

HONG KONG 2050 IS NOW

Response to The Council for
Sustainable Development

Long-term Decarbonisation Strategy

Public Engagement

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General Information

Which of the following identities are you using to respond to this views collection form?
(Please select **ONE** only)

Organisations

- Professional bodies
- Building construction
- Transportation
- Public organisations
- Others: NGO
- Engineering
- Others

Companies

- Real estate
- Real estate developers
- Property management companies
- Commercial tenants
- Others
- Brokerage and agencies

Individuals

Which age group do you belong to?

- Below 18
- 18-30
- 31-60
- Above 60

Are you a private commercial/industrial property owner?

- Yes
- No

Introduction

Hong Kong 2050 Is Now Project introduction

This response is based on the “Hong Kong 2050 Is Now” project, an independent initiative by Civic Exchange and World Resources Institute (WRI) seeking to galvanize action towards Hong Kong becoming close to carbon neutral by 2050. The study takes, as its core scenario the IPCC’s 1.5C report’s advice that human civilization as a whole must be close to net zero GHG emissions by 2050 to have any chance of limiting average global temperature rise to 1.5C. The project will undertake a detailed modeling exercise to understand from a scientific, technical, and economical perspective, how Hong Kong can transform into a net zero emissions economy and society.

Global 2050 vision

A 60% reduction to a global average of 2 tonnes CO₂e per capita can keep temperature increases up to 2050 to 2 degrees above pre-industrial levels if the reduction takes place quickly enough. It will not, however, stop temperatures from continuing to increase after 2050. Instead, the radiation imbalance making the world’s climate worse will continue to increase until humanity achieves net zero greenhouse gas (GHG) emissions. Further, it will take many years for the world’s climate and sea levels to stabilize at the increased level of GHG in the atmosphere caused prior to achieving net zero GHG emissions. This further deterioration is due to the many years it takes to warm up oceans and melt ice to match the new GHG level.

The Paris Agreement requires countries to submit their mid-century (i.e. 2050) climate change strategies to the United Nations Framework Convention on Climate Change (UNFCCC) next year. Eleven countries have already done so. Among them, Germany has set the goal of achieving net zero GHG emissions by 2050¹; France is revising its low-carbon strategy and incorporating it into the goal of achieving net zero by 2050²; and the UK has passed laws to bring all GHG emissions to net zero by 2050.³ This adoption of a net zero target by 2050 by advanced economies recognizes:

- The desirability of limiting temperature increases to 1.5C rather than 2C.
- The different development stages of countries around the world makes it both equitable and efficient for the global average reduction in emissions to comprise some less developed countries having small reductions or, in some cases increases, while advanced countries have greater than average reductions.

As Asia’s World City, Hong Kong should develop its own strategy and goal of achieving net zero carbon by 2050.

Hong Kong’s GHG emissions and driving forces

Hong Kong’s Scope 1 GHG emissions were 41.8 million tonnes CO₂e in 2016, and net GHG emissions including land-use change and forestry were 41.4 million tonnes CO₂e. From a production perspective electricity generation contributes to 66% of Hong Kong’s Scope 1 GHG emissions and transport contributes to 18% (**Figure 1**). From a consumption perspective, the building sector is the largest contributor, accounting for more than 60% of Hong Kong’s total GHG emissions⁴.

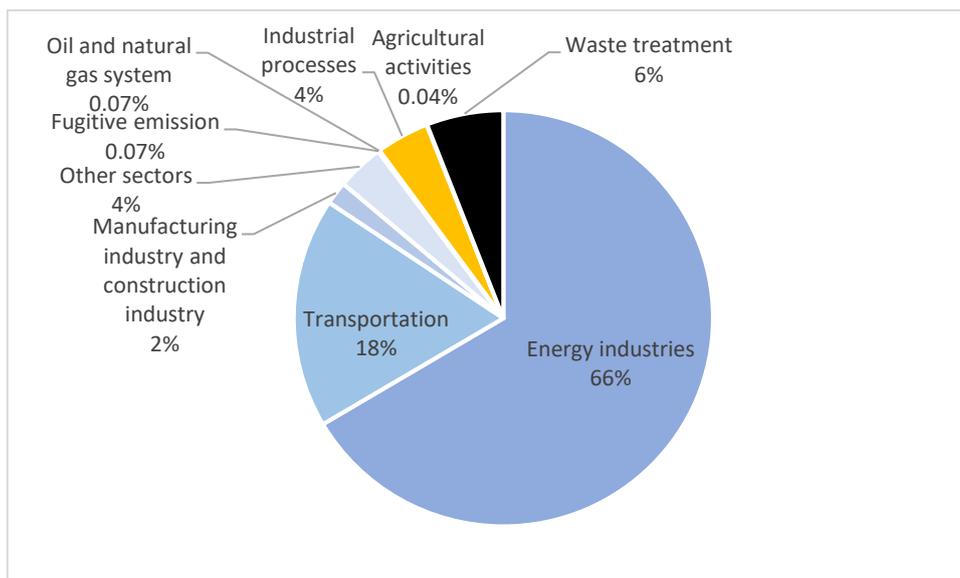
¹ Climate Action Plan 2050. <https://unfccc.int/node/181390>

² French national low-carbon strategy. https://unfccc.int/files/focus/long-term_strategies/application/pdf/snbc_4pager_fr_en.pdf

³ www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law

⁴ Hong Kong’s Climate Action Plan 2030+

Figure 1. Hong Kong’s GHG Emissions Profile in 2016



Source: Hong Kong 2050 is Now project, based on data from Hong Kong EPD

We analyzed the trend of Hong Kong’s GHG emissions from energy activity and the four driving forces with KAYA equation, and analyzed the contribution of these driving forces using the Logarithmic Mean Divisia Index (LMDI) method. Hong Kong's GHG emissions have shown a slow upward trend and fluctuated since 2000. Carbon intensity increased from 2000 until 2009 and during this period energy mix contributed to the emissions increase. After 2010, carbon intensity started to decline slowly and remained fluctuating for several years. GDP per capita is the major driving force behind the increase of GHG emissions. (see Figure A-1 and Figure A-2 in Appendix)

Hong Kong’s existing goals and performance tracking

In 2010, Hong Kong, for the first time, put forward its target to reduce the carbon intensity by 50%-60% from 2005 levels by 2020⁵. Hong Kong’s Climate Action Plan 2030+ report published in 2017 in response to the Paris Agreement states the government’s carbon emissions reduction target for 2030 and action plans to meet it. This is an important step forward for the government, acting as a blueprint for Hong Kong to become a greener, more liveable, and more climate-resilient city. However, based on our evaluation of the progress, many targets are not on track. (see Table A-1 in Appendix). Hong Kong needs to take more action to ensure the fulfilment of its own climate goals.

⁵ Hong Kong Climate Change Report 2015 www.enb.gov.hk/sites/default/files/pdf/ClimateChangeEng.pdf

Energy and Electricity (Q1 to Q3)

Question 1

Carbon emissions by the current generation have serious implications on our future generations - extreme weather, flooding, etc. Decarbonisation is an inter-generation challenge. The key way to reduce carbon emissions is to allocate resources to gradually phase out fossil fuel. Do you support this direction?

Yes No No comment

While we have replied “Yes” the word ‘gradual’ may be misleading as, per scientific advice⁶, it is well justified to aim to limit temperature increase to 1.5C, an objective which requires halving global emissions by 2030 and achieve Net Zero carbon dioxide emissions by 2050. This is a very substantial change which will require urgent, continuous, substantive action. It may require retiring some assets before the end of their normal economic life.

Question 2

How would you rank the importance of different considerations (reliability, security and availability, affordability, and environmental performance and response to climate change) when considering the long-term fuel mix for Hong Kong? (please rank the following in order of importance: 1 – most important; 4 – least important)

-- Reliability

-- Security and availability

-- Affordability

-- Environmental Performance and response to Climate Change

This is not a meaningful question for several reasons. First, the terms are not sufficiently clearly defined. Second, all four considerations are important. Their relative importance at any point in time depends on the current level of performance at that point in time.

We recommend the following policies for Hong Kong regarding the electrical power generation sector:

Massive ramp-up of renewable energy

Renewable energy has very limited large-scale application potential in Hong Kong, or 3-4% according to most recent studies. But how is this figure estimated? In particular, what are the projected future cost and potential generation in Hong Kong regarding different types of renewable energy including roof-top solar PV, large scale (e.g. reservoir) PV, on-shore wind, off-shore wind, waste to energy, and other renewable energy? We recommend the government and private sector sharing more information so we can further determine application potential. The Hong Kong government should also create an enabling environment to fully explore the domestic renewable energy potential that could be provided at reasonable cost. Examples of such enablers, some of which the government is already using are:

1. Implementing feed-in-tariffs,
2. Promoting rooftop solar PV,
3. Subsidies for solar panels,

⁶ The Oct 2018 IPCC special report on Global Warming of 1.5°C www.ipcc.ch/sr15/

4. Low cost finance for solar projects,
5. Enforcing renewable portfolio standards,
6. Promoting local capacity building,
7. Eliminate regulations that make it harder for businesses to adopt solar PV (e.g. counting solar PV as extra building floor space),
8. Providing solar maps to provide information to potential customers,
9. Building wind farms on outlying islands and offshore wind farms,
10. Adding waste-to-energy facilities

In addition, the government could commission new studies on renewables potential in Hong Kong and its potential for co-benefits like job creation.

Government and local electricity companies should explore energy collaboration opportunities in China, in particular, Southern China, by playing the role of an investor in utility projects. Joint venture investment on renewable energy generation project may allow Hong Kong to access low carbon electricity from renewable sources in Mainland China. If this is done, local electricity companies will participate in designing, building, operating and managing the facilities with other investors ensuring reliability and quality of supply. They should start small on such projects to build relationships, trust, and collective governance; and then ramp up strongly. In addition, the Hong Kong government shall play a more active role to liaise the discussion between local electricity companies and city governments in Southern China.

In order to realize the full potential of renewable energy, Hong Kong should develop electricity storage capacity in tandem with renewable energy projects. See recommendation on next page “Action to match supply and demand for electricity”

Importing more nuclear energy from Mainland China

Daya Bay has supplied Hong Kong with about 25% of its electricity in a safe, low pollution, low cost, reliable manner for over 20 years. Hong Kong should explore the potential of increasing nuclear energy imports from Mainland China.

Further data is required for making decisions. The consultation notes that by 2025 the % of Hong Kong’s electricity which can come from low carbon Mainland sources can be increased from 25% to 35%. It does not however provide information on how this low-carbon electricity might be obtained. The Hong Kong Government’s 2010 consultation proposed increasing the share of Hong Kong electricity coming from nuclear from 25% to 50%. Discussion of this proposal understandably stopped after the Fukushima accident. Mainland China however, after carrying out a detailed nuclear safety assessment, is now going ahead with building a substantial number of nuclear power stations. Some of these are being built in Guangdong Province and CLP has a minority sharing in one of these. Such ownership provides additional transparency and hence comfort on the governance of these stations. Hong Kong should commission a study immediately to assess safety standards and risks with a view towards making a decision about the potential for increasing the share of Nuclear energy imported from China into its energy mix.

Natural Gas with Carbon Capture and Storage (CCS)

Natural gas plants reduce emissions relative to coal but without CCS lock in a medium ambition trajectory which will not achieve net zero carbon by mid-century. Rather, gas-fired plants need to be outfitted with CCS technologies in order to reach near-zero emissions. However, the feasibility and potential costs of decarbonizing the electricity supply by using such plants are unknown. Issues which need to be resolved before Hong Kong commits to Gas with CCS include:

- Availability of geological storage: Guangdong Province has identified very substantial saline aquifers about 100km offshore Hong Kong but there would need to be an agreement with Mainland China for Hong Kong to use this storage.
- Confirmation from large scale pilots that CCS is has a sufficiently high CO₂ capture rate at an acceptable total, including transport, cost. As a small territory, Hong Kong is not in a position to develop such pilots. Rather it can position itself to be a ‘fast follower’ once the technology has been developed elsewhere.

Action to match supply and demand for electricity

If, as we recommend, a much higher percentage of Hong Kong’s electricity supply comes from nuclear and renewables, then the ability to adjust supply to meet demand will reduce substantially. Other ways of matching demand and supply of electricity are:

- **Storage** - This is needed when electricity supply exceeds demand. CLP already runs a pumped water facility in Shenzhen. There will presumably need to be further such facilities. Hong Kong should also monitor technology for improving storage. Options include batteries and converting electricity to hydrogen.
- **Demand management** - Disincentivizing electricity usage in times of demand may exceed supply. Options include:
 - Introducing a more expensive tariff for guaranteed power at all times and a cheaper tariff for accounts where the electricity utility can restrict supply – e.g. by turning off air conditioners when supply cannot meet total demand.
 - Peak-load pricing for electricity could be higher than at times of low load.

We note CLP has started a pilot project on demand response. The utilities should be required to follow-up on such pilot projects and study how best to combine demand response with variable renewable energy and grid storage for the grid of the future.

Question 3

Do you support the measures mentioned in the preamble for deep decarbonisation with a view to complying with the target of the Paris Agreement? Such measures include adopting a low-carbon lifestyle, intensifying energy saving efforts, and increasing the proportion of zero carbon energy in our fuel mix through closer regional cooperation, etc.

Yes No No Comment

If you support the measures mentioned, which one should be prioritised? (Please take one that applies)

Adopting a low-carbon lifestyle

Intensifying energy saving efforts

Increasing the proportion of zero carbon energy in our fuel mix through closer regional cooperation

Our view is that all the above actions are necessary. We note that:

- Decarbonizing electricity has the biggest impact on emissions reported to the UNFCCC.
- Carbon emissions embodied in Hong Kong’s imports of food, clothing, machinery and its purchase of international air travel together almost certainly substantially exceed the Hong Kong emissions reported to the UNFCCC.

Reducing our own emissions (Q4)

Question 4 What measures would you adopt to reduce your carbon emissions? (Please tick ONE that applies)

For Organisations / Companies (only applicable to respondents who answer this views collection form in their organisational/company's capacity)					
		Very likely	Likely	Unlikely	Very Unlikely
Procurement	(i) Formulate (or tighten up) green procurement policy and provide training to staff on green procurement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	(ii) Purchase energy-efficient electrical office appliances (e.g. those with energy labels), such as computers, printers, LED light bulbs, etc.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Energy Efficiency and Conservation	(iii) Participate in the Energy Saving Charter to practise energy saving measures such as maintaining air-conditioned average room temperature between 24 °C and 26 °C or above in summer	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	(iv) Retrofit office premises to improve energy efficiency, such as installing new lighting and air-conditioning systems	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	(v) Participate in the Government 4T Charter (namely target, timeline, transparency and together) to set a target and timeline to reduce carbon emissions by saving energy	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	(vi) Carry out energy / carbon audits with a view to identifying and implementing measures to reduce energy consumption and carbon emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transportation	(vii) Instead of taking business trips, conduct video conferencing or use emails to reduce carbon footprint from flights	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	(viii) Use new energy vehicles (e.g. electric vehicles) as company vehicles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Policy Formulation	(ix) Formulate (or update) waste reduction and recycling policy (e.g. paper and plastic recycling materials)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Others	(x) Please specify:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Building Energy Efficiency (Q5 & 6)

Question 5

Beyond measures listed in question 4, what could you or your sector do to reduce energy consumption in new and existing buildings in Hong Kong? what support measures and information may be useful to further promote energy efficiency in new and existing buildings?

As we note in our answer to Q6, the key initiative on buildings is for Government to bring in regulations which enable companies which take strong action on energy efficiency to be competitive. Prior to that it can:

Encourage companies to join voluntary initiatives to set targets and improve performance.

These initiatives include:

- Science Based Target (SBT), a global initiative, with 624 companies and growing.⁷
- Hong Kong Green Building Council (HKGBC)'s "ACT Shop" programme to implement retro-commissioning.
- Local initiate Energy Charters. Encourage developers and building management companies to maintain an average indoor temperature between 24-26°C during summer.

Encourage a move from retro-commissioning to exploring new retrofit opportunities.

Retro-commissioning means periodically check an existing building's performance. The process identifies operational improvements that can effectively save energy and thus lower energy bills and improve indoor environment. Compared with retrofitting, retro-commissioning involves less capital investment, but energy reduction is limited as well. The business sector can fill in training and experience gaps in this space.

Retrofitting involves, where appropriate, replacing building services machinery which can bring down energy consumption significantly. Retrofitting may require substantial capital investment. The sector should, therefore explore business models and financial mechanisms such that retrofitting buildings can become self-financing.

⁷ <https://sciencebasedtargets.org/what-is-a-science-based-target/>

Question 6

The Government has rolled out various measures to promote green buildings. To help us achieve the decarbonisation target, is there a need for the Government to do more to promote energy efficiency in new and existing buildings? If yes, what further policy instruments and incentives should be implemented?

There is a need (Please specify the policy instruments and incentives that should be implemented)

No need

Short and medium term measures to improve building energy efficiency

Policies and regulations should be progressively tightened

Tighten the requirements in the Building Energy Code, Mandatory Energy Efficiency Labelling Scheme, Overall Thermal Transfer Value, and Residential Thermal Transfer Value.

For new buildings, standardise passive building design, onsite renewable generation and building envelope insulation..

Reforming the GFA Concession for 'Green' features

Tighten GFA concessions with a requirements including registration for BEAM Plus with periodic performance review. We suggest varying the concession cap awarded based on BEAM plus ratings that there are substantial penalties if design performance is not achieved.

Improve energy audit

Require the industry to be better prepared for energy audits: understand the information required, build a new data collection and analytics method and understand how the information can be used for formulating policies.

The government should set regulation to require energy audits every 5 years instead of the current 10 years with requirements for building owners to implement cost-benefit justified energy efficiency audit recommendations.

Demand side management/behavior change

Currently Hong Kong government is relying mostly on the supply side to reduce the GHG emissions from the building sector, i.e. changing the fuel mix. We recommend more focus on the demand side.

Expand the Energy Charter to influence more target groups. Making the Energy Charter a mandatory requirement/legislation will significantly reduce the energy consumption in buildings.

Encourage replacing natural gas with electricity in both residential and commercial buildings. This reduces waste heat and hence a/c load if a kitchen is air-conditioned. Expand on the schemes currently being run by CLP and Hong Kong to shift cooking from gas to electricity.

Long Term Measures to improve building energy efficiency

Target setting and track performance periodically

While the HKGBC has initiated a 30% electricity consumption reduction target in 2030 compared with 2005⁸ this is not formally adopted and there is very limited reporting of progress against this plan. The Hong Kong Government should commit to 2030 and 2050 energy consumption reduction targets for each major building segment. It also establish a performance tracking mechanism, which enables annual evaluation and disclosure of performance.

Town planning to control the building area increase

Start formulating strategies to achieve net zero target for new towns, and old areas which are redeveloped. These strategies should, include a near zero definition, verification, innovation design, material approvals, and developing new initiatives to certify super low energy building.

Empower the HKGBC to add a 'BEAM+ Energy Star' measure to its existing ratings

Commercial buildings account for the majority of electricity used in Hong Kong's buildings; so action to strongly incentivize their energy efficiency is important. Based on studies and experience elsewhere in the world the most effective action to manage down this electricity consumption is to introduce and incentivize a measure for publicizing actual building energy efficiency⁹. We therefore recommend to empower the HKGBC to add a 'BEAM+ Energy Star' measure to its existing ratings. This new rating would be additional to current BEAM+ ratings. It will only measure actual energy efficiency during a 12-month period so owners cannot compensate for poor energy efficiency by having other green features. This can be calculated from the buildings energy consumption, size and hours of operation with adjustments for special equipment, such as large computers, used in the building. It will be given as a 'Star' rating so it is easily understandable by the public. and each rating is valid for one year and must then be renewed.

The cost of running the scheme will be low if the HKGBC trains independent Engineers and other appropriate professionals and then certifies them as able to given BEAM+ Energy Star ratings as a part of its existing BEAM+ scheme. All ratings, with supporting information, are sent to the HKGBC which randomly checks them to assure quality and consistency. After a phase in period the ratings for large buildings should be published on the HKGBC website.

Tax incentives for achieving certain BEAM+ Energy Star levels should be introduced once the scheme has been running for some years and developed both substantial coverage and good public trust in its ratings.

⁸ HKGBC HK3030 www2.hkgbc.org.hk/hk3030/eng/index.aspx

⁹ Studies highlighting the importance of measuring and publishing actual building energy consumption

- 1) WBCSD Energy Efficiency in Buildings. Levers for change on page 31 of http://docs.wbcd.org/2007/10/EEB_FactsTrends-Summary.pdf
- 2) HKGBC HK3030 on the crucial role of benchmarking: www2.hkgbc.org.hk/upload/HK3030/Home/roadmap_31OCT2014_preview.pdf
- 3) NABERS: www.nabers.gov.au/about/what-nabers

Mobility (Q7 & 8)

Question 7

What are your views on promoting the wider use of green and innovative transport technologies?

The government should consider the relative merit of green and innovative transport technologies within the commonly used approach of 'Avoid, Shift, Improve' to both improve mobility and reduce CO₂ emissions from transport. Please refer to our answer to Q10 for further comments on this.

The number of private vehicles on the road in Hong Kong has been constantly increasing, with a 14% increase in car registrations from 2014 to 2018. In April 2019, there were a total of 621,648 registered private vehicles in Hong Kong. Private cars produce higher CO₂ emissions by passenger-kilometer and use more road space than other transport modes. Their inefficient use of road space leads to greater traffic congestion causing an overall increase in CO₂ emissions from transport.

The most effective way to control the growth in private cars is to continuously increase the public transportation ridership and reduce the desire to purchase cars.

Short -term recommendation

Review and restructure the private vehicle licence fee structure

The current private vehicle licence fee depends on the cylinder capacity of the engine or gross vehicle weight, for instance, larger cylinder capacity will cost the owner more for licence renewal. The polluter pays principle should be introduced into the vehicle licence fee system, in particular, the vehicular CO₂ emission should be taken for consideration. The licence fee structure should include a base tax and a CO₂ tax. Using Germany's experience as an example, the base tax is €2 per 100cc (petrol) and €9.50 per 100cc (diesel). The CO₂ tax is linear at €2 per g/km emitted above 95 g/km and vehicles with CO₂ emissions below 95 g/km are exempted from it.

Hong Kong can maintain the current license fee as a base tax, and establish a CO₂ tax on top of it. The CO₂ tax can be waived for vehicles emitting below 95 g/km. The CO₂ waiver standard should be reviewed every three years with vehicles that cannot meet the top 20% best performance in the reviewing year required to pay the CO₂ tax.

Long-term recommendations

Actively search for emerging technology and design a long-term technology roadmap

The government should actively study and trial emerging transportation technologies to contribute to research and joint-venture development. Hong Kong can learn from technologies currently in use in other countries, such as hydrogen fuel (H₂V) in Japan, and understand how they can be applied here. A specific aspect that is desirable for users in Hong Kong at this stage is technology to shorten charging time and enhance range of electric vehicles.

The government should cooperate with local and international companies as well as research institutes to pioneer the development of EV and H₂V technologies. It should also be proactive in improving supportive infrastructure and devising progressive standards. Strong high-level policy support, for issues such as the streamlining of road testing permit procedure and device installation permit application, is important for Hong Kong adopting new technologies.

The widespread proliferation of EVs affects the demand for electricity, and should be planned for, as should potential environmental impacts from practices such as the emissions from electricity generation and the end-of-life disposal of batteries. In addition, Government must lead a comprehensive grid-EV integration study to evaluate the potential impact on the grid while EV deploy extensively in Hong Kong.

The government should also establish a long-term roadmap and governance framework for the deployment of advanced technology. A clear target should be set for industries, suppliers, and operators to guide their innovation and implementation work. This would allow for a more concerted, defined effort towards adoption of new energy vehicles in the city.

Currently, a significant volume of EVs are being produced and used globally but only a small number of H₂Vs. H₂Vs, however, could be a key future technology to consider when developing long-term policies. Factors in favour of H₂Vs include:

- Lighter weight and greater power making them suitable for Heavy Duty Vehicles (HDVs) such as buses and refuse collection vehicles which are payload constrained.
- Faster refuelling times making them suitable for vehicles which operate for long hours. These include many HDVs, taxis and min-buses.
- Substantially less use of difficult to recycle metals. (EVs often have lithium and cadmium in their batteries.)

Reasons, beside the above advantages to believe H₂Vs may well have a significant future role include:

- The likelihood that international shipping will switch to H₂ making it viable for Hong Kong to develop H₂ infrastructure.
- The IEA's recent report on the hydrogen economy¹⁰.

Focus on making zero emission fuels economic for taxis and minibuses

There are two reasons why it is a much higher priority to convert Hong Kong taxis to zero emission fuels, such as EV or H₂V, than private cars. First, the average Hong Kong taxi does more than 14 times the mileage of the average Hong Kong private car. Second, Hong Kong taxis and many of its minibuses use LPG which has high CO₂ emissions.

The Government should, therefore, holistically approach on how to efficiently change from LPG to zero emission taxis and minibuses. For EV taxis the time taken to charge each taxi may mean the total fleet size must be increased with drivers being able to leave a taxi for charging and pick a charged taxi part way through their shift. The solution may include;

- Provide space for taxi fleet operators to have depots where they recharge many taxis at the same time;
- Adjusting first and annual registration taxes on taxis to make the change economic for taxi fleet operators.

The issues and solutions for mini-buses are similar to taxis. The green mini-buses being on fixed routes may make it easier to provide an economic solution.

As the government has the power to regulate taxi and mini bus fuel, it is suggested that the government should actively search for new technology, pilot testing and setting a robust roadmap for converting these vehicles from internal combustion engines to zero emission fuels taxis. The

¹⁰ The IEA June 2019 report on the hydrogen economy:
www.iea.org/publications/reports/thefutureofhydrogen/

government can consider changing the operational model of the taxi with related guilds and big syndicates by initiating a dialogue.

Motivate a shift from private car ownership to use of public transport and walking supplemented by car fleets or ride-sharing services

The Government should implement policies that discourage private car ownerships and encourage walkability. Parking space regulation, limits on new car registrations, electronic road pricing, right of way for public transport, prioritizing planning for walkability and cycling, etc are examples of ideas implemented successfully in other jurisdictions.

We encourage the government to promote the use of EV based car sharing transport or autonomous shuttles to supplement public transport. Car-sharing should, however, only be used when the needs of passengers cannot be fulfilled by public transportation. For example, families with kids, the elderly, and pregnant women are potential users of car sharing because it is potentially more difficult for them to use public transport. Other potential users are those living in remote areas with only limited access to public transport.

Question 8

There are calls for a ban on fossil fuel powered (e.g. petrol and diesel) vehicles around the world. Some countries have announced that they will ban the sale of fossil fuel vehicles from 2030 onwards. What are your views on banning fossil fuel vehicles in Hong Kong? What other measures would you suggest to further reduce our transport-related carbon emissions?

Yes, Hong Kong should ban fossil fuel powered vehicles but the timing of the ban must take account of technological developments. For example, banning fossil fuel private cars can happen sooner than banning heavy duty vehicles. We offer the following recommendations:

For private cars establish robust targets to adopt zero emission vehicles with pathways to adopt these vehicles and substantially curb the use of internal combustion engine vehicles

Overall, the government should set robust targets for the proportion of vehicles that are EV or H₂V and advise that it will adjust its policies annually to curb any deviation from these targets. We recommend that Hong Kong should aim for EVs and H₂Vs to take up 50% of new vehicle sales by 2030. Also, the government should progressively ban imports of vehicles with internal combustion engines once there is sufficient technology and enough support for EVs or H₂Vs. We expect this to be by 2040. Strategies utilized in Europe, such as in London and Copenhagen, can serve as references for the Hong Kong government in terms of how fossil fuel-driven personal vehicles can be fully restricted

Set a more proactive target near-term improvement and long-term banning of commercial vehicles powered by traditional fuels

To ensure the timely replacement of diesel commercial vehicles and continuous improvement of air quality, current government policy requires pre-phase, first, second and third phase of the European Union diesel commercial vehicles to be phased out according to the first registration date of the vehicles. The government has set a 15-year retirement period for diesel commercial vehicles registered on or after 1 February 2014. Eligible owners can apply for special grants to buy cleaner vehicles. This policy has been beneficially but will need to be adjusted.

The government should pay close attention to the development of EVs and H₂Vs technology together with related software and hardware infrastructure. With the emergence of new technologies, the government should consider tightening restrictions on lower-standard diesel vehicles, for example, by including the fourth and fifth phase of the European Union diesel commercial vehicles.

Improve charging facilities and establish a coverage target

In addition to the property tax concession, the government should also allocate more resources towards enhancing the performance of EV chargers. To increase charging speed, the government should encourage technological innovation, R&D and cooperation with foreign EV technology companies. Besides, the number of chargers should be greatly increased to meet local demand. We recommend the government establish a charging facilities coverage target. For instance, subject to benefit/cost studies it should, arrange for all public parking meter and government car park berths must include installed chargers by 2025.

Apart from increasing the number of public chargers, the government should also make it mandatory for private housing estates to provide chargers. In existing buildings, the government can subsidize real estate developers to add chargers in car parks. For new buildings, the government should require the build-up of chargers in car parks by amending the Buildings (Planning) Regulation.

Other measures:

To further reduce our transport-related carbon emissions, we suggest the following policies;

- **Establishing congestion pricing in central district immediately:** For over 30 years, the government has suggested congestion pricing in the central business district to reduce the number of private vehicles on the road. The Hong Kong Government should take the lead in using congestion pricing to control the growth of private cars, learning from experiences in Singapore, Sweden **and the United Kingdom.**
- **Incorporate a mandatory fleet-wide average carbon dioxide standard into APCO or relevant legislation:** As carbon dioxide is the major contributor to global warming, the government should include the carbon dioxide emissions of new vehicles in the Air Pollution Control Ordinance (APCO). We suggest it can reference the standards set by the European Commission and set a schedule for reduction in average CO₂ emissions with changes every, say, five years towards zero emissions from motor vehicles. As part of achieving this goal, the government should consider the EU fleet-wide average emissions target by requiring that a percentage of each importer's vehicle fleet must meet the 95 g CO₂/km threshold. The policy should include flexibility to change targets based on results of annual reviews.

Lifestyle (Q9)

Question 9

What measures would you suggest to (a) the Government / the public sector and (b) private organisations that would motivate you as an individual to practice low-carbon lifestyle?

Government efforts to lower lifestyle carbon footprints

This is an issue of prime importance. Lifestyle, such as in the use of space conditioning impacts Scope 1 emissions which Hong Kong reports. It also, as noted in our answer to Question 3, impacts CO₂ emissions embodied in Hong Kong's imports of food, clothing, machinery and its purchase of international air travel. These items, taken together, almost certainly substantially exceed the Hong Kong emissions reported to the UN.

The role of the government is crucial in the transition to low carbon lifestyles, as it is the only stakeholder capable of coordinating and overseeing a society-wide response. The government should set more specific carbon emissions reduction targets to guide progress and inform future decision-making. Government strategies can be divided into three strands:

First, influencing choice involves adding elements of behavioural science into policy-making. Understanding the motivations of individuals, will help in implementing policies to guide consumers into making more sustainable choices.

Second, the government needs to significantly improve its promotion effort to provide a multi-pronged strategy that covers information provision, labelling, feedback, and action plans.

Third, the government can eliminate or restrict high-carbon choices from the market through regulations, tax incentives and market-based financial disincentives.

The government also needs to communicate measures that promote and educate sustainable habits in daily life, for instance for clothing circular economy processes including rental, repair, and redistribution services should be strongly promoted.

The government should encourage a reduction in meat consumption towards a flexitarian diet¹¹, and strive to lower food miles, educating both the consumer and private sector with regard to the heavy GHG footprint of our current consumption

Green financing can be another important component of addressing climate change. The government should guide the financial sector to support environmental friendly and low-carbon development, and ensure the investment to consider low-carbon factors as one of the key indicators.

Measures that would motivate individuals to lower carbon emissions caused by their energy use in buildings

A major source of emissions impacted by individual lifestyles is household energy usage. To increase awareness about such emissions, individuals need to play a more active role in energy accounting and also adopt smart technology for home upgrades. Through the use of smart thermostats, localised cooling devices, smart lighting and smart plugs, accompanied by promotion efforts, and assisted by financial incentives, households can become more energy efficient and energy

¹¹ Flexitarian diet definition: <https://en.wikipedia.org/wiki/Semi-vegetarianism>

conserving. Aside from that, building owners owner corporations should actively engage neighbourhood and community efforts to increase motivation for energy savings.

Businesses can enhance social responsibility by influencing overall lifestyle patterns and supply chains through modifying the composition of products in the market. Chambers of Commerce should encourage their members to transition into green procurement strategies, and adjust their business models towards a more circular economy approach.

If, as recommended in our answer on page 11 to Question 7, a Hong Kong Beam + Energy Star is introduced it will make the energy performance of office buildings as visible as hotel 'Star' ratings make the quality of hotels. This can then drive company decisions on which building to rent space in.

Other Recommendations (Q10)

Question 10

Apart from all the decarbonisation measures mentioned in the PE document, do you have any other suggestions to help Hong Kong reduce carbon emissions?

Scope of carbon emissions on which Hong Kong reports

The Hong Kong SAR Government's past practice has been to report only on its Scope 1 emissions. We recommend Hong Kong changes to report on its Scope 1 plus Scope 2 emissions. Reasons for this include: first, by reporting on and targeting Scope 1 + 2 emissions Hong Kong will avoid any bureaucratic tendency to reduce reported emissions by having electricity generated in Mainland China rather than Hong Kong. Second, an increasing number of provinces and cities in Mainland China are realizing the importance of scope 2 emissions and have begun reporting on Scope 1 + 2. Hong Kong adopting the same basis facilitates China's UNFCCC reporting of Hong Kong, Macau and Mainland numbers. Third, reporting on scope 2 emissions would help analyze characteristics of emissions from a consumption perspective and contribute to decision making in demand side management related policies.

Besides its reporting of Scope 1 + 2 emissions, the Hong Kong SAR Government should have a programme to estimate the main Scope 3 emissions of Hong Kong residents. These include imported food, manufactured products and travel outside Hong Kong. These footprints will need to be reduced as humanity moves to global decarbonisation. Having a programme to understand them will help the Government plan for the impacts of this reduction.

Putting a price on carbon emissions

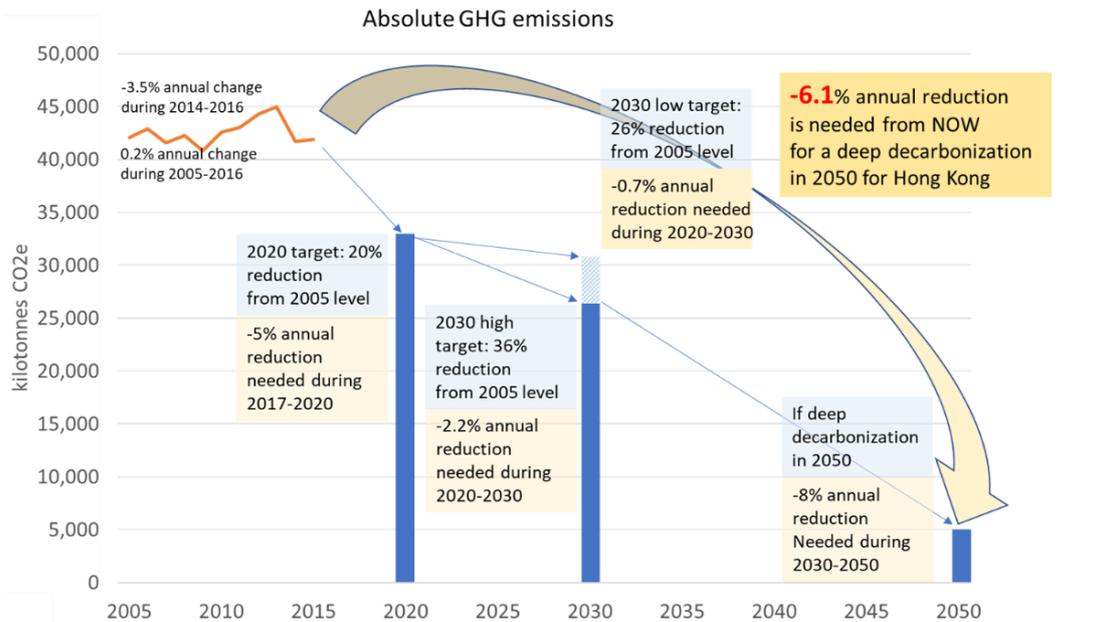
In line with Hong Kong's tradition of 'light touch' government it should study the opportunities from decarbonizing through putting a price on carbon emissions. A carbon price allows best solutions to be found through market mechanisms and simplifies the role of government.

Target setting

Set net zero emissions/deep decarbonisation vision for Hong Kong by 2050 and update more ambitious target for 2030

Hong Kong's target to reduce absolute GHG emissions is 20% by 2020 and 26%-36% by 2030, compared with 2005 level. Considering the most updated data available is 2016, this means the average drop of total GHG emissions from 2017-2020 needs to be 5% annually. However, historical trends show that Hong Kong has a 0.2% average annual increase during 2005-2016. Even if there was drop in 2015 and 2016, the average annual drop was only 3.5%. In addition, if the 2020 target is achieved, 2030 targets only require an average annual drop of 0.7% (26% for 2030) to 2.2% (36% for 2030) during 2020-2030. This means 2030 targets are not ambitious enough. Instead means an average annual drop of 8% will be needed during 2030-2050 if Hong Kong wants to achieve net zero in 2050. This will require much more ambitious actions. Therefore, we suggest Hong Kong changes its 2030 target to a more ambitious one which facilitates a pathway toward net zero in 2050. – See Figure 2:

Figure 2. Gaps on Hong Kong's absolute emissions targets



Source: Hong Kong 2050 is Now project

Set sectoral targets for 2030 and 2050

These should include emission targets for power generation, transport and waste management; as well as energy efficiency targets for each type of building and each mode of transport.

Using ‘Avoid, Shift, Improve’ thinking to manage down CO2 emissions from mobility

As note in our answer to question 7, the government should consider the relative merits of green and innovative transport technologies within the commonly used approach of ‘Avoid, Shift, Improve’ to both improve mobility and reduce CO₂ emissions from transport. In brief:

- **Avoid** stands for ‘Avoiding Journeys’. For example, better town planning can reduce travel for community to work.
- **Shift** covers ‘Shifting’ from more CO₂ emissions intensive to less CO₂ emissions intensive transport modes. For example, from private cars to buses; or, from buses to the MTR.
- **Improve** covers ‘Improving’ a given mode of transport. For example, reducing CO₂ emissions by switching from petrol to electric vehicles.

An example of how ‘Avoid, Shift, Improve.’ thinking helps reduce CO₂ emissions is Town Planning. Specifically:

- Mixed use districts allow people to live close to their work and children to walk to school.
- Expanding the MTR network with dense property developments provided in the 500 meters closest to MTR station allows people to move about though a combination of walking and MTR. This is aided by careful planning for attractive walking, and where appropriate cycling, paths from MTR stations to residential on work buildings.

This action both avoids the need for journeys and increases the percentage of travel which is on low-carbon transport modes.

International travel

More than half the hydrocarbons imported into Hong Kong are used for bunkers for international shipping and aviation. This is one indication of how critically dependent Hong Kong's economy is on these sectors. Hong Kong should, therefore, give priority to participating in work to decarbonize them. To the extent Hong Kong has jurisdiction under one country two systems specific action include:

Assist in the establishment of a Monitoring, Reporting and Verification (MRV) system for international shipping and aviation

A strong MRV system is a precondition and foundation for all carbon dioxide emission reduction activities, including understanding current and historical trends, forecasting future emissions, setting emission reduction targets, formulating action plans, and tracking performances. EU and International Marine Organization (IMO) launched mandatory MRV scheme for international shipping in January 2018 and January 2019 respectively¹².

Participate in the R, D & D for low carbon fuels

In the longer-term, low carbon fuels or paying for Direct Air Capture will be crucial to international shipping and aviation becoming net zero carbon. Given, as noted above, the importance of these sectors to its economy, Hong Kong should participate in the R, D & D for such fuels. For example, it should (a) prioritize marine electrical shore power systems and (b) pay close attention to how it would refuel ships that use hydrogen or ammonia as fuel.

Encourage people to reduce their international travel related carbon footprint

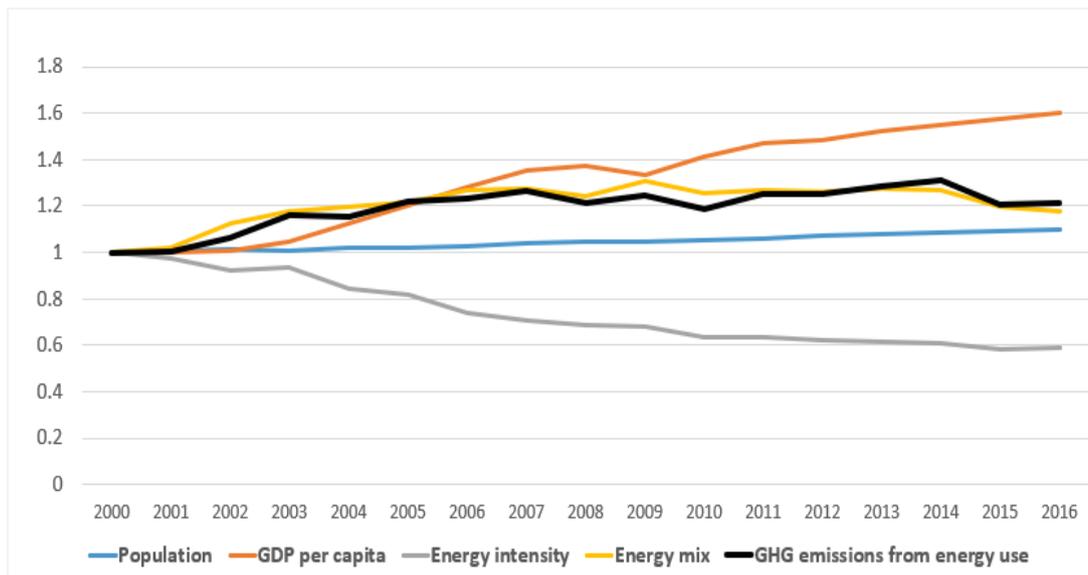
Based on our calculation, Scope 3 carbon emissions from Hong Kong's international aviation in 2016 was 19 million tonnes CO₂, which equals almost 50% of Hong Kong's Scope 1 emissions reported to the UN. Hong Kong can reduce these emissions by (a) better use of video-conference etc for business; (b) facilities and culture for Hong Kong people to enjoy their holidays in Hong Kong; (c) choosing lower-carbon transport modes. For example, taking high speed rail from Hong Kong to Mainland China cities instead of taking airplane would reduce 60-80% of carbon emissions per person journey, based on our calculation¹³.

¹² www.dnvgl.com/maritime/insights/topics/EU-MRV-and-IMO-DCS/index.html

¹³ Aviation CO₂ emissions were calculated using ICAO tool www.icao.int/environmental-protection/carbonoffset/pages/default.aspx, emissions from high speed train were calculated using distance and emissions per person kilometre travelled

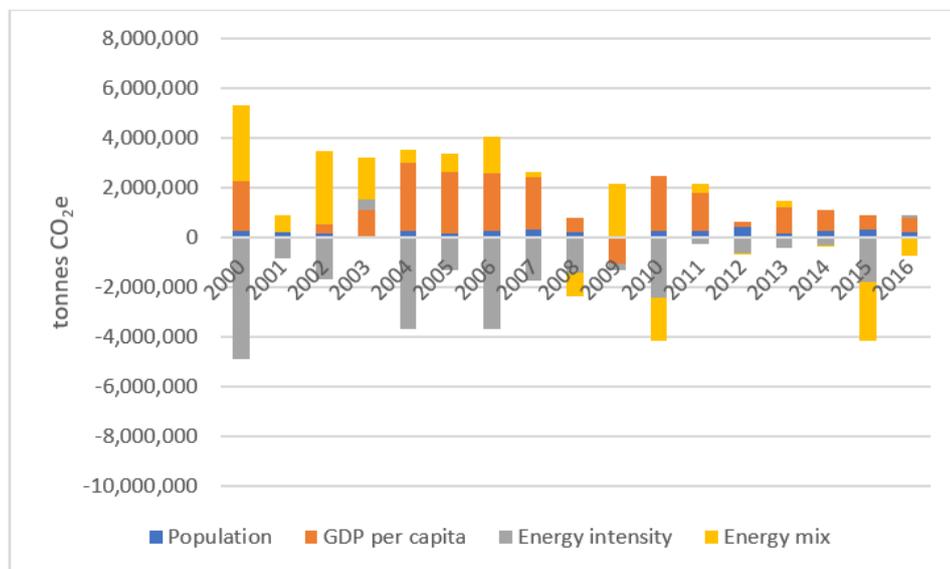
Appendix

Figure A-1. Trend of Hong Kong's GHG emissions from energy use and driving forces



Source: Hong Kong 2050 is Now project

Figure A-2. Contribution of Driving forces on Hong Kong's GHG emissions from energy use



Source: Hong Kong 2050 is Now project

Table A-1. Climate change and related targets in Hong Kong, and performance tracking

Area	Policy/initiative	Publish time	Target	Performance tracking
Climate change	Hong Kong's Climate Action Plan 2030+	2017	Reduce absolute carbon emission by 20% by 2020 and 26%-36% by 2030, using 2005 as the base;	Challenging
			Reduce carbon intensity by 50%-60% by 2020, and 65%-70% by 2030, using 2005 as the base;	
			Reduce per capita carbon emission to 4.5 tons in 2020 and 3.3-3.8 tons in 2030;	
			Carbon emissions will peak by 2020	Achievable but with condition
Energy saving and efficiency	Energy Saving Plan for Hong Kong's Built Environment 2015~2025+	2015	Reduce energy intensity by 40% by 2025, using 2005 as the base	On track
	APEC energy intensity target	2011	Reduce energy intensity by 45% by 2035, using 2005 as the base	On track
Electricity generation	Hong Kong's Climate Action Plan 2030+	2017	Reduce the share of coal to 25%, and increase the share of natural gas to 50% by 2020;	Challenging
			Continue to phase down coal and increase natural gas and non-fossil fuels by 2030	
Building	2015 Policy Address	2015	5% saving in electricity consumption for government buildings during 2015-2020.	On track
	Energy Saving Plan for Hong Kong's Built Environment 2015~2025+	2015	New government buildings with construction floor area of >5,000 m2 with central air-conditioning or >10,000 m2 to achieve at least BEAM Plus Gold	No data
	Market Drivers for Transformation of Green Buildings in Hong Kong: A Roadmap to Deep Energy Reduction	2014	A reduction of 30% to the absolute building electricity consumption by 2030, as compared to the level of 2005. (Initiative by the Hong Kong Green Building Council)	Challenging
Transport	Railway Development Strategy 2014	2014	6 railway lines completed in 2031 to increase the total length of Hong Kong railways to 300km,	Challenging
			The share of railways in the total number of public transport passengers increased to 45-50%	
Waste	A Food Waste & Yard Waste Plan for Hong Kong 2014-2022	2014	To cut down the amount of food waste that goes to landfills by at least 40% by 2022. This means to reduce food waste to landfills from around 3,600 tons a day to around 2,160 tons a day.	Challenging
	Hong Kong Blueprint for Sustainable Use of Resources 2013-2022	2013	To reduce the Municipal Solid Waste (MSW) disposal rate to landfill by 40% on a per capita basis by 2022 using 2011 as the base. (1.27 kg per day to 0.8kg per day);	
			To transform the waste management structure by 2022: recycling 55%, incineration 23%, landfilling 22%.	

On track
 Achievable but with condition
 Challenging

Source: Hong Kong 2050 is Now project

Note: The targets listed only cover the ones relevant with CO₂ emissions.