

**For discussion on
21 April 2023**

**Legislative Council
Panel on Environmental Affairs**

**Charging network in support of
the popularisation of electric vehicles in Hong Kong**

Purpose

This paper sets out the Government's overall strategies to support the charging network of electric vehicles (EVs) and their progress.

Background

2. Carbon emissions from transport make up around 20% of total carbon emissions in Hong Kong. Developing green low-carbon transport is of paramount importance in achieving the goal of carbon neutrality. The Government has announced the *Hong Kong Roadmap on Popularisation of Electric Vehicles* (the EV Roadmap), *Clean Air Plan for Hong Kong 2035*, and *Hong Kong's Climate Action Plan 2050* in March, June and October 2021 respectively, covering policy directions and future targets in different areas promoting the adoption of new energy transport technologies, to guide Hong Kong towards zero vehicular emissions before 2050 and attain carbon neutrality within the same timeframe.

3. The EV Roadmap sets out the vision of “Zero Carbon Emissions • Clean Air • Smart City”, and the long-term policy objectives and plans to promote the adoption of EVs and their associated supporting facilities. Major initiatives include setting the target to cease new registration of fuel-propelled private cars (PCs) (including hybrid vehicles) in 2035 or earlier, promoting dedicated trials for electric commercial vehicles (e-CVs) including buses, light buses, taxis, goods vehicles etc. with a view to setting a more concrete way forward and timetable in 2025, expanding the EV charging network on multiple fronts and marketising charging services progressively to promote their sustainable

development in the long run, as well as creating a conducive environment for popularisation of EVs to speed up the pace towards carbon neutrality.

4. To further promote green transport, the *Chief Executive's 2022 Policy Address* (Policy Address) announced a wide range of measures that affirmed the Government's way forward for promoting new energy transport. In the coming 3 years, the Government will provide an additional 7 000 parking spaces with EV charging facilities in government premises to be completed soon or just completed. We will also announce a roadmap for the promotion of electric public transport and CVs by 2025, and formulate the long-term strategies for the application of hydrogen energy in road transport. We also target to introduce about 700 electric buses (e-buses) and about 3 000 electric taxis (e-taxis) by end-2027.

5. The Government has made notable progress in promoting the popularisation of EVs. Driven by various government policy measures, the percentage of electric PCs among all newly registered PCs has soared in recent years from 6.3% in 2019 to 52.8% in 2022, representing that 1 out of every 2 newly registered PCs is electric. As at the end of February 2023, the number of electric PCs in Hong Kong was about 50 700, accounting for 7.8% of the total number of PCs in Hong Kong. The comparison of the growth in the number of newly registered petrol PCs and electric PCs in the past 5 years and the percentage of electric PCs to newly registered PCs in Hong Kong are tabulated as follows:

<u>Year</u>	Number of newly registered PCs within the year		
	Petrol PCs	Electric PCs	Percentage of electric PCs
2018	41 551	471	1.1%
2019	35 858	2 423	6.3%
2020	32 441	4 595	12.4%
2021	29 724	9 583	24.4%
2022	17 683	19 795	52.8%

6. Availability of sufficient and convenient EV charging facilities is one of the major keys to success in further promoting the wider adoption of EVs. As such, a comprehensive charging network is very critical in support of popularisation of EVs.

Overall strategies in EV charging

7. In view of the increasing number of electric PCs at present, in the course of promoting the popularisation of electric PCs, we need to effectively provide support for charging of the ever-increasing electric PCs. The electric PCs currently available in the market, upon completion of charging at home or usual parking spaces, are capable of meeting the needs of daily operations. Therefore, we set out in the EV Roadmap that the Government's standing e-PC policy is that owners should mainly charge their PCs at home, work place or places they travel to regularly, while public charging facilities mainly provide ad hoc top-up charging services for electric PCs in case of needs. This measure can effectively divert the need of electric PCs towards public charging facilities so that public charging facilities can be reserved for charging of electric PCs with no designated charging spaces and other CVs in need.

8. In the course of promoting the popularisation of electric PCs, given the different needs of various types of electric PCs and e-CVs towards charging modes, the constraints on land resources of Hong Kong, and the leading role of the Government in promoting the popularisation of EVs, the Government needs to introduce different charging arrangements for different types of EVs, so as to support a more diversified EV charging infrastructure to cope with the needs of different types of vehicles. The charging arrangements required by different types of EVs are tabulated as follows:

Vehicle type	Longest range upon full charging	Major charging arrangements
Electric PCs ¹ , light duty vehicles, motorcycles	About 400 km	<ul style="list-style-type: none">• mainly charge at home, work place, shopping malls or places visited by car owners regularly• public charging facilities should only provide ad hoc top-up charging services in case of occasional needs

¹ Generally speaking, upon full charging, electric PCs can go as far as at least 400 km. As such, they only need to be charged every few days.

Larger vehicles (e.g. coaches, goods vehicles and other CVs, etc.)	About 200 km	<ul style="list-style-type: none"> • Depots or usual parking spaces equipped with charging facilities for night charging • High usage owners can top up the batteries during daytime at conveniently-located quick charging facilities
High usage public transports (e.g. public light buses and franchised buses, etc.)	250 – 350 km	<ul style="list-style-type: none"> • equip charging facilities at their depots or usual parking spaces for night charging • the provision of quick charging facilities at their termini, stations or public transport interchanges (PTIs) to facilitate top up charging in addition to overnight charging for daily operations
Commercial vehicles with no designated parking spaces such as e-taxis	About 400 km	<ul style="list-style-type: none"> • a territory-wide quick charging network

9. Along the above strategies and objectives regarding the charging arrangements for e-PCs, the Government sets out in the EV Roadmap the goal to have at least 150 000 parking spaces in private residential and commercial buildings equipped with EV charging-enabling infrastructure (EVCEI) before 2025. To this end, the Government through: (1) the measure of gross floor area (GFA) concessions to encourage the installation of EV charging-enabling infrastructure in parking spaces of newly built private buildings; and (2) launching the EV-charging at Home Subsidy Scheme (EHSS) to help car parks of existing private residential buildings and housing estates with the installation of EVCEI so as to effectively achieve the target pertaining to EVCEI. As for e-CVs, in light of different operational needs, various e-CVs need to be supported with individual charging strategies to reach optimal cost-effectiveness.

10. Apart from EVCEI, the Government is further promoting the installation of chargers at more locations, including equipping public car parks managed by the Government with EV charging facilities. In parallel, we will also expedite progressively the marketisation of charging services provided by government car parks so as to drive the market development of charging services at private car parks, as well as further enhance the number of charging facilities at car parks in newly built government and private buildings through revising relevant planning guidelines. We will, through implementing various trial schemes on electric public transport, evaluate different charging modes and technologies of charging facilities, and will examine how, through the market, to establish and operate charging facilities as a business to best address the charging needs of different types of vehicles. Details are set out in paragraphs 12 to 28 below.

The progress on expanding e-PC charging network

(I) Private charging network

Measure of GFA concessions and equip parking spaces of newly built buildings with charging facilities

11. To encourage the installation of EVCEI in parking spaces of newly built private buildings, the Government tightened the GFA concession arrangements in 2011 to only provide concession to underground car parks that have EVCEI installed at all car parking spaces. The key objective of the policy is to enable car owners to install chargers required at their parking spaces and arrange for power connection according to their needs without any constraints in respect of power supply capacity of the buildings, or cabling and conduits of the car parks, etc. As at December 2022, the Government has approved over 77 900 relevant parking spaces, of which more than 30 500 parking spaces have been completed and equipped with EVCEI. In addition, we have also written to the Real Estate Developers Association of Hong Kong to encourage other real estate developer members to install chargers at these parking spaces granted with GFA concessions, and share the locations of these parking spaces to the public so as to facilitate charging of EVs.

12. To further enhance the number of charging facilities at parking spaces in newly built private buildings, the Government is revising the *Hong Kong*

Planning Standards and Guidelines (HKPSG²) and the Practice Note related to GFA concessions to stipulate that all parking spaces for PCs, motorcycles and light goods vehicles (whether indoor or outdoor) within the boundaries of newly built buildings must be fully equipped with medium chargers for EVs. We have consulted relevant stakeholders' opinions and we expect the relevant revisions to be completed within this year.

Latest progress on the EV-charging at Home Subsidy Scheme (EHSS)

13. The Government launched the EHSS (the first phase) in October 2020 to subsidise the installation of EVCEI in car parks of existing private residential buildings and housing estates to facilitate car owners to install EV chargers required in parking spaces in their residential estates in the future in a simple and easy manner. In view of the overwhelming response, the Government has further injected an additional funding of \$1.5 billion into the EHSS in the year 2022-23 and extended the EHSS for four years to the year 2027-28 (the second phase) to enable more car parks of existing private residential buildings to participate in the installation of EVCEI. As at March 2023, we have received more than 680 applications under the EHSS, covering more than 138 000 parking spaces. The Environmental Protection Department (EPD) has completed the processing of all applications received in the first phase and 80 applications received in the second phase. EPD will complete processing the remaining 300 applications received in the second phase within this year.

14. After an application for subsidy has been approved by EPD, the applicant must arrange to engage consultant and contractor for the design and installation works of EVCEI through public tendering exercise. In this regard, time is needed for preparing the tendering work, tackling technical problems relevant to the installation works, and liaison with car park owners to reach consensus over the detailed design of the installation works, during which EPD will provide the required assistance as far as possible. As at the end of March 2023, 17 car parks of housing estates, covering about 2 400 parking spaces, have commenced or completed the installation works. We anticipate that a total of about 77 000 parking spaces in more than 400 car parks will have EVCEI installed by the end of 2025, and our target of completing the installation of EVCEI for about 140 000

² The current HKPSG requires only 30% of parking spaces for PCs in public car parks to be equipped with EV chargers, and this requirement is not applicable to outdoor car parks.

parking spaces in about 700 car parks of housing estates can be achieved in year 2027-28 as planned.

15. With the abovementioned measure of GFA concessions and the EHSS, we are confident to achieve the target of having at least 150 000 parking spaces equipped with EVCEI before 2025 as set out in the EV Roadmap and raise the number to over 200 000 parking spaces in this term of Government.

(II) Charging network for the public and in government buildings

Expanding charging facilities at car parking spaces in government buildings

16. The Chief Executive announced in Policy Address that it will provide an additional 7 000 parking spaces with EV charging facilities in government buildings in the coming 3 years. To this end, various relevant departments have indicated that they will increase the number of EV chargers in government buildings under construction or planning as far as technically feasible without affecting the progress of the works. For example, the Kai Tak Sports Park under construction will provide an additional medium chargers for EVs in more than 300 public parking spaces to facilitate the charging of electric PCs by the public during parking time. We will also study the provision of quick charging facilities at some parking spaces to facilitate the use of some CVs.

Updating the *Joint Circular on Green Government Buildings* (the Circular)

17. In the meantime, the Government has also completed updating the Circular in March this year, which requires that instead of no less than 30% of government indoor parking spaces, all government parking spaces must be fully equipped with medium chargers for EVs. The new requirement stipulates that all parking spaces for PCs, motorcycles and light goods vehicles (whether indoor or outdoor) within the boundaries of newly built government buildings with tender documents issued on or after 1 April 2023 must be fully equipped with medium chargers for EVs³.

³ This requirement offers suitable flexibility according to the circumstances of individual projects on a case-by-case basis, such as the Government will provide exemption accordingly taking into account that there are no mature EV charging facilities proven to be reliable available in the market that can be installed for multi-storey or multidirectional Automated Parking Systems.

Public chargers in government car parks

18. The Government allocated \$120 million in 2019 to install over 1 000 medium chargers in more than 70 car parks open for public use. With the completion of the project last year, it renders the Government achieving ahead of schedule the target of having at least 5 000 public chargers for public use by 2025, as set out in the EV Roadmap. As at the end of December 2022, there were a total of about 5 434 public chargers provided by the Government and private organisations, among which 2 210 were provided by the Government. With rapid development of technologies and the drop in prices of charging facilities, we also plan to gradually upgrade some standard charging facilities to medium charging facilities, so as to enhance the cost-effectiveness of EV charging facilities.

Imposing EV charging fees progressively in government car parks and promoting marketisation of charging services

19. The EV Roadmap sets out that EV charging fees will be imposed in government car parks starting from 2025 to marketise EV charging services, so as to promote their sustainable development in the long run. To expedite the marketisation of charging services, the Government has decided to advance the installing of self-service payment kiosks for EV chargers by phases at several government car parks to prepare for the marketisation of EV charging services provided. The first phase of works at Kwai Fong Car Park has commenced and tests are expected to commence in first half of this year to tie in with the imposition of EV charging fees in government car parks progressively starting from the second half of this year the earliest. With the gradual marketisation of the Government's EV charging services, more private car park operators will install chargers in their public car parks to provide paid EV charging services for public use. We anticipate that public EV charging facilities will be on the rise together with the increase in number of EVs.

Expanding the coverage of application "EV-Charging Easy"

20. The Government launched the "EV-Charging Easy" mobile application in June 2022 to facilitate EV drivers to locate available public chargers conveniently in real time when needed. Currently, the "EV-Charging Easy" mobile application mainly provides information on EV chargers in government estates,

covering about 1 600 chargers. We will progressively expand the coverage of real time information and have invited other public and private organisations to participate in “EV-Charging Easy”. Currently, organisations have already expressed their willingness to share the information of public chargers in the car parks under their management. In the future, the information of public EV chargers provided by these organisations will be directly uploaded to the “EV-Charging Easy” mobile application to ensure its timeliness.

Expanding e-CV charging network

21. The critical factors for succeeding in promoting the wider adoption of electric CVs include (1) the availability of suitable EV models that can cater for their operational needs; (2) the price difference between EVs and conventional fuel-propelled vehicles; and (3) the provision of sufficient charging facilities. Various types of public transport and CVs in Hong Kong are having rather special operational modes. They need to cope with Hong Kong’s hilly terrains, the provision of air-conditioning in all seasons, as well as the general high daily mileage and passenger loading. Therefore, for promoting the local development of electric CVs, it takes more time to identify vehicle models that are both suitable for local mainstream business applications and affordable. It also takes time to set up sufficient charging facilities for these vehicles.

Charging strategies for e-buses

22. The Government has earlier subsidised 5 franchised bus companies (FBCs) to purchase a total of 36 single-deck e-buses and related charging facilities for trial on a number of routes. With the experience accumulated in the trials, currently some FBCs have already planned to introduce progressively electric double-deckers at their own cost and already commenced passenger service trials starting from mid-2022. There will be more electric double-deckers that can commence operations this year. The Government also plans to assist FBCs in installing charging facilities in new and existing bus depots.

Charging strategies for e-taxis

23. Taxis in Hong Kong operate almost on a round-the-clock basis, and can run for more than 20 hours and over 400 km a day. The EVs will be subject to

relatively more demanding requirements of driving range and charging speed for switching to e-taxis. To test the operational arrangements of quick charging for e-taxis, we are planning to provide dedicated quick chargers for e-taxis in Lantau and Sai Kung districts and encourage taxi owners' participation in the New Energy Transport (NET) Fund trial schemes, so that the trade could experience and understand more about the charging arrangements and operation modes of e-taxis. We expect no less than 10 related quick chargers to commence operations by phases starting from mid-2023 to provide assistance in gathering more data on practical operations and business for the trade's reference, so that the trade could accumulate more experience and confidence in the operations of e-taxis.

24. In view of the unique operational modes of taxis, a quick charging network covering the territory is needed to effectively support the operations of e-taxis. The Government is identifying suitable locations (such as taxi stands, different government premises, some lands under short-term tenancy and suitable locations close to substations of power companies) across the territory for setting up dedicated e-taxi charging facilities. We will also explore using existing commercially operated quick charging facilities to facilitate charging for e-taxis, and encourage commercial operators to expand public quick charging network. In addition, the Government is preparing to gradually convert, in the medium to long run, some existing petrol filling stations (PFS) and liquefied petroleum gas (LPG) filling stations into quick charging stations for charging various types of vehicles (including e-taxis). Furthermore, relevant government departments such as Food and Environmental Hygiene Department and Leisure and Cultural Services Department have also initially agreed to provide quick charging facilities on their premises. Two departments will provide no less than 30 additional quick charging facilities on their premises. We expect that through the above modes, 1 400 quick charging facilities⁴ can be provided in 2027.

25. To further promote the application of e-taxis, as announced in the 2023-2024 Budget, the Government will put in place a loan scheme with 100% guarantee for the taxi trade for taxi owners to replace their existing taxis with pure battery taxis. Meanwhile, the Government will also continue to promote trials of new generation e-taxis among the trade under the NET Fund. As at March

⁴ There are at present 18 000 LPG taxis in Hong Kong, of which 4 000 have switched to hybrid taxis. The remaining 14 000 ones can be switched to e-taxis. Generally speaking, 1 charging facility can be used for charging 10 e-taxis, thus it is estimated that about 1 400 charging facilities are needed to provide for the use of 14 000 e-taxis.

2023, the NET Fund approved trial applications of 23 new e-taxis. We are closely monitoring the trial results, the latest market development of e-taxis, the models available in the market, the views of the trade and the operational performance of e-taxis, as well as the development of quick charging network, in order to establish a comprehensive e-taxi charging network, and will strive to achieve the target of introducing about 3 000 e-taxis by end-2027 as mentioned in the Policy Address.

Charging strategies for electric public light buses (e-PLBs)

26. Hilly terrains, long daily mileage, high air-conditioning demand in different seasons, long charging time, as well as space and power requirements for installation of charging facilities all make application of e-PLBs in Hong Kong challenging. As such, the Government has earmarked \$80 million for the implementation of a pilot scheme on e-PLBs, to subsidise operators of e-PLBs to purchase e-PLBs and conduct trials on various green minibuses (GMB) service routes for about 12 months.

27. EPD has carried out site inspections of GMB termini and public transport interchanges (PTIs) that have potential for installing charging facilities and conducting trial schemes to confirm their suitability for setting up quick charging facilities and availability of sufficient power supply. The Government has been sparing no efforts in conducting relevant work, and we expect to commence the trial on e-PLBs in the second half of 2023 the earliest. The Government will also gather relevant data, to evaluate the performance of the e-PLBs and their charging facilities, in order to devise a concrete and feasible roadmap for the electrification of PLBs.

Charging strategies for other types of e-CVs

Conversion of PFSs into quick charging stations

28. The planning standards and guidelines on PFSs in Section 3, Chapter 12 of the *Hong Kong Planning Standards and Guidelines* was revised in July 2022 to allow the use of PFSs as EV charging stations and add relevant requirements for EV charging stations. The Government is exploring to gradually convert, in the medium to long run, some existing PFSs into quick charging stations to provide charging support for more types of EVs, especially e-CVs. To facilitate the conversion, we have been communicating with related operators and tapped their views, and are liaising with relevant government departments regarding site

selection and the tenancy arrangements of the sites, etc. We plan to invite tenders within this year for the conversion of the first PFS site to a quick charging station.

NET Fund

29. The Government has been subsidising the transport trade and charitable/non-profit-making organisations via the NET Fund since 2011 for trials and wider use of new energy transport technologies. The NET Fund Steering Committee assists the Government in assessing each application. The Steering Committee is chaired by a non-government official with members comprising representatives elected by the transport sectors, experts and academics in green innovative transport technologies, district councillors, as well as representatives of relevant government departments including the Environment Branch of the Environment and Ecology Bureau, the Electrical and Mechanical Services Department, the Innovation and Technology Commission and the Transport Department. In 2020, an additional \$800 million was injected into the NET Fund to promote wider use of new energy transport technologies with zero roadside emissions. Future key projects for promotion of NET Fund include trial applications of hydrogen fuel cell vehicles, e-taxis and electric medium and heavy goods vehicles. Besides, a new section of Applications for Use (AU) is created under the NET Fund to subsidise the trade to directly procure technologies that have been proved under Application for Trial (AT) to be relatively mature and suitable for local adoption.

30. With the rapid development of EV technologies in recent years, some suppliers have introduced or planned to introduce a variety of e-CV tools with long driving range and quick charging capability. To promote the use of new energy transport tools to the trade in a more flexible manner, we propose to enhance the current subsidy approach and subsidy caps of NET Fund⁵, which the NET Fund Steering Committee also supported relevant enhancement proposals at the 37th and 38th Meetings.

⁵ The eligibility for application, limits of applications, subsidy levels and caps of NET Fund have been uploaded on https://www.eeb.gov.hk/tc/new-energy-transport-fund.html#Application_for_the_Fund.

AT

- For hydrogen fuel trial projects, we suggest expanding eligibility of applicants (such as green technology startups). The subsidy ceiling for each application and the total ceiling for each applicant will also be adjusted, being raised from \$10 million and \$12 million to \$50 million⁶. The proposed subsidy framework for trial projects on technologies is at **Annex I**. The applicant shall submit project proposal for the Steering Committee's assessment and approval;
- Create a new category for trial projects on e-taxi charging mode to support the taxi trade to identify the charging option that are most suitable for their operation. We suggest accepting applications from related transport trade operators (such as charging service providers) as well, but they must partner with various taxi owners to test a certain number of e-taxis. We suggest to adjust the total subsidy ceiling for each applicant from \$12 million to \$20 million, or 75% of the total project cost (whichever is lower). Applicants are required to submit proposals for the Steering Committee's assessment and approval; and
- Propose that applicants who participate in the above trial projects are still eligible for trials of other new energy transport technologies under AT, with a subsidy ceiling kept at \$12 million.

AU

- Revise the AU subsidy approach and caps⁷. Eligible applicants can, according to their operational needs, purchase the new energy vehicles in the market of which the models have been type approved by the Transport Department;

⁶ Under AT, the subsidy level of the NET Fund is the price difference between the new energy vehicle and its conventional counterpart or 50% of the cost of the new energy vehicle, whichever is higher, with a cap of \$3 million per vehicle. 75% of the costs of related supporting system are also subsidised, excluding the associated recurrent expenditure. The subsidy cap is \$10 million per application, and the subsidy ceiling for each applicant and its related companies is \$12 million.

⁷ As mentioned in the Legislative Council Paper No. CB(1)336/19-20(04) in 2020, we set up a new AU section and proposed to engage technical consultants to develop a set of rapid screening test methods for formulating a list of AU funded product models. The AU subsidy for each application and the ceiling for each applicant are capped at \$10 million and \$12 million respectively.

- Relax the total subsidy cap of \$12 million for FBCs and applicants operating heavy vehicles; and
- Applicants will be reimbursed by phases after meeting a certain annual mileage⁸.

Way Forward

31. The Government will actively implement strategies under the *Hong Kong's Climate Action Plan 2050* and the *Clean Air Plan for Hong Kong 2035* to promote the adoption of new energy transport to expedite green transformation, and will continue to take forward the measures set out in the EV Roadmap, with a view to reducing roadside air pollutant emissions and attaining the target of carbon neutrality in transport sector before 2050.

32. In view of the rapid development of EV technologies, the Government needs to continuously adjust its plan and expedite green transformation. We have decided to make adjustment to review the progress of the popularisation of EV and the development of other new energy vehicles periodically around every three years, instead of every five years as suggested previously, so as to evaluate and improve our overall strategies and objectives in a timely manner. The Government will continue to expand EV charging ancillary facilities on all fronts, bring forward the marketisation of EV charging services, and actively promote the development of various electric and other new energy public transport and e-CVs, with a view to announcing a roadmap for the promotion of electric public transport and CVs by 2025.

Advice Sought

33. Members are invited to note and comment on the Government's strategies to support the EV charging network and their progress.

⁸ The Government will commission an independent third-party consultant via the NET Fund to gather and analyse the applicant's operational data for assessing the effectiveness of emission reduction, and submit reports to the Government regularly to ensure that the operational data submitted by the applicant is accurate and that the designated mileage is met.

Environment and Ecology Bureau
Environmental Protection Department
April 2023

**Proposed Subsidy Framework for
Trial Projects on Hydrogen Fuel Technology under the NET Fund**

- (1) Scope of subsidy: covering costs of procurement, construction or renting of hydrogen fuel cell electric vehicles, installation of hydrogen refilling facilities and procurement of pure battery EVs of the same vehicle type for comparison of operational performance; operating costs related to the trials (such as expenses on hydrogen fuel, trial-related service contracts and staff remuneration), etc.;
- (2) Subsidy cap for each trial project: \$50 million or 75% of the total project expenditure, whichever is the lower;
- (3) Duration of trial projects: Starting from the commencement of the trials of hydrogen fuel cell electric double-deckers and/or heavy vehicles, the applicants should endeavour to use and maintain the vehicles and associated facilities procured with the subsidy for at least three years, during which on-road trial should be conducted for a minimum of 12 months.