normal retirement age in (i) 2024, (ii) 2026 and (iii) 2031;

(3) given that the Government grants subsidies through the New Energy Transport Fund to franchised bus companies for purchasing double-deck battery-electric buses, whether the Government knows the progress of the procurement work, and whether it has plans to encourage franchised bus companies to introduce hydrogen fuel cell battery-electric buses; if so, of the details; if not, the reasons for that;

(4) of the progress of discussion between the Government and franchised bus companies on the arrangement for the full electrification of single-deck buses, and the implementation timetable;

(5) as the Government anticipates that the pilot scheme on electric PLBs will not commence until 2023, whether it will explore advancing the commencement of the scheme so as to phase out diesel PLBs as early as possible;

(6) of the number of first registered PLBs in each of the past three years,

with a breakdown by the type of energy they used (i.e. diesel, liquefied petroleum gas, hybrid power, and electricity);

(7) given that the Government is discussing with the taxi trade the implementation of a trial scheme to examine the operation of electric taxis as well as the performance of taxis of different models, of the relevant details (including the number of charging facilities to be provided);

(8) of the quantity of air pollutants emitted by ferries as well as its percentage in the total emissions by all vessels, in each of the past three years;

(9) whether it will draw up a timetable for implementing a requirement that vessels may be powered only by electricity within the Victoria Harbour; if so, of the details; if not, the reasons for that;

(10) as the Government has indicated in the Hong Kong Roadmap on Popularisation of Electric Vehicles that it would promote trials for various modes of electric public transport and commercial vehicles, with a view to setting a concrete way forward and a timetable in around 2025, whether the Government will set a more aggressive work target, such as setting before 2025 the percentage of electric buses in the total number of buses in Hong Kong; if so, of the details; and

(11) whether it has studied the introduction of public transport modes to be powered by hydrogen; if so, of the details; if not, the reasons for that?

Reply:

President,

Improving air quality has long been one of the Government's key tasks in environmental protection. As electric vehicles (EVs) have no tailpipe emissions, replacing conventional vehicles by EVs will help not only improve roadside air quality but also reduce carbon emissions. The Environment Bureau (ENB) announced in March this year the first Hong Kong Roadmap on Popularisation of Electric Vehicles (EV Roadmap), setting out the long-term policy objectives and plans on the adoption of EVs and their associated supporting facilities which include ceasing new registration of fuel-propelled private cars including hybrid vehicles in 2035 or earlier. The Government's long-term target is to attain zero vehicular emissions before 2050, which acts in concert with other target of achieving carbon neutrality in the same time frame in Hong Kong. The Government will actively promote trials on electric public transport and commercial vehicles, with a view to mapping out a more concrete way forward and timetable in the review of EV Roadmap around 2025.

Moreover, the ENB announced in late June this year the new Clean Air Plan for Hong Kong 2035, detailing the goals and major areas of action to continuously improve air quality in Hong Kong from now to 2035 which include the promotion of the use of new energy vehicles and vessels.

As regards the question on emissions of air pollutants by public transport modes as raised by the Hon Chan Hak-kan, our responses in consultation with the Transport Department (TD) are as follows:

(1) The Environmental Protection Department (EPD) compiles the Hong Kong Air Pollutant Emission Inventory annually to analyse the distribution and trends of major air pollutant emission sources in Hong Kong. The emission inventory for 2020 is still under compilation. Based on the Hong Kong Air Pollutant Emission Inventory for 2019, figures on air pollutant emissions with a breakdown by mode of local public transport (including franchised buses, public light buses (PLBs), taxis and ferries) and their respective percentage to the total local emissions are tabulated below:

Major Air Pollutant	2019 Emissions (Tonnes) (Note) (Percentage to Total Local Emissions)				Percentage of Emissions from Four Public Transport Modes to Total Local Emissions in 2019
	Franchised Buses	PLBs	Taxis	Ferries	
Sulphur dioxide	<5 (<1%)	<5 (<1%)	<5 (<1%)	30 (<1%)	<1%
Nitrogen oxides	2 300 (3%)	370 (<1%)	2 000 (2.6%)	1 830 (2.4%)	8%
Carbon monoxide	1 100 (1.8%)	4 900 (8.1%)	10 300 (17.1%)	330 (<1%)	27%
Respirable suspended particulates	70 (2%)	<5 (<1%)	<5 (<1%)	30 (<1%)	3%
Volatile organic compounds	40 (<1%)	250 (1.2%)	170 (<1%)	30 (<1%)	2%
Fine suspended particulates	70 (2.7%)	<5 (<1%)	<5 (<1%)	30 (1.1%)	4%

Note: For figures on vehicular emissions, those less than 5 are represented by "<5", those between 5 and 10 are rounded to the nearest integral, those between 10 and 1 000 are rounded to the nearest ten, those between 1 000 and 10 000 are rounded to the nearest hundred, those larger than 10 000 are rounded to three significant figures. For figures on vessel emissions, they are rounded to the nearest ten.

(2) Currently, franchised buses mainly use diesel as fuel. As regards the retirement arrangement of franchised buses, a bus shall retire from service before its age reaches 18 years old. Subject to the actual fleet replacement situation of franchised bus companies (FBCs), the TD estimated that FBCs will replace around 90, 60 and 480 franchised buses in 2024, 2026 and 2031 respectively.

The Government also limits the service life of diesel commercial vehicles (DCVs) (including PLBs) to 15 years for those newly registered on or after February 1, 2014. With the programme for phasing out pre-Euro IV DCVs ended in end-June 2020, the EPD launched another incentive-cum-regulatory programme in October 2020 to progressively phase out about 40 000 Euro IV DCVs by the end of 2027. As vehicular emissions of liquefied petroleum gas (LPG) vehicles are generally lower than that of diesel vehicles, the Government currently has no plan to set the retirement age for PLBs and taxis running on LPG.

(3) Having regard to the latest development in technologies on double-deck electric buses (e-buses), the New Energy Transport Fund granted subsidies to the Kowloon Motor Bus Company (1933) Limited and the Citybus Limited in November 2020 for conducting trials on a total of four double-deck e-buses. The two bus companies are inviting tenders and the trials are expected to commence in 2023.

Since the promulgation of the EV Roadmap, the feedbacks from different sectors of the community are positive. For instance, FBCs have announced separate and detailed plans on procuring double-deck e-buses and installing charging facilities in new bus depots, as well as actively assessing the feasibility of using hydrogen fuel cell buses. On the use of hydrogen energy, the Government will set up an inter-departmental working group to handle a range of preparation work on the supply of hydrogen energy and the necessary technological studies, safety considerations, regulatory legislation, etc. that are needed for the local application of hydrogen energy.

(4) The Government has subsidised FBCs in full to purchase 36 single-deck e-buses and the ancillary charging facilities for trial on a number of routes, with a view to assessing their operational performance under local circumstances. Among these e-buses, 33 have commenced their two-year trials.

The Government have been working with FBCs to install new charging facilities at suitable bus termini and depots for single-deck e-buses to conduct top-up charging during their daytime operation, so that they will be able to cope with the frequent bus services in Hong Kong. The Government will review the trial findings, application and operation performance of single-deck e-buses in the coming few years, with a view to formulating a comprehensive electrification plan.

(5) PLBs are a means of transportation unique to Hong Kong with specific dimensions, specifications and number of seats. As technologies related to electric PLBs (e-PLBs) are still under development, coupled with the fact that both the hilly terrain in Hong Kong and the supply of air-conditioning during summer require e-PLBs to have batteries catering for a higher driving range, models of e-PLB that can meet their whole-day operational needs are currently not yet available in the local market. To speed up the adoption of e-PLBs in Hong Kong, the Government engaged a consultant in March 2019 to develop the basic specifications and requirements that are suitable for the local operating environment of e-PLBs and their associated charging facilities, thereby providing guidance for manufacturers and charging service

providers in the manufacturing of e-PLBs and charging facilities capable of fast charging. The consultant was also tasked to identify suitable PLB routes for trial under the pilot scheme on e-PLBs, and to consult PLB trade members about their intention of joining the pilot scheme and using e-PLBs. The guidelines on such specifications and requirements were published in October 2020. In addition, the Government has preliminarily identified eight public transport interchanges for installing quick charging facilities to facilitate the early implementation of the pilot scheme.

Given that PLB is a type of vehicle not popular in the international market, and that its development and manufacturing will take time, the Government anticipate that the trial of the first batch of e-PLBs will commence in mid-2023.

(6) The numbers of first registered PLBs from 2018 to 2020, with a breakdown by fuel type, are tabulated below:

Year	Number of First Registered PLBs			
	Diesel	Liquefied Petroleum Gas	Electric	Total
2018	160	336	0	496
2019	142	339	0	481
2020	12	147	0	159

Note: Figures on hybrid vehicles have been included in the respective fuel types.

(7) The Government is exploring with the taxi trade to launch a trial of electric taxis (e-taxis) and planning to take forward pilot projects to test the operation and performance of different e-taxi models in Lantau Island and Sai Kung where taxi operations within these areas are relatively confined. The Government will set up not less than ten dedicated quick chargers for e-taxis with an output power of 100kW. About 12 e-taxis will be trialed and the number of e-taxis would be gradually increased depending on the actual operation of the e-taxis and chargers. The Government anticipated the trial would start in 2023. The trial will help the taxi trade to adapt to the operational mode of e-taxis. The Government will make reference to the outcome of the trial and formulate policies to further promote the adoption of e-taxis.

(8) As mentioned in item (1) above, the Hong Kong Air Pollutant Emission Inventory for 2020 is still under compilation. Figures on air pollutant emissions by ferries in Hong Kong between 2017 and 2019 are tabulated as follows:

Major Air Pollutant	Emissions by Ferries (Tonnes) (Note) (Percentage to Total Vessel Emissions in Hong Kong)		
	2017	2018	2019

Sulphur dioxide	30 (<1%)	30 (<1%)	30 (1%)
Nitrogen oxides	1 800 (6%)	1 800 (6%)	1 830 (7%)
Carbon monoxide	320 (2%)	320 (2%)	330 (2%)
Respirable suspended particulates	30 (2%)	30 (2%)	30 (3%)
Volatile organic compounds	30 (1%)	30 (1%)	30 (1%)
Fine suspended particulates	30 (2%)	30 (3%)	30 (4%)

Note: All emission figures are rounded to the nearest ten.

(9) The Government has been encouraging the transportation industry to test and use new energy transport technologies to help improve air quality. At present, new energy vessels are not widely used. The Government is preparing to launch a pilot scheme and test the technical and operational performance of electric and hybrid ferries in in-harbour and outlying islands ferry routes respectively. Subject to the trial results and technological development of new energy vessels, the Government will explore with the ferry operators the possibility of progressively replacing traditional ferries with new energy ferries before 2035.

(10) As stated in the EV Roadmap, the Government will pave the way for the trade to switch to electric commercial vehicles progressively in the coming few years. The Government will continue to conduct trials together with different trades to test the technical and commercial viability of different types of electric commercial vehicles for use in the local environment, with a view to identifying the best options for Hong Kong and setting out a more concrete way forward and timetable in the review of the EV Roadmap around 2025. Therefore, it is premature to set targets for the percentage of e-buses to the total number of buses in Hong Kong at the current stage.

(11) As mentioned in item (3) above, the Government will set up an inter-departmental working group to handle a range of work relating to the local application of hydrogen energy. These include examining the feasibility of using hydrogen fuel cell electric vehicles (FCEVs) in Hong Kong as well as the supporting facilities required, such as building hydrogen filling facilities, providing training to technical personnel to use and repair FCEVs safely, etc.