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## **Hong Kong Roadmap on the Popularisation of Electric Vehicles**

### **PURPOSE**

This paper briefs Members on the target, strategies and key measures of the Hong Kong Roadmap on the Popularisation of Electric Vehicles (“EV Roadmap”).

### **VISION**

2. The Government announced the first ever EV Roadmap on 17 March 2021, which sets out the vision of “Zero Carbon Emissions • Clean Air • Smart City”. Our target is to attain zero vehicular emissions before 2050, in concert with our relentless efforts to strive for carbon neutrality in the same time frame.

3. We anticipate that EV technologies will advance rapidly in the future. The strategies of promoting popularisation of EVs should therefore be adjusted from time to time, taking into account technological, environmental, social and economic developments. In this connection, the Roadmap is a living document, keeping up with the times. We will review the strategies, measures, progress, etc. in the Roadmap around every five years with a view to keeping up with the developments and move towards the target of zero vehicular emissions early.

### **CHALLENGES AND PROGRESS MADE**

4. Adoption of EVs in Hong Kong comes with challenges unique to the city. Unlike other places where people live in houses or less populated setting, most buildings in Hong Kong are high-rises with comparatively less number of parking spaces. Given that these buildings are usually of multiple ownership and under third-party property management, Hong Kong’s EV owners are often required to obtain consent from other owners of the same premises for the installation of

charging facilities at parking spaces, and may encounter other sticky issues including the concern about electricity supply and high installation costs of charging infrastructure.

5. On the other hand, as Hong Kong has a hilly terrain, vehicles are often required to run on slopes. The hot and humid weather also demands air-conditioning for most of the time. Public transport also has long operating hours and travel distance every day. In view of the above, EVs in Hong Kong need to have greater battery capacity than that in many other places.

6. Despite the challenges, the Government has been promoting EV adoption and formulated a series of policies and measures, including providing first registration tax (FRT) concessions, imposing lower vehicle licence fees, supporting technological developments via various trials and funds, expanding the public charging network, etc. The number of EVs in Hong Kong has grown by more than 100 times, from about 180 in 2010 to over 18 500 by the end of 2020.

7. Among the 18 500 EVs in 2020, more than 18 100 are electric private cars (e-private cars), which made up 2.7% of all private cars. We have observed an increasing market share of e-private cars in Hong Kong in the recent years. Their share among all new private cars has grown from 0.1% in 2010, 5.2% in 2015 to 12.4% in 2020, representing that 1 out of every 8 new private cars is electric. The increase in adoption rate compares well with other economies.

## TARGETS AND PROMOTION

### e-Private Cars

8. Private cars account for more than 70% of vehicles in Hong Kong, and their total carbon emissions are the highest among vehicle types. Hence, promoting use of e-private cars is necessary and can speed up the pace towards carbon neutrality.

### ***No new registration of fuel-propelled private cars including hybrids in 2035 or earlier***

9. A number of leading economies in EV adoption such as Denmark, Ireland, and the Netherlands have announced targets for 100% zero emission vehicle (ZEV) sales for private cars in the next decade or two. For Norway, the economy with highest EV adoption rate in the world, the target for 100% ZEV sale is set at 2025. To cater for the demand of EVs in the private car market, many conventional car manufacturers have also formulated plans to shift their focus to develop and produce EVs. Hong Kong needs to act in tandem with other places to phase out fuel-propelled vehicles progressively, with a view to heading towards our target of zero vehicular emissions.

10. Taking into account the global trend to promote EVs, Hong Kong will stop new registration of fuel-propelled private cars, including plug-in hybrids and hybrids, in 2035 or earlier. This target will prompt stakeholders to prepare for better transition to EVs. For instance, public and private organisations can plan for charging facilities accordingly, while vehicle suppliers can timely introduce more models of e-private cars of different price levels and performance into the market. Furthermore, post-secondary institutions can offer training and re-training to professionals and technicians in the repair and maintenance sector. Car manufacturers and importers can also plan for the recycling arrangement of EV batteries with the recycling trade.

11. We will review the Roadmap roughly every five years. Depending on the global technological development, local EV uptake, development of supporting facilities, etc., we will examine during the next review to see whether it is opportune to set timetables for the electrification of other fuel-propelled vehicles, including public transport and other commercial vehicles. We will also consider if there is any room to promulgate more aggressive targets to attain zero vehicular emissions. In particular, we will pay special attention to e-light goods vehicles and e-motor cycles as the development of these two types of EVs will likely become comparatively mature in the next few years and more popular in the international market. In the long term, we will actively explore the possibility to stop renewing vehicle licences of fuel-propelled vehicles before 2050 in order to cater for Hong Kong to achieve carbon neutrality within the same time frame.

### *Use of financial incentives*

12. In view of land scarcity and population density in Hong Kong, it is important to strike a balance between promoting adoption of EVs and giving unintentional impetus to vehicular growth. Therefore, Hong Kong has implemented the “One-for-One Replacement” Scheme since 28 February 2018 to provide higher FRT concessions to car owners that replace their old private cars with EVs. From 24 February 2021, EV owners can enjoy FRT concessions at \$287,500 under the Scheme, while the basic FRT concession level for new EVs not under the Scheme is \$97,500. E-commercial vehicles will continue to have their FRT fully waived. The arrangement of the above FRT concessions has been extended to 31 March 2024.

13. Looking forward, as more and more affordable e-private cars enter into the local market, the cost of purchasing and using EVs will become increasingly closer or even the same as that of fuel-propelled vehicles. When the cost gaps between EVs and fuel-propelled vehicles narrow in the local market, the Government will review the policies on subsidies and concessions in good time and may adjust relevant financial incentives, making reference to other economies’ experience.

## **e-Commercial Vehicles**

14. Promoting adoption of e-commercial vehicles has met with different challenges. Yet, the breakthrough in technology can help tackle most of the difficulties encountered. The Government will facilitate the trades to switch to e-commercial vehicles progressively in the coming few years. As the first step, we continue to conduct trials together with the trades to test the technical and commercial viabilities of different types of e-commercial vehicles for use in the local environment, so as to identify the best options for Hong Kong –

### (a) Taxis

We are in close liaison with taxi operators for a potential trial of e-taxis to test the operation and performance of different e-taxi models. We explore to first conduct a small-scale trial in relatively confined areas including Lantau Island and Sai Kung. In parallel, various government departments have been working together to identify appropriate locations in the above two areas to set up quick EV chargers for e-taxis. The outcomes of the e-taxi trial will be useful for the trade to identify viable operational modes and EV models, and facilitate the Government to formulate policies and measures to implement the electrification of taxis.

### (b) Public light buses (PLBs)

The Government has earmarked \$80 million to launch a 12-month trial that will subsidise about 40 e-PLBs running on various routes so as to test their operation under local environment. We will focus on green PLBs first as they are running on fixed routes that are relatively short and hence their requirements on driving range and charging power are easier to cope with. Quick charging facilities will be installed at the termini, public transport interchanges or other places where the PLBs operate.

The Government anticipates that the trial scheme will commence in 2023. The scheme will help gather operational data from PLB operators and charging service providers during the trial for evaluation of the performance of e-PLBs and their charging facilities, and devise a concrete and feasible timeline for the electrification of PLBs.

### (c) Buses

The Government has been examining the performance, reliability and commercial viability of the single-deck e-buses in local conditions by subsidising franchised bus companies (FBCs) to purchase 36 single-deck e-buses for trial. The initial findings of the trial show that the passenger carrying capacity and driving performance of the single-deck e-buses are comparable with that of conventional ones. We also expect that the range constraints could be overcome in the next few years when the battery capacity is further enhanced to support more than 300 km a day after a full charge.

The FBCs are taking proactive actions including procuring more e-buses to conduct further trials or replace diesel buses that will retire soon with e-buses. They are also carrying out conversion works for existing bus termini to equip with charging facilities and training more staff for the maintenance of e-buses. One of the FBCs plans to establish new depots equipped with charging facilities with a view to preparing for further electrifying its bus fleet. In view of the above, the Government is in active dialogue with the FBCs on the arrangement of the full electrification of single-deck buses.

On the other hand, the \$1.1 billion New Energy Transport Fund (NET Fund) has approved funding to two FBCs to embark on trials of the double-deck e-buses in the next two years. The NET Fund is also supporting e-bus trials for non-franchised buses such as shuttle buses serving residential estates or coaches. With the improving battery technology and performance of these buses, we will continue exploring the adoption of e-buses with different operators.

(d) Goods vehicles and other vehicles

The development of e-light goods vehicles is following the footsteps of e-private cars. There are already a few models with driving range up to 300 km and payload more than 1 000 kg introduced in recent years. Some models have also been subsidised for trial under the NET Fund and are proven to be reliable and have similar performance and lower fuel costs than their diesel counterparts.

As for e-medium and heavy goods vehicles, there is currently only one model of e-medium goods vehicles in the local market and it is on trial under NET Fund. Besides, the Hong Kong Productivity Council is applying funding under the Innovation and Technology Fund for the development of a 16-tonne e-truck for solid waste collection. Tentatively, the Council will produce the e-truck in 2021 and commence a 12-month trial at the West New Territories Landfill in 2022.

(e) Other vehicles

In September 2020, the Government extended the scope of the NET Fund to cover new energy motor cycles and non-road vehicles including e-commercial vehicles in airport and container terminals. As meal delivery has become more and more popular in the past few years and uses mainly motor cycles as the transport mode, we have encouraged service operators to make use of the NET Fund to try out e-motor cycles once suitable models are available locally.

15. The Government will take the opportunity of the five-year regular review mentioned above to assess the situation as a whole in around 2025. Subject to the development of technologies and supporting facilities, we will then set out a more concrete way forward and timetable for the promotion of e-commercial vehicles.

16. Furthermore, to tie in with Hong Kong’s target to attain carbon neutrality before 2050, the Government will establish a task force to keep abreast of high-end development of new decarbonisation technologies globally, including green transport, new energy vehicles, and fuel technology such as hydrogen fuel. This will facilitate the Government’s understanding of the latest technology and global development, thus assisting in the formulation of forward-looking policies.

**Fleet of Government and Public Organisations**

17. To demonstrate the commitment in pushing forward Hong Kong’s transition to EVs, the Government has just formulated a new policy to set EV as standard for small and medium private cars to be procured or replaced, unless there are special circumstances such as operational needs that render the use of EVs technically infeasible. For other types of vehicles, EVs and other more environmentally friendly vehicles will be accorded priority for use. Senior government officials will also take the lead in switching their saloon cars to EVs when their cars are replaced.

18. We will also advance in tandem with the global development in exploring electrification of other types of special purpose vehicles in the government fleet such as refuse collection vehicles and street washing vehicles, and will strike a balance between prudent use of public monies and taking the lead in promoting EVs.

19. With the champion by the Government, we aim to promote public organisations to make reference to the above new measures in fleet procurement, with a view to further advancing the popularisation of EVs in Hong Kong.

**Supporting Measures and Facilities**

20. To support mass adoption of EVs, associated charging facilities would become part of the infrastructure of Hong Kong. We need to introduce different charging arrangements for various types of EVs –

<b>Vehicle type</b>	<b>Main charging arrangement</b>
Private cars/light duty vehicles/motor cycles	Parking spaces at home or workplaces
Larger vehicles (coaches, franchised buses, public light buses, goods vehicles, etc.)	Depots/termini/stations/public transport interchanges/regular parking spaces
Commercial vehicles with no designated parking spaces, including taxis	A network of quick charging facilities across the territory

## ***Private Charging Facilities***

21. Along the above strategy, it is our target to have at least 150 000 parking spaces in private residential and commercial buildings equipped with EV charging infrastructure before 2025, to support mainly e-private cars and certain e-light goods vehicles. To achieve the target, the policies will cover both new and existing private buildings –

### (a) New Buildings

The Government tightened the arrangement of gross floor area (GFA) concessions in 2011 to only provide concession to car parks that have EV charging infrastructure installed at each car parking space. Since the implementation of the arrangement, about 68 000 parking spaces have been approved and will be equipped with charging infrastructure. To keep abreast of the market situation and technological development, we are now exploring to adjust the requirement for EV charging infrastructure in car parks of new private buildings so that all parking spaces are required to be provided with charging infrastructure that supports medium chargers.

### (b) Existing private buildings

The Government launched a \$2 billion EV-charging at Home Subsidy Scheme in October 2020 to subsidise installation of charging infrastructure in car parks of existing private residential buildings. With charging infrastructure, EV owners can install chargers that suit their own needs and charge at home easily. We expect that the scheme will cover more than 60 000 parking spaces at the existing private residential buildings in three years. Responses to the scheme are very positive, with more than 200 applications received in four months after its launch, covering nearly 60 000 parking spaces.

22. With wider adoption of EVs, the market demand for EV charging will continuously grow. The Government will gradually let the market play its role to provide and enhance the EV charging infrastructure and supporting facilities. For installation of charging facilities in existing buildings, the Government will formulate guidelines and standards, and actively promote collaboration among private sector, property management, homeowners and the general public to expand the charging network to ensure that the community is well prepared for the transition to EVs.

## ***Public Charging Facilities***

23. As at end-2020, more than 3 300 chargers from the private and public sectors are open to the public, among which more than 1 100 are offered by the Government and the rest are provided by the private sector. The Government has also allocated \$120 million for a three-year programme to gradually increase the number of chargers in government car parks to 1 800 by 2022.

24. The Government's target is to have at least 5 000 public chargers provided by 2025, and plans to double the number in future. To achieve this, the Government will continue exploring different approaches and install public charging facilities. With the growing EV uptake, it is essential to marketise the EV charging services so as to promote their sustainable development in the long run, and avoid abuse of the chargers. We have embarked on the preparation work, hardware and software upgrade, etc. for fee charging, with a view to imposing EV charging fees in the government car parks from around 2025. The marketisation of charging services is also expected to give impetus to the provision of additional public charging facilities by the private sector.

### ***Charging Facilities for Public Transport and Heavy Commercial Vehicles***

25. A comprehensive territory-wide quick charging network is needed to support the wider adoption of e-public transport and heavy commercial vehicles. Given the limited developable land in Hong Kong, we are looking for every possible site for setting up charging facilities, taking into account a basket of factors (e.g. accessibility, traffic impact, land zoning, technical feasibility, etc.) on top of identifying different charging arrangements for public transports. The Government is actively identifying sites of various scale and shapes, including government premises, spaces under flyovers and road-dividing zones to complement the development of charging network. We will also explore the feasibility to gradually convert existing petrol and liquefied petroleum gas (LPG) filling stations to quick charging stations in the medium to long term, including turning some larger filling stations to mega charging stations that offer charging services to various types of vehicles simultaneously.

### ***Repair and Maintenance***

26. It is vital to both train new vehicle mechanics and provide retraining opportunities for existing mechanics. For the training of new professionals and mechanics, post-secondary institutions funded by the University Grants Committee are currently offering academic programmes in design, research and development (R&D), and maintenance of EVs. The Vocational Training Council (VTC) also offers full-time training programmes relevant to automobile maintenance that include the latest technological development, safety standards, design, and operational principles. The Government will closely liaise with the institutions to keep them informed of the policy directions in the promotion of EVs and facilitate their planning and design of appropriate courses to meet the needs of the EV market.

27. As for existing vehicle mechanics, the VTC is offering a number of part-time evening courses for existing mechanics and technicians to equip themselves with knowledge of the structure, operation, and safety procedures relevant to EV and their maintenance. The Government will also strengthen communication with the trade and facilitate EV suppliers to cooperate with local institutes for the further provision of EV maintenance courses, with a view to providing retraining opportunities for vehicle mechanics to upgrade themselves and meeting the rising demand for EV maintenance.



## ***Handling of Batteries***

28. Handling and disposal of retired EV batteries are regulated under the Waste Disposal Ordinance (Cap. 354) and its subsidiary Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C). EV suppliers have currently engaged licensed collectors to collect the retired batteries of their brands' EVs. After proper preliminary treatment (e.g. sorting, discharging and insulating) and packaging, these retired EV batteries are exported to appropriate treatment facilities overseas, e.g. Japan, Korea or Belgium, for recycling.

29. Lithium-ion batteries are commonly used in EVs. Driven by market demand, the battery technology has kept evolving rapidly with new design, improved material compositions and new recycling technologies. As the recycling of retired EV batteries is complicated and highly technical, a sufficiently large market demand was required to support the setting up of a local battery recycling facility. It is anticipated that the number of retired EV batteries in the coming few years will not reach the required threshold.

30. Although the number of retired EV batteries in Hong Kong remains small at this stage, there will be more retired EV batteries when EVs become more popular. The Government has set up a \$200 million Green Tech Fund to fund R&D projects which help Hong Kong decarbonise and enhance environmental protection. Projects relevant to the promotion of EVs and giving second life to EV batteries are both under the priority theme of green transport under the Fund.

31. Furthermore, regions and countries such as the Mainland China and the European Union have gradually implemented or conducting trials for using Producer Responsibility Scheme (PRS) for retired EV batteries as a policy tool. Typically, EV producers, including manufacturers and importers, have to take up responsibility for the collection, recycling, treatment and disposal of end-of-life products with a deposit-refund and incentive scheme, with a view to facilitating collection and recycling. In parallel, the PRS will also encourage development of second life applications of retired batteries. We will engage EV suppliers and relevant stakeholders to explore approaches suitable for Hong Kong, with a view to legislating a PRS for retired EV batteries in the next few years.

## **WAY FORWARD**

32. Members are invited to note the paper. The EV Roadmap and its leaflet are available on the Environmental Protection Department website –

[www.epd.gov.hk/epd/english/resources\\_pub/policy\\_documents/index.html](http://www.epd.gov.hk/epd/english/resources_pub/policy_documents/index.html)

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