

Joint submission to call on the HKSAR Government to establish ambitious goals and measures to accelerate the transition of public transport and commercial vehicle fleets to zero emission vehicles

In response to the formulation of Hong Kong's first EV Roadmap announced by the Financial Secretary in the 2020/21 Budget

Submitted by:



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Hong Kong 2050 Is Now

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For the attention of:

- The Financial Secretary, HKSAR Government
- The Secretary for the Environment, HKSAR Government
- The Environmental Protection Department, HKSAR Government
- The Steering Committee on the Promotion of Electric Vehicles

EXECUTIVE SUMMARY

This submission is in response to the Financial Secretary's announcement for the 2020/21 Budget in February 2020 that the HKSAR Government plans to launch Hong Kong's first Electric Vehicle Roadmap (EV Roadmap).

The submission is made on behalf of Civic Exchange, the Clean Air Network and Hong Kong 2050 Is Now - and is addressed to the relevant bureaus and departments of the Government which will be crucial in formulating this EV Roadmap.

We seek to draw the attention of policy makers to the importance of including both commercial vehicles and public transport in the EV Roadmap to achieve both clean air and decarbonization goals, and to harmonize with the policy goals and standards committed to on an international level.

Electrification of the vehicular fleet must proceed in well-planned steps, and thus the HKSAR Government needs to set ambitious goals in the EV Roadmap to accelerate the transformation of road transport to ultimately reach zero emissions.

Our key recommendations for an effective transition which should be considered for the upcoming EV Roadmap are therefore:

1. Establish a policy vision, targets and measures for all commercial vehicles including public transport.
2. Formulate an EV Action Plan with stage-wise developments, close engagement of public and private stakeholders, appropriate subsidies, streamlined approval processes and better trial design.
3. Clarify the institutional roles of involved Government Bureaus and Departments.
4. Strengthen the membership of the Steering Committee on the Promotion of Electric Vehicles.

This submission outlines the scientific basis as well as the local and regional policy background (Part 1), offers a perspective on the challenges of transforming vehicular fleets, tracing progress, findings of past policies and studies, and observations from recent stakeholder engagements (Part 2), and details out our policy recommendations (Part 3) to achieve clean air and decarbonization goals.

1. BACKGROUND

1.1 The Science

Currently, urban transport is the second largest direct source of greenhouse gas emissions (17.8%) in Hong Kong, a major source of roadside air pollution and a key contributor to public health risks. Commercial vehicles account for over 90% of roadside air pollution, and according to a regional study Heavy Duty Diesel Vehicles (HDDV) and Light Duty Gasoline Vehicles (LDGV) account for over 40% of respiratory mortality and lung cancer in Hong Kong due to the emissions of nitrogen oxides (NOx) ¹ .

It is estimated that, in Hong Kong, over 1,700 premature deaths and over HKD20 billion in economic losses, 130,000 additional hospital bed days and 2.3 million additional doctor visits (HKU) were incurred by air pollution in a single year². Recently a landmark coroner's ruling in London affirmed that air pollution can be fatal, following the death of a 9-year old due to an asthma attack in 2013. The coroner's court ruled that air pollution was a significant contributory factor to both the induction and exacerbation of her asthma, and thus cause of her death. This ruling set a global precedent for the recognition of air pollution as a cause of death, and should alarm the HKSAR government to accelerate mitigation strategies for air pollution especially as Hong Kong's air quality, in terms of all major pollutants, has not been meeting the World Health Organization's safe level for years. This means that Hong Kong citizens continue to be exposed to excessive levels of pollution.

1.2 EV Roadmap as an opportunity to achieve international and local goals

In November 2020, the Chief Executive pledged in her 2020 Policy Address to achieve carbon neutrality by 2050, which is in line with the wider regional and global efforts of mitigating climate change.

Internationally, China has reiterated its target of carbon neutrality by 2060 in the recent Climate Ambition Summit and reaffirmed a cut in emissions per unit of GDP by at least 65% compared with 2005 levels. As part of the C40 Cities Climate Leadership Group, the HKSAR has committed to a healthy, equitable and sustainable economic recovery from the COVID-19 pandemic.

Thus, the EV Roadmap represents an opportunity not only to achieve clean air and decarbonisation goals, but for the HKSAR to fulfil its international commitments.

1.3 Latest Study shows Full Electrification of Buses will reduce 6,000 Premature Deaths Annually

¹ Xingcheng Lu, Teng Yao, Ying Li, Jimmy C.H. Fung, Alexis K.H. Lau, Source apportionment and health effect of NOx over the Pearl River Delta region in southern China, *Environmental Pollution*, Volume 212, 2016, Pages 135-146, ISSN 0269-7491, <https://doi.org/10.1016/j.envpol.2016.01.056>. (2016)

² School of Public Health, the University of Hong Kong. Hedley Environmental Index. Retrieved from <http://hedleyindex.hku.hk/html/en/>

According to a recent working paper³ which estimated the costs and benefits of electrifying public transport, a full electrification of public buses will reduce up to 6,000 premature deaths annually. Replacing the entire bus fleet (>6000 vehicles) by the mid-2020s would amount to a total cost of about HKD30 billion, excluding the financing of additional infrastructure. However, capital costs are expected to reduce significantly into the mid-2020s as EV technology further matures.

Apart from reducing mortality, there will be considerable additional savings in health costs by reducing the need for treatment of chronic cardiovascular and pulmonary diseases.

1.4 Hong Kong continues to fall behind regional counterparts

Compared to other global cities including Shenzhen, London, Singapore and Seoul, the HKSAR has insufficiently progressed in terms of EV policy goals⁴. Hong Kong neither has a clear timeline and clear fleet development targets of phasing in zero emission buses, nor is there currently a holistic policy to provide financial support to cover the capital cost gap of purchasing EVs and to build necessary charging infrastructure.

1.5 Rapid Development of Singapore and London on Zero Emission Bus

As part of the national ambition to achieve carbon neutrality by 2050, Singapore pledged to electrify its entire bus fleet (5,400 buses) by 2040 and has already tendered the procurement of 60 electric buses, including 10 double-decker buses which have entered service by November 2020. Singapore also announced a ban of all types of internal combustion engine (ICE) vehicles by 2040.

The U.K. has recently moved to similarly banning ICE private vehicles and some of the commercial vehicles including light trucks, from 2025 to 2030. The growth rate of zero emission buses in London is rapid. Since 2019, all new double-decker buses are hybrid, electric or hydrogen vehicles. In central London, all single-deck buses will have zero exhaust emissions by the end of 2020. By 2037, all 9,200 buses across London will be zero emission.

2. THE CHALLENGES

2.1 Insufficient Impact of the Steering Committee on Promotion of Electric Vehicles

In 2009, a Steering Committee on the Promotion of Electric Vehicle was set up under the chair of the Financial Secretary, with the objective to 'recommend a strategy complementary with specific measures to promote the use of electric vehicles in Hong

³ Decarbonising Public Transport in Hong Kong, Inter-Modal Transport Data Sharing Programme
<https://trpc.biz/wp-content/uploads/2020/11/Decarbonising-Public-Transport-in-Hong-Kong-November-2020.pdf>

⁴ Factsheet: Policies and measures on promoting the use of electric vehicles in selected places
<https://www.legco.gov.hk/research-publications/english/1920fs01-policies-and-measures-on-promoting-the-use-of-electric-vehicles-in-selected-places-20200610-e.pdf>

Kong, having regard to the resulting energy efficiency, environmental benefits and the creation of business opportunities.’

The effectiveness of the committee however remains debatable. Since the committee’s establishment, it has neither established a concrete strategy, nor a timeline for stakeholders and the public to understand what milestones are being targeted. Furthermore, meeting agendas and minutes are not publicly available as ‘the Committee’s meetings [are] conducted confidentially to encourage frank and open discussion’. This hampers a good public understanding of the accountability for any plans developed within the Committee.

2.2 Stagnant Transformation of Zero Emission Bus

The Pilot Green Transport Fund (PGTF), established by the Environmental Protection Department, has been ineffective in driving research, development and deployment of Zero Emission Bus technology in Hong Kong. By the end of 2019, only 36 electric buses were operating in service, accounting for only 0.5% of public buses in Hong Kong.

Although the Government injected an additional \$800 million to the fund and extended its scope to form the “New Energy Transport Fund” (“NET Fund”) in September 2020, it is unlikely to accelerate the pace of transformation. For example, two franchised bus operators are funded to purchase just two electric double-decker buses in December 2020. The scale of these trials is far too small to substantially drive a transformation.

2.3 Lessons Learnt from Previous Trials

The “Electrification of Single-Deck Bus and Minibus in Hong Kong” study (2016) by the Central Policy Unit provided an analysis of problems of electrifying single decker franchised bus and minibus in Hong Kong⁵, based on the results of a seminar and a public forum which collected the views of academics, bus operators, minibus operators, power companies, consultancies and government officers.

Core issues which were identified included:

- I. A large knowledge gap in e-bus technologies and total cost in ownership (TCO)
- II. Lack of appropriate design of trialed e-buses to suit operating conditions in Hong Kong
- III. Lack of collaboration among key stakeholders, i.e., government, bus operators, e-bus manufacturer, battery manufacturer, charging facility provider to ensure a successful e-bus programme.

2.4 Stakeholders’ Point of View

Civic Exchange, the World Resources Institute and Clean Air Network initiated a round of stakeholder engagements in late 2020 to understand key stakeholder concerns and

⁵ Electrification of Single-Deck Bus and Minibus in Hong Kong
[https://www.pico.gov.hk/doc/sc/research_report\(PDF\)/2015_A6_058_15D_Final_Report_Dr_Hung.pdf](https://www.pico.gov.hk/doc/sc/research_report(PDF)/2015_A6_058_15D_Final_Report_Dr_Hung.pdf)

challenges involved in the transition to zero carbon emission vehicles. The first workshop, held in November 2020, gathered participants from franchised bus companies, vehicle manufacturers, corporate representatives, and non-government organisations. The five key challenges to 100% electrification of buses in Hong Kong identified at the workshop were: (I) infrastructural challenges, (II) operational and business model changes, (III) limited range and reliability of electric vehicles (EVs), (IV) lack of grants and funding, and (V) lack of policy support from the government. In the following, we present further details on each of these points:

I. Infrastructural challenges

- Limited land and space in Hong Kong for charging infrastructure that is required for battery electric buses (BEBs)
- Installation of chargers in existing conventional bus depots and termini, and linking chargers to transformers incurred costs >HKD1 million.
- Implementation of infrastructural changes (e.g. installation of EV-friendly infrastructure) hampered by long approval processes and times, and silos in government departments leading to high costs and lengthy cross departmental requirements to gain approval for on-street charging of BEBs

II. Lack of funding and investment

- Start-up costs of BEBs estimated to be about twice of those of a comparable diesel bus, with a lack of adequate funding for franchised bus companies to make purchasing decisions in favour of BEBs
- Indirect subsidy of diesel vehicle operation due to lack of taxation on diesel

III. Lack of policy support and government determination

- Lack of a holistic cross-departmental and cross-bureau policy (transport department, environmental protection department, environmental bureau, housing department, etc.)
- Lacklustre determination of the Government to take lead in introducing e-buses in HK
- Insufficient incentives to push forth electrification: The government needs to provide incentives for EV use, particularly as HK has over 6000 registered buses within the franchise system and over 800,000 registered vehicles in total
- Heightened international and local pressure to form local mandates in Hong Kong as more countries and companies transition to zero-emission technology, especially with China's newly-set targets for zero-emission by 2060 and the current progression towards zero-emission in the Greater Bay Area (GBA: this may provide clarity and greater support on policy initiatives for local companies to help their transition to zero-emission technology
- Strong cases from international experiences for the role of the government in facilitating the creation of enabling conditions for systemic changes in industries: For the business cases to be heard and challenges acknowledged and overcome, policy guidance and government support are foundational for increasing both

public and private confidence

IV. Range and reliability

- Significant gap between manufacturer-stated daily range (250km) and actual performance (120-150km), which is inadequate for regular route operation in Hong Kong
- Use of only single-deck EV buses currently not justifiable due to considerable additional space requirements for charging facilities and depots under already tight constraints; Current double-deck BEBs inadequate in quality or range; Maturity of double-deck BEB technology not expected within the next 5 years
- Lower total operational capacity of a BEB compared to a comparable diesel bus due to its lower lifetime <18 years.

V. Operational / business model

- Different maintenance requirements of EV buses and diesel buses: impacts on operational models
- Limited leverage with manufacturers to supply tailor-made models to Hong Kong's specific market requirements due to limited EV deployment
- Changes to business models considered possible, such as government procurement and ownership of bus fleet with lease-back to bus companies
- High maintenance cost and cost for replacing batteries in case of technical failures

Participants concluded that regulation and enforcement of EV use in Hong Kong will inevitably be enacted in the foreseeable future and that actors in the public and private sphere need to prepare for and begin the transition of their vehicle fleet to zero-emission alternatives as soon as possible. It is thus necessary to change buying patterns in a gradual process starting now, in order to prepare for future EV mandates.

2.5 Further Insights

Further to stakeholder's views, Civic Exchange, the World Resources Institute and Clean Air Network consider the following points as significant challenges to a swift transition:

I. On public policy direction:

There is a lack of policy leadership in setting concrete deadlines. This encourages corporate actors to retain a business-as-usual approach, phasing out diesel vehicles only when they reach the end of their service life (18 years), as currently mandated by the Public Bus Service Ordinance.

II. On resources:

Fundamental discussions on appropriate funding models to accelerate zero-emission vehicle adoption are lacking. The formulation of an EV Roadmap by the Financial Secretary may provide an opportunity for the corporate sector to seek funding

through public subsidies to close the gap for purchasing zero emission vehicles. The upfront purchasing cost is currently the main barrier to a wider adoption of EVs as the period of return is too uncertain for corporate decision makers. Fuel and maintenance costs however are expected to significantly decrease in the long term, posing lesser risks.

III. On information flow:

With the rapidly changing landscape in terms of fuel cost, vehicle technology cost and maintenance cost, there is a profound lack of up-to-date knowledge sharing to facilitate corporates to make informed business decisions. Also, knowledge on technologies suitable and applicable to Hong Kong, including case studies and implementation results from foreign cities, is not readily available to both government and private sector stakeholders.

3. OUR POLICY RECOMMENDATIONS

Key summary of recommendations

- 3.1 Establish measurable targets for all vehicles to achieve both clean air and decarbonisation goals
- 3.2 Formulate an EV Action Plan to achieve targets
- 3.3 Clarify institutional roles of related Government Bureaus and Departments to enable more effective and efficient coordination to support the overall EV strategy
- 3.4 Strengthen membership of the Steering Committee to include relevant experts in helping to promote Electric Vehicles

Detailed recommendations

In the following we detail out our recommendations for consideration in the upcoming EV Roadmap:

3.1 Establish a policy vision, targets and measures for all public transport and commercial vehicles

- In order to achieve clean air and decarbonisation goals, the EV Roadmap should put strong emphasis on **electrifying all public transport and commercial vehicles**, including buses, freight vehicles, minibuses, taxis, in addition to private cars.
- The EV Roadmap should outline a measurable goal to phase out conventional diesel commercial vehicles and ultimately to achieve a zero-emission vehicular fleet. Taking reference from regional counterparts, Singapore aims to have all vehicles run on cleaner energy by 2040, Tokyo aims to have 300 zero emission buses by 2030, and Seoul aims to have 3,000 electric buses (40% of total) by 2025.

3.2 Formulate an EV Action Plan

As part of the EV Roadmap, the Government should formulate an **EV Action Plan** to set out a policy vision and its targets. The EV Action Plan should address:

- **The stage-wise development and construction of charging infrastructure to meet projected growing needs for the public transport and commercial vehicles.**

The Government should bear the responsibility to build the dedicated charging infrastructure for public transport; one option is to categorize the charging infrastructure as a public works capital expenses item.

- **Financial subsidies to close the capital gap for purchasing new energy vehicles:**

The cost-benefit-ratio of Battery Electric Buses (BEB) varies with individual locations and manufacturers. The price premium of purchasing a BEB over a conventional diesel bus currently amounts to approximately HK\$2 million, however, this is expected to further decrease towards the mid-2020s. We thus recommend the Government to provide subsidies to bus operators to cover the gap on capital costs to incentivize the transformation at the initial stages.

- **Engagement of stakeholders:**

from the public and private sectors in developing different charging options and to ensure their practicability and sustainability;

- **Ease approval process for installing charging infrastructure:**

Current application procedures for infrastructural changes and installing EV-friendly infrastructure at bus depots and on street requires lengthy and time-consuming cross departmental approvals. We recommend to delegate oversight to a specific Government Department or Task Force to handle applications for setting up charging infrastructure to streamline the process.

- **Improve trial design:**

Current trial designs involve only small batches of vehicles. Consequently, market incentives for maintenance and support services to cater to EVs and to step up efforts to address and remediate technological issues encountered during trials are insufficient.

We recommend the establishment of a platform that will bring together experts from various concerned sectors and areas, including power transmission, EV charging technology, EV charging facilities, EV manufacturers and dealers, EV maintenance workshops, battery management systems as well as public transport operators to formulate better trial designs.

A good reference example is the Low Carbon Vehicle Partnership platform established in the U.K. The HKSAR government should also work closely with Great Bay Area and ASEAN cities to exchange latest technology and operational data of electric buses.

3.3 Clarifying institutional roles of involved Government Bureaus and Departments

- The **Steering Committee on the Promotion of Electric Vehicles** under the leadership of the Financial Secretary should assume the overall responsibility to formulate this EV Roadmap, as the initial Terms of Reference of this Steering Committee refer to its role as “to recommend a strategy complementary with specific measures to promote the use of electric vehicles in Hong Kong [...]”⁶.
- The **Environment Bureau** should continue to be the supporting arm of the Steering Committee and to actively take the initiative to set out a vision and timeline for the EV Roadmap, focusing on the central objectives of speeding up the process for Hong Kong to achieve clean air (i.e. to meet the World Health Organization’s recommended safe level) and to deeply decarbonize (i.e. to meet net zero carbon emissions by 2050).
- In parallel to formulating the EV Roadmap, there should be an implementation arm set up within the administration. This could be achieved by **setting up an EV Office** to implement **the EV Action Plan** with regular engagement of key stakeholders from the public and private sector to address anticipated issues, including technology and operational compatibility of EVs and charging systems, as well as the development of charging infrastructure.

3.4 Strengthening membership of the Steering Committee on the Promotion of Electric Vehicles

- **The Steering Committee on the Promotion of Electric Vehicles** under the leadership of the Financial Secretary should be strengthened to include members of experts from various concerned sectors and areas, as mentioned previously, including power transmission, EV charging technology, EV charging facilities, EV manufacturers and dealers, EV maintenance workshops, battery management systems as well as public transport operators.

⁶ Steering Committee on the Promotion of Electric Vehicles, Website of EPD, HKSAR Government (Last Revision Date: 11 October 2019)
https://www.epd.gov.hk/epd/english/environmentinhk/air/prob_solutions/sc_promotion_of_electric_vehicles.html

APPENDIX

- I. **Table 1: Number of licensed franchised buses in Hong Kong**
 II. **Table 2: Comparison of EV development targets/vision among selected cities**

I. **Table 1: Number of licensed franchised buses in Hong Kong⁷**

Engine class	KMB*	CTB (F1)*	CTB (F2)*	NWFB*	LWB*	NLB*	Total (by engine class)	Fleet proportion
Euro II Diesel Bus	22	0	0	0	0	0	22	0%
Euro III Diesel Bus	891	0	0	7	18	13	929	15%
Euro IV Diesel Bus	93	24	0	38	32	23	210	3%
Euro V Diesel Bus	2823	675	221	528	225	113	4585	74%
Euro VI Diesel Bus (incl. Hybrid)	220	47	20	108	0	5	400	6%
Electric Bus	16	5	0	4	4	2	31	1%
Total (by operator)	4,065	751	241	685	279	156	6,177	100%
Fleet proportion of Euro VI Diesel Buses (incl. Hybrid)	5.4%	6.3%	8.3%	15.8%	0.0%	3.2%	6.5%	
Fleet proportion of Electric Buses	0.4%	0.7%	0.0%	0.6%	1.4%	1.3%	0.5%	

Key

- KMB - The Kowloon Motor Bus Company (1933) Limited
- CTB (F1) - Citybus Limited (Franchise for Hong Kong Island and Cross-Harbour Bus Network)
- CTB (F2) - Citybus Limited (Franchise for the Airport and North Lantau Bus Network)
- NWFB - New World First Bus Services Limited
- LWB - Long Win Bus Company
- NLB - New Lantao Bus Company (1973) Limited

⁷ Examination of Estimates of Expenditure 2020-21, HKSAR Government (2020). Reply Serial No. ENB041. https://www.legco.gov.hk/yr19-20/english/fc/fc/w_q/enb-e.pdf

II. Table 2: Comparison of EV development targets/vision among selected cities⁸

City	Targets/Vision
London	<ul style="list-style-type: none"> ▪ ban of ICE private vehicles and some of the commercial vehicles including light truck by 2030 ▪ zero emission bus fleet across London (9,200 buses) by 2037
Tokyo	<ul style="list-style-type: none"> ▪ at least 300 zero-emission buses in service by 2030
Singapore	<ul style="list-style-type: none"> ▪ ban of all types of ICE vehicles by 2040 ▪ fully electrified bus fleet by 2040 (5,400 buses)
Seoul	<ul style="list-style-type: none"> ▪ 3,000 electric buses (40% of total) in service by 2025
California	<ul style="list-style-type: none"> ▪ all new buses purchased by municipalities to be zero emission by 2029

⁸ LegCo Research Secretariat (2020)

Factsheet: Policies and measures on promoting the use of electric vehicles in selected places.

<https://www.legco.gov.hk/research-publications/english/1920fs01-policies-and-measures-on-promoting-the-use-of-electric-vehicles-in-selected-places-20200610-e.pdf>