

**For discussion  
on 26 February 2018**

**LEGISLATIVE COUNCIL  
PANEL ON ENVIRONMENTAL AFFAIRS**

**Promoting the Use of Electric Vehicles**

**PURPOSE**

This paper outlines the efforts made by the Government in promoting the use of electric vehicles (EVs).

**KEY POLICIES AND MEASURES TO PROMOTE THE USE OF EVs**

2. Commercial vehicles (CVs) account for 95% of the vehicular emissions of respiratory suspended particulates (RSP) and nitrogen oxides (NO<sub>x</sub>), both major air pollutants. Hence, CVs have all along been a major target of the Government's measures to improve roadside air quality. The Government has been implementing various measures to reduce vehicular emissions in recent years, including phasing out old diesel CVs, strengthening the emission control of petrol vehicles and liquefied petroleum gas (LPG) commercial vehicles, retrofitting franchised buses of earlier models with emission reduction devices, etc. Roadside concentrations of major air pollutants have dropped by around 30% over the past five years.

3. EVs have no tailpipe emissions and are efficient in converting energy from the grid to power at the wheels. Replacing conventional vehicles, especially CVs, with EVs can help improve roadside air quality and reduce greenhouse gas emissions. That said, the formulation of policies on promotion of the use of EVs and the actual outcome of the measures would depend on various factors, including local conditions (e.g. climate and terrain conditions, local demand for vehicles, quantities of air pollutants emitted from different types of vehicles, the Government's transport policies, etc.), development of EVs and the related technologies (e.g. operational performance of EVs, cost

effectiveness and technologies of charging facilities, etc.), economic situations (e.g. vehicle owners' affordability) and market situations (e.g. EV prices, vehicle owners' preferences, availability of EV models and their supply) and so on.

## **Electric Commercial Vehicles**

4. As technologies for e-CVs are still under development, with their prices much higher than their conventional counterparts, the Government currently focus on promoting EVs through the following measures:

- (a) The Government has **fully** waived the first registration tax<sup>[1]</sup> (FRT) of electric CVs (e-CVs) since 1994 until 31 March 2018, to encourage owners to purchase e-CVs and promote the development of e-CVs;
- (b) Since 2010, enterprises which procure environment-friendly vehicles including EVs are allowed full profit tax deduction for the capital expenditure on the vehicle in the first year of procurement;
- (c) A \$300 million Pilot Green Transport Fund (PGTF) has been put in place since March 2011 to encourage the public transport sectors, goods vehicle operators and non-profit-making organisations (NPOs) to test out green innovative transport technologies, including e-CVs; and
- (d) \$180 million was set aside to fully subsidise the franchised bus companies to purchase 36 single-deck electric buses (including 28 battery-electric buses and eight supercapacitor buses and their charging facilities) for trial on a number of routes.

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<sup>1</sup> The FRT of a conventional vehicle is derived from the taxable value of the vehicle times the appropriate tax rate. The tax rates for different vehicle classes are shown below:

- FRT rates of private cars are 40% on the first \$150,000 of vehicle taxable value, 75% on the next \$150,000, 100% on the next \$200,000 and 115% on the remainder.
- FRT rates of CVs (except van-type light goods vehicles not exceeding 1.9 tonnes permitted gross vehicle weight) are 3.7% to 17% of their taxable values depending on their vehicle classes, and motor cycles and motor tricycles at 35%.
- FRT rates of van-type light goods vehicles not exceeding 1.9 tonnes permitted gross vehicle weight are 35% on the first \$150,000 of vehicle taxable value, 65% on the next \$150,000 and 85% on the remainder.

5. The effectiveness of our policies on promoting the use of e-CVs depends very much on the maturity of e-CV technologies, their prices and suitability for use in Hong Kong (including their ability to suit the modus operandi of local transport sectors). However, existing e-CV technologies are yet to fully meet the operational needs of the local transport sectors -

- (a) As at the end of January 2018, the PGTF approved 118 trials, of which 56 were on e-CVs, covering various types of vehicles (including a total of 81 taxis, light buses, single-deck buses and goods vehicles). Results of the trials have reflected that high production cost, limited service life, long charging time and low energy density of EV batteries are the key constraints for e-CVs to become popular. The driving range and charging time of most e-CVs currently available in the local market are yet to completely cope with the requirements of the local transport sectors. Besides, prices of e-CVs are not as competitive as their conventional counterparts, and inadequate maintenance services are also not uncommon. For instance, the three electric taxis once on trial under the PGTF take four hours a day for charging, which cannot cope with their round the clock operation. Electric light buses and electric buses have also experienced similar problems<sup>[2]</sup>;
- (b) In comparison, results of the PGTF have revealed that electric light goods vehicles (e-LGVs) are more likely to be practicable for operators who require relatively lower daily mileage and payload, because these e-LGVs could be charged during non-operating hours. However, e-LGVs may not be suitable for transport businesses that have relatively higher daily mileage. To promote the use of electric LGVs, we have held experience sharing sessions for those transport sectors that are suitable to use such vehicles. Moreover, we will continue to encourage the transport sectors to make use of the PGTF to try out other green innovative transport technologies, and their suppliers to introduce more products for use by the local transport sectors; and

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<sup>2</sup> The electric light bus trialed under the PGTF could only sustain a driving range of 180 km after a full charge taking about two hours, lower than the daily mileage of a typical public light bus. In the case of the electric buses, with the driving range of only 200 km to 280 km, it takes as long as four hours to be fully charged.

- (c) As for franchised buses, currently about 95% of them are double-deck buses. However, the technology of double-deck electric buses is still developing and there are very few models available in the international arena. Furthermore, their passenger carrying capacity and operational efficiency still fail to fulfill the local operational needs of franchised buses which include long daily service hours, high peak passenger loadings, the need to tackle hilly terrains as well as intense air-conditioning capability being required in hot and humid summer. Regarding the single-deck electric buses, as mentioned in paragraph 4(d), the Government is fully subsidising the franchised bus companies to purchase 36 single-deck electric buses and their charging facilities for trial on a number of routes to assess their operational efficiency and performance under local conditions. At present, 24 battery-electric buses and two supercapacitor buses have commenced operations. It is expected that most of the remaining electric buses will progressively commence operation in 2018. Preliminary trial results showed that the driving performance of the single-deck electric buses is comparable with that of conventional buses. However, when the ambient temperature is high, the driving range of battery-electric buses after a full charge is only about 110 to 150 km, which is lower than the daily mileage requirement of general public buses for 200 to 300 km.

6. Given the current development of e-CV technologies as mentioned above, and their price difference compared to that of conventional CVs<sup>[3]</sup>, there are only 116 licensed e-CVs (see **Annex I**) as at the end of January 2018 despite that we have been proactively promoting the trial and use of e-CVs by offering various incentives. Looking ahead, we will keep in view the development of e-CV technologies, encourage the transport sectors to make use of the PGTF to try out other green innovative transport technologies, and their suppliers to

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<sup>3</sup> Under the on-going franchised electric bus trials, the unit price of a single-deck electric bus with the provision and installation of corresponding charging facility is about \$5 million, which is around 2.5 times of the conventional bus (the unit price of a conventional single-deck diesel bus is about \$2 million). A full charging for battery-electric buses will normally take three to four hours. With full operation of air-conditioning system in summer, they do not yet meet the general daily mileage requirement of single-deck buses after a full charge. Furthermore, the low energy density of e-CV batteries will reduce the goods and passengers payloads of e-CVs. For example, the e-LGV models available in the local market can only take up payloads up to 0.65 tonne with vehicle prices up to some \$400,000 (with FRT waived), whereas the payload of the most popular conventional one is around 1 tonne and priced about \$316,000.

introduce more products for use by the local transport sectors. The Government will explore how to promote the wider use of single-deck electric buses by the franchised bus companies, subject to the outcome of the trials as well as the affordability of the franchised bus companies and passengers. As for double-deck electric buses, we will keep in view the development in other places and introduce suitable models for trial in due course.

## **Electric Private Cars**

7. As for electric private cars (e-PCs), the Government's standing policy is to encourage the public to use public transport as far as possible, and should they need to acquire private cars, choose e-PCs. The Government's main supporting measures include offering financial incentives such as tax concession and lower annual vehicle licence fee, and facilitating the development and improvement of charging networks for e-PCs.

### Financial Incentives

8. On the provision of financial incentives:

- (a) The FRT for e-PCs was waived in full from 1994 to 31 March 2017. Having considered various factors (including the enhanced performance of e-PCs brought forth by the advancement of e-PC technologies in recent years can now fairly meet drivers' general needs, there are more affordable models of e-PCs with greater varieties in local market, and the Government's established public transport-oriented policy, etc.), the Government decided to cap the FRT concessions for e-PCs at \$97,500 from 1 April 2017 to 31 March 2018;
- (b) E-PCs also enjoy a lower annual vehicle licence fee under the Road Traffic (Registration and Licensing of Vehicles) Regulations (Cap. 374E)<sup>[4]</sup>. For example, annual vehicle licence fees for e-PCs range from about \$600 to \$1,100, which are significantly lower than

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<sup>4</sup> Annual vehicle licence for e-PC is charged based on the unladen weight of the vehicle, at a fee of \$440 for the first tonne and \$95 for each additional 250 kilograms or part thereof. Annual vehicle licence for conventional PC is charged based on the cylinder capacity of the engine (c.c.) ranging from \$3,815 (for petrol PCs with engine cylinder capacity not exceeding 1 500 c.c.) to \$12,675 (for diesel PCs with engine cylinder capacity exceeding 4 500 c.c.).

those for conventional PCs ranging from \$3,815 (for petrol PCs with engine cylinder capacity not exceeding 1 500 cubic centimetres (c.c.)) to \$12,675 (for diesel PCs with engine cylinder capacity exceeding 4 500 c.c.); and

(c) Energy efficient EVs will save fuel cost<sup>[5]</sup>.

9. Since the implementation of FRT concessions cap at \$97,500 for e-PCs in the 2017-18 financial year, the Government has been monitoring the latest situation. In the light of the latest development of technologies and market situation of EVs, as well as other traffic considerations, we are reviewing the current arrangement with due consideration given to views and suggestions collected from various sectors. Results of our review will be announced soon.

10. As at the end of January 2018, there are 10 453 privately-owned licensed e-PCs (see **Annex I**). Between January 2017 and January 2018, there are 3 871 e-PCs first registered. 3 200 of them were first registered between 22 February 2017 (the delivery date of the 2017-18 Budget) and 31 March 2017 and 110<sup>[6]</sup> were first registered on or after 1 April 2017.

### Promoting the Development and Enhancement of Charging Networks

11. Regarding the charging arrangements for e-PCs, it has always been the Government's policy direction that e-PC owners should perform daily charging of their e-PCs by using charging facilities at their home, workplace or other suitable places (including charging facilities provided by e-PC suppliers). Public charging facilities in Hong Kong are supplementary in nature, set up for

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<sup>5</sup> According to the Electrical and Mechanical Services Department's Energy Utilisation Index ([http://ecib.emsd.gov.hk/en/indicator\\_trp.htm](http://ecib.emsd.gov.hk/en/indicator_trp.htm)), for a petrol private car with engine size 1501 - 2500 c.c. (most dominant type in Hong Kong), the fuel consumption of its internal combustion engine is about 11.6 litres per 100km on average. Assuming a petrol price of \$15 per litre, private cars need \$1.74 to travel one kilometre on average. The most common electric private car model in Hong Kong consumes about 0.2kWh per kilometre on average. Taking an electricity tariff of \$1.3 per kWh, e-PCs need \$0.26 to travel one kilometre on average, far lower than the cost incurred by a conventional vehicle. To note however is that, the fuel economy of a car depends on various factors, including Hong Kong's actual road conditions and the driving habit of drivers, and hence the actual difference of costs may vary.

<sup>6</sup> As a one-off arrangement, e-PCs ordered by buyers from local registered distributors or arranged for shipment to Hong Kong by owners before 11 a.m. (Hong Kong time) of 22 February 2017, the delivery date of the 2017-18 Budget Speech by the Financial Secretary, could still have their FRT fully waived even if the concerned e-PCs were first registered after 31 March 2017. Between 1 April 2017 and 31 January 2018, 18 number of newly registered e-PCs were eligible for the one-off arrangement.

EVs to top up their batteries at times of occasional needs. They do not serve as daily charging facilities or their alternatives. Potential buyers of e-PCs should fully consider the daily charging arrangements required and should not rely on public charging facilities for daily charging of their e-PCs.

12. Given the above policy direction, the Government's priority is to facilitate and encourage the installation of charging facilities in private premises when planning for the development of charging facilities for e-PCs. On the development of public charging networks as supplementary facilities, the Government not only takes the lead in providing and enhancing governmental public charging facilities but also supports private establishments to set up and enhance non-governmental public charging networks. On facilitating the installation of charging facilities in **private premises**, granting of concession on gross floor area for private car parks in new buildings have been tightened from as early as April 2011 to encourage developers to provide the EV charging-enabling infrastructure, including provision of sufficient power supply, cabling and conduits for all parking spaces in the buildings concerned<sup>[7]</sup>. The policy aim is that if EVs are widely used in the future, owners of parking spaces will not be hindered from installing the required EV chargers due to constraints in respect of power supply capacity, cabling and conduits, etc. According to the information of the Buildings Department, from April 2011 to September 2017, over 80% of private parking spaces in the newly approved developments, involving about 370 car parks and around 40 000 parking spaces, will be provided with EV charging-enabling infrastructure. Besides, the Hong Kong Planning Standards and Guidelines was amended in the same year to recommend 30 per cent of private parking spaces in new buildings to be installed with charging facilities for e-PCs.

13. For existing private premises, as there are constraints in installing charging facilities in their car parks, the Environmental Protection Department (EPD) established in 2011 a dedicated team and a hotline to provide information and technical support as necessary. Besides, EPD has appealed to owners' corporations for their support to installing EV chargers at their premises upon request by EV users, and has shared successful experience with the property management sector. The two power companies also provide technical advice

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<sup>7</sup> At that time, EVs were still at the development stage and mainstream standards for EV chargers and related installations were not established yet. Hence, installation of chargers with electricity meter connection at parking spaces with EV charging-enabling infrastructure has not been a requirement by the Government.

to EV owners and render service to connect power supply for car parking spaces at their homes. In recent years, several private companies have been providing EV owners, housing estates or business establishments with one-stop EV charging services, including installation of charging facilities at EV owners' parking spaces and provision of charging services at other specified locations. As far as we know, these companies have installed charging facilities in around 30 housing estates.

14. The number of public chargers territory-wide was increased from 1 036 in 2013 to 1 846 by the end of 2017 (including 931 medium<sup>[8]</sup> or quick chargers) across the 18 districts in Hong Kong (see **Annex II**). Regarding **public charging network**, the Government currently provides a total of 664 public chargers in government car parks<sup>[9]</sup>. Among them, 519 chargers were installed by EPD at 425 parking spaces available for public use (accounting for 7% of the parking spaces) inside the government car parks under the management of the Transport Department (TD) and Government Property Agency (GPA). To enhance charging efficiency, EPD has been upgrading standard chargers to medium chargers (There were 268 existing medium chargers with another 96 standard chargers to be upgraded by February this year. There will be 364 medium chargers upon completion of the upgrade.).

15. As for non-governmental public charging networks, we have all along been encouraging the two power companies and both public and private establishments to actively support the installation of EV charging facilities. Besides, concessions on gross floor area for car parks have been extended to cover underground public car parks since March 2017. There are currently about 1 180 public chargers available in non-governmental car parks, and the two power companies are upgrading their existing public standard chargers to medium or even quick chargers.

16. Nowadays, the driving range of e-PCs is at least around 150 km, while the daily mileage of most PCs in Hong Kong is a few tens of kilometres. As such, an e-PC should be able to sustain a whole day's journey after a full charge at its owner's home or workplace. The need for e-PCs to top up their batteries by public chargers should be minimal. Meanwhile, utilisation of public chargers available to public in government car parks under management of the

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<sup>8</sup> Compared to the standard chargers, the charging time of the medium chargers can be reduced by around 60%.

<sup>9</sup> Including TD, GPA, Leisure and Cultural Services Department, Electrical and Mechanical Services Department, Housing Department and the Cruise Terminal.



TD and GPA remains low. From January 2016 to September 2017, the average utilisation rate of standard/medium chargers in government car parks was about 13 times per month per charger (this might be because of the Government being unable to designate car parking spaces for EV charging so as to take care of the needs of parking spaces for all drivers). On the other hand, the average utilisation rate of standard/medium chargers installed by the two power companies in public car parks was around 38 times per month per charger, which was also rather low. When considering the provision of more public chargers, the Government has to take account of not only the parking needs of drivers but also the utilisation rate of existing public chargers to ensure cost effectiveness.

17. EPD is conducting a pilot scheme at four open government car parks to test the reliability of outdoor charging facilities, and the review of the findings is expected to be completed by the end of this year. We will then consider whether more outdoor charging facilities can be provided in other government premises, and also study with relevant departments whether trial for EV charging is possible at suitable outdoor parking spaces.

18. Information on public chargers, including their locations, types and numbers, is currently available on EPD webpages. Certain EV charging service providers and EV suppliers are providing mobile applications by which EV owners can check instant information of chargers available and make reservations. As regards public chargers in government car parks, equipment is being installed in these car parks for trial on sending instant electronic information of public chargers' utilisation to government electronic platforms for public reference. The trial will be completed this year.

19. In the light of the rapid changes in the usage of EVs, the Government is reviewing the various policies and measures on promoting the use of EVs. Our efforts include exploring ways to encourage installation of charging facilities to tie in with the usage of EVs, retrofitting existing car parks with charging facilities and updating the relevant guidelines and planning standards as necessary.

## **EV BATTERIES**

20. Regarding the recycling of EV batteries, as most EVs in Hong Kong remains were of a low age, the number of retired EV batteries remains small at this stage, being mainly the disposal of those individual waste EV batteries that are damaged and cannot be repaired. Most EV manufacturers or agents currently have engaged licensed collectors to handle these waste EV batteries. After proper preliminary treatment, these waste EV batteries are exported to treatment facilities in Japan, Korea or Belgium for recycling. As EVs will become more popular in the future, we have been exploring with EV suppliers in proper collection and handling of waste EV batteries so as not to bring damages to the environment.

## **WASTE TYRES HANDLING**

21. As regards the handling of waste tyres from the EVs, similar to those from conventional vehicles, they are mainly delivered to the landfills for disposal at present but the quantity is relatively small in comparison with other waste materials, and hence a lower priority for their recycling and treatment. In addition, Hong Kong currently does not have sufficient treatment facilities in support for territory-wide recycling, and recycling outlets for recyclables are also limited. We are now exploring the feasibility of application of asphalt rubber in Hong Kong with a view to expanding the recycling outlet for waste tyres. We will keep in view the development of the recycling market concerned and take corresponding measures to encourage the recycling of waste tyres.

## **CLEAN ENERGY VEHICLES**

22. We have been actively promoting the use of green transport technologies by CVs. We launched an incentive scheme in 2000 to replace diesel taxis with LPG ones. The scheme was completed in the end of 2003. Currently, almost all taxis in Hong Kong are using LPG. We also launched another incentive scheme in 2002 to replace diesel light buses with LPG or electric ones. The scheme was completed in the end of 2005 and over 55% (over 4 200 light buses) of light buses are using LPG. Moreover, we have also set up the PGTF to encourage trials of green innovative transport technologies and introduction of more products for use by local transport sectors.

23. To mitigate tailpipe emissions and climate change, developing clean energy vehicles (CEVs) has become a global trend. Several places have set out timetables or targets for a total ban on the sales of PCs solely using petrol or diesel. We are collating relevant information, including the specific plans and measures to be taken by these places, and the work plan of various manufacturers in producing CEVs, with a view to exploring the availability of CEVs suitable for use in Hong Kong and their conditions of use, for considering our next step.

### **WAY FORWARD**

24. We will continue to keep monitoring of the development of technologies on the use of CEVs around the world, encourage local transport sectors to make use of the PGTF to test out other green innovative transport technologies and encourage other suppliers to introduce more products for use by local transport sectors. Members are invited to note the Government's efforts in promoting the use of EVs in Hong Kong.

**Environment Bureau/Environmental Protection Department**  
**February 2018**

## Annex I

### **Number of Licensed Electric Vehicles (EVs) by Vehicle Class** **(as at January 2018)**

	<b>Government EVs</b>	<b>Privately-owned EVs</b>	<b>Total</b>
Private cars	173	10 453	10 626
Light goods vehicles	17	71	88
Medium goods vehicles	-	-	-
Light buses	-	6	6
Taxis	-	1	1
Buses	-	38	38
Motor cycles	63	34	97
<b>Total</b>	<b>253</b>	<b>10 603</b>	<b>10 856</b>

Note: The above figures exclude electric fork-lift trucks and electric industrial tractors (commonly used for waste management by property management companies within residential areas) which are special-purpose vehicles not intended for ordinary use on roads.

Annex II

**Distribution of Public Charging Facilities for Electric Vehicles (by District)**  
**(as at End 2017)**

District	Number of Chargers			District	Number of Chargers		
	Standard	Medium	Quick		Standard	Medium	Quick
Central & Western	93	75	24	Kwai Tsing	16	9	25
Eastern	37	68	32	Tsuen Wan	14	40	7
Southern	4	17	19	Sai Kung	38	14	16
Wan Chai	84	91	20	North	35	16	6
Kowloon City	54	2	18	Tai Po	6	3	8
Kwun Tong	219	40	41	Sha Tin	110	35	32
Sham Shui Po	17	46	4	Yuen Long	40	11	14
Wong Tai Sin	24	46	9	Tuen Mun	10	8	14
Yau Tsim Mong	100	58	28	Islands	14	26	9
			<b>Standard</b>	<b>Medium</b>	<b>Quick</b>		
			<b>915</b>	<b>605</b>	<b>326</b>	<b>Total:</b>	<b>1 846</b>