For discussion on
12 September 2019

Paper FC 10/2019

Family Council

Council for Sustainable Development's
Public Engagement on Long-term Decarbonisation Strategy

PURPOSE

This paper seeks to brief Members on the public engagement ("PE") on long-term decarbonisation strategy conducted by the Council for Sustainable Development ("SDC").

BACKGROUND

The Paris Agreement

2. In December 2015, 195 countries including China adopted the Paris Agreement ("PA"), which is an agreement within the United Nations Framework Convention on Climate Change dealing with greenhouse gas ("GHG") emissions[1]. More specifically, the PA seeks to hold the increase in global average temperature to well below 2 degrees Celsius above pre-industrial levels, while pursuing efforts to limit it to 1.5 degree Celsius. It emphasises the principles of equity, as well as common but differentiated responsibilities for, and respective capabilities by, the participating Parties, so that they can take into account the different national circumstances in mapping out their individual approach and pace in achieving the PA goals. Accordingly,

[1] Human activities such as electricity generation, transport operation, waste disposal, industrial processes, etc. produce GHG emissions. These gases act like a blanket in the atmosphere, trapping heat and keeping our planet warm. However, excessive ambient concentration of GHG causes climate change, which is disrupting national economies and affecting lives given the significant impacts arising from changing weather patterns, rising sea level, and more extreme weather events. Among the different types of GHG, carbon dioxide is the most common type released to the atmosphere. For simplicity, the term "carbon emissions" is sometimes used to represent all kinds of GHG emissions, where GHG other than carbon dioxide are translated into carbon dioxide equivalent based on their individual global warming potentials.

the PA has not made any specification or set any rigid requirement as to how each Party shall set its mid-century carbon reduction target; setting visionary goals is also regarded as a viable option.

3. The PA came into force on 4 November 2016, and applies to the Hong Kong Special Administrative Region ("HKSAR").

4. To help HKSAR fulfil its commitments under the PA, the Government has invited the SDC to conduct a territory-wide PE on long-term decarbonisation strategy. Through the PE, the SDC hopes to raise public awareness of the negative impact of human induced carbon emissions, and gauge the views of the community on how Hong Kong should contribute to the global decarbonisation efforts.

SDC's PUBLIC ENGAGEMENT

The Preparatory Phase

5. The SDC has formed a Support Group on Long-term Decarbonisation Strategy ("SG"), convened by Mr LAM Chiu-ying, to assist in the planning and implementation of the PE exercise.

6. With the assistance of a Programme Director (i.e. Policy for Sustainability Lab, Centre for Civil Society and Governance, The University of Hong Kong), the SG held six focus group meetings last year with stakeholders from various sectors including the academia, professional organisations, youth groups, non-governmental organisations ("NGOs"), green groups, District Councils, chambers of commerce, energy audit-related organisations, energy technology-related organisations, the transport sector, property management companies, and advisory bodies on matters relating to environmental protection. More than 100 participants from 88 organisations attended the focus group meetings.

7. Having considered the views of the focus groups, the SDC has identified three key areas for more in-depth public discussion:

(a) transition towards a low-carbon society;

(b) reducing energy use and further decarbonising electricity generation; and

(c) low-carbon transport in a smart city.

It has also prepared a detailed document (the PE document, at **Annex A**) and a concise leaflet (**Annex B**) for this purpose.

The Public Engagement Document

8. The PE document consists of four chapters. The first chapter introduces the concept of climate change, including the causes of climate change as well as its impacts on Hong Kong and the world, and key points of the PA. This chapter also brings out the importance of taking timely climate mitigation actions and explains the purposes of the PE.

9. The second chapter summarises the sources of carbon emissions in Hong Kong so as to help the public understand how to deal with the issue.

10. The third chapter first explains that a comprehensive package of actions in various fields needs to be taken together, including ways to adopt low-carbon lifestyles by individuals, enhance energy saving measures and pursue further decarbonisation of the energy sector, enhance energy efficiency in buildings, and transit to low-carbon transport, in order to achieve carbon reduction targets at varying levels. The chapter then quotes overseas experiences in reducing carbon emissions. Furthermore, this chapter introduces ways to promote carbon reduction in Hong Kong.

11. The fourth chapter is a views collection form.

12. There is a key message in the PE document: to meet the target under the PA, the whole society needs to step up its efforts, and everyone has to contribute by adopting low-carbon living lifestyles. In the long run, to comply with the decarbonisation target, Hong Kong will need to increase the proportion of zero carbon energy.

The Public Interaction Phase

13. The SDC released the PE document and launched a three-month public

interaction phase on 14 June 2019. Activities in this phase include regional forums, visits to schools, consultations with relevant advisory bodies, meetings with different stakeholders including youth groups, NGOs, green groups, chambers of commerce and relevant trades, etc.

14. The activities are being publicised through TV and Radio Announcements in the Public Interest ("APIs") and posters; roving exhibitions; a dedicated website, as well as the networks of about 120 supporting organisations.

15. Views and responses collected during the public interaction phase will be analysed by an independent analysis and reporting agency (i.e. The Social Sciences Research Centre of The University of Hong Kong) and taken into account by the SDC in preparing a report with recommendations to the Government.

ADVICE SOUGHT

16. Members are invited to note the SDC's work, and comment on the issues set out in the PE document.

Secretariat of the Council for Sustainable Development
Environment Bureau
June 2019

Annex A

Long-term Decarbonisation Strategy

Public Engagement

可持續發展委員會
Council for Sustainable Development

JUNE 2019

Contents

Foreword

Climate change is an imminent global challenge that has no border. Floods, heatwaves, storms and other extreme weather phenonmena are increasing in frequency and intensity. Hong Kong, a coastal city with a subtropical climate, is especially vulnerable to risks related to climate change. For instance, Super Typhoons Hato and Mangkhut battered the city in 2017 and 2018 respectively. These are some of the latest grim evidence of the growing threats posed by climate change. Just a few months back, we even experienced the warmest winter solstice since records began in 1884. Climate scientists have warned that we have some 10 years left to thwart climate change before the damage becomes irreversible. Mitigating climate change is not just for ourselves, but is also our responsibility for our children and future generations.

The climate change crisis can only be effectively dealt with if the Government, private sector and civil society can work hand in hand. The adoption of the Paris Agreement in 2015 was a remarkable step forward for international cooperation in climate actions. As this historic climate agreement is applicable to Hong Kong, we are therefore obligated to draw up our own mid-century long-term low greenhouse gas emissions development strategy by 2020, with a view to holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.

Based on the above reasons, the Council for Sustainable Development ("SDC") has decided to accept the Government's invitation to launch a territory-wide public engagement on "Long-term Decarbonisation Strategy". The SDC hopes to deepen public understanding of the negative impact of human induced carbon emissions, so as to facilitate Hong Kong's transition towards a lower carbon economy. The public engagement would provide a platform to gauge the views of the community in formulating Hong Kong's long-term decarbonisation strategy, charting practical pathways and developing feasible actions to achieve that target, thereby contributing to the global decarbonisation efforts.

Time is running out for combating climate change. The SDC sincerely invites you to participate in our public interactive activities, and send us your views and ideas by completing the views collection form at the end of the document. Your participation is vital. Let us map out Hong Kong's long-term decarbonisation strategy together, and head towards the carbon reduction goals of the Paris Agreement.

Climate Ready@HK
氣候變化香港行動

Professor the Hon Arthur LI Kwok-cheung, GBM, GBS, JP
Chairman, Council for Sustainable Development

Executive Summary

Impacts of Climate Change

Climate change is now affecting every corner of the Earth. Like other coastal cities, Hong Kong faces multiple climate-related threats, including rising temperatures and more extreme weather phenonmena. Unless the world takes bolder and quicker actions to reduce greenhouse gas (GHG) emissions, the impacts will intensify and take place at an even more rapid pace in the coming decades.

Decarbonisation Target

In 2015, 196 signatories adopted the historic Paris Agreement. It is a multilateral treaty for combating climate change with ambitious goals for building up a low-carbon, resilient and sustainable future. All signatories of the Agreement are committed to holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels. As the Paris Agreement applies to the Hong Kong Special Administrative Region, it is our obligation to formulate the long-term decarbonisation strategy up to 2050 by 2020, and review our climate change efforts every 5 years.

It is worth noting that the **world will need to reduce absolute carbon emissions by between 40% and 70% by 2050 compared with 2010, and to achieve net zero emissions of carbon dioxide and other GHGs before 2100 in order to meet the well below 2°C target.** The recent Special Report on Global Warming of 1.5°C of the Intergovernmental Panel on Climate Change (IPCC) has provided scientific evidence that limiting warming to 1.5°C could further reduce climate risks compared with limiting it to 2°C. **Yet, it is already an audacious plan to limit global warming to 2°C. To go further beyond to 1.5°C will require global carbon emissions reaching net zero around 2050 which will be even more challenging.** Against this background, we must explore ways for Hong Kong to set aspirational yet achievable strategies for meeting a deeper decarbonisation target, and mobilise stronger and timely climate mitigation actions across different sectors of society.

Time To Step Up Action Now

To adequately address the climate crisis, we must urgently reduce our carbon emissions. It requires cross-sector collaborative actions on lifestyle/consumption, buildings, transport, energy, water and waste systems, etc. with intensive participation of the community, the business sector and the Government. Many cities and countries are exploring various ways to reduce their carbon emissions focusing on several key areas: enhancing education and publicity, enhancing building energy efficiency, deep decarbonisation in the energy sector and promoting green transport, as well as other measures such as industrial upgrading, better waste management, and adoption of carbon removal measures. Another global trend is to explore different financing mechanisms, such as issuance of green bonds and setting of carbon pricing, to channel private sector investment into projects and activities that contribute to a low-carbon and more climate-resilient economy.

We need all members of society to step up efforts by implementing a host of measures, including adopting a low-carbon lifestyle, enhancing energy efficiency in buildings, using more zero carbon fuel sources for electricity generation, and developing an efficient and environmental-friendly public transportation system to further reduce carbon emissions. In this regard, the public engagement document has set out three key broad areas for active public discussion:

Executive Summary (Cont'd)

1. Transition Towards A Low-carbon Society

- Are you aware of the relationship between your daily activities and carbon emissions? How can we facilitate you to have a better grasp of the related information?
- What can help you switch to a low-carbon lifestyle? How can goods and services providers facilitate your behavioural change?
- What are the obstacles for you to switch to a low-carbon lifestyle?
- What kinds of education and publicity activities should be put forward in promoting low-carbon lifestyle?

2. Reducing Energy Use And Further Decarbonising Electricity Generation

- Building is one of the main sources of carbon emissions in Hong Kong. What can we do further to promote energy saving and reduce building-related carbon emissions?
  - > What measures may be considered to encourage or regulate building owners and tenants to raise energy efficiency of the whole buildings (i.e. including non-communal units/ areas)?
  - > What measures may be considered to encourage building owners to develop more on-site renewable energy installations?
  - > What passive energy-saving design elements (e.g. natural ventilation) may be considered to enhance building energy efficiency in the long run? What incentives should be provided to further encourage developers and owners to adopt passive energy-saving design elements?
- Fossil or non-fossil fuels, what will you choose? For the benefits of both the current and future generations, what are your considerations in deciding the future fuel mix for Hong Kong?
- What can we do to further enhance the development of renewable energy locally?
- Further enhancement of regional cooperation for increasing the proportion of zero carbon energy in our fuel mix is an inevitable step towards achieving higher carbon reduction targets in 2030 and 2050. What are your views on this in the face of the threat of climate change?
- How would you rank the importance of different considerations (including reliability, security and availability, affordability, and environmental performance and response to climate change, etc.) when considering the long-term strategy to decarbonise the electricity generating sector towards 2050 for Hong Kong?

3. Low-carbon Transport In A Smart City

- How to promote wider use of green and innovative transport technologies?
- What other measures would you suggest to further reduce our transport-related carbon emissions? For example, would you consider short-distance commuting instead of travelling by vehicle and replace face-to-face meetings with video conferencing?

Your Views Matter

Through this public engagement (PE) process, the Council for Sustainable Development (SDC) hopes to arouse public awareness of the impact of carbon emissions, and gauge the views of the community in developing feasible strategies and measures for carbon reduction. Given the long-term low GHG emissions development strategies envisaged under the Paris Agreement only covers mitigation measures, this PE exercise will focus on gauging public views on mitigation actions with due consideration of the geographical, social and economic contexts of Hong Kong.

The SDC sincerely invites you to send us your views on key issues related to the formulation of the long-term decarbonisation strategy for Hong Kong. Please complete and return the views collection form in Chapter 4 on or before 20 September 2019. You are also invited to participate in our public interaction activities. Details of the activities are available at the SDC's dedicated website www.susdev.org.hk. For further information, please call the Public Engagement Hotline: 3917 4763.

1

Why Can't We Ignore Climate Change?

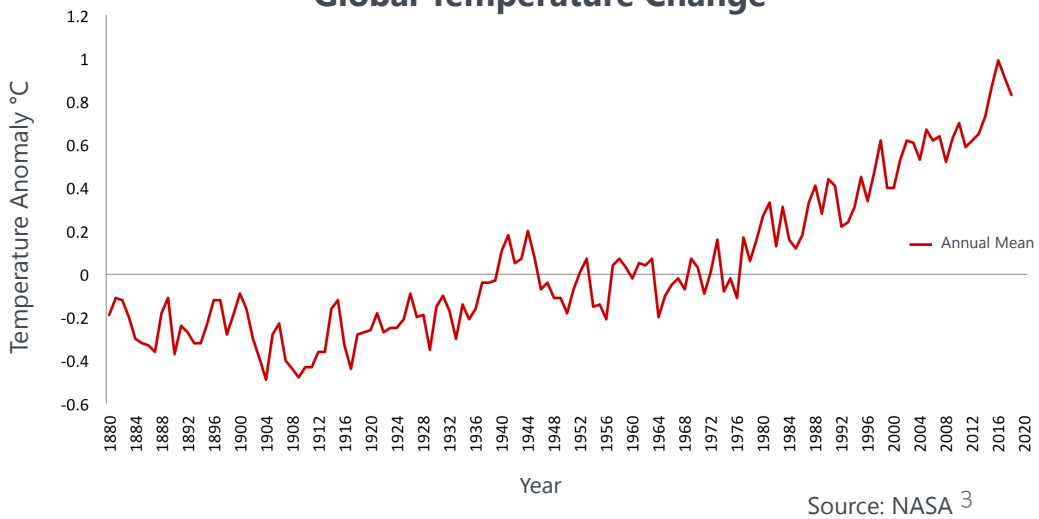
What's The Big Deal If Our Climate Is Changing?

1.1 Many scientists have warned that climate change would lead to irreversible consequences to the world. Recently, students around the world were out on strikes to protest and demand actions on climate change. Nevertheless, some skeptics choose to disregard the projected impacts of climate change as scaremongering; some consider receding glaciers and habitat loss for polar bears of little relevance. They have been indifferent to climate change impacts, not to mention changing lifestyles to cope with it. In fact, the impacts of climate change are hitting increasingly close to home. From erratic weather patterns to the rising frequency of extreme events, all of us should be able to experience that climate change is already affecting every part of our lives, no one is spared.

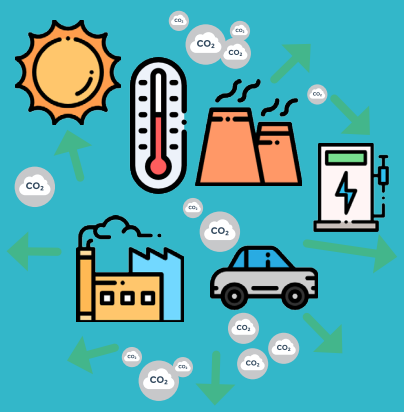
1.2 Our lifestyles and consumption habits cause the rising temperatures globally. Therefore, all human beings need to bear the responsibilities for mitigating the impacts of climate change. According to the recent Special Report on Global Warming of 1.5°C of the Intergovernmental Panel on Climate Change (IPCC), it is evident that human-induced warming has already reached about 1°C above pre-industrial levels, and the warming rate is now about 0.2°C per decade. [1] Temperatures greater than the global average has also already been experienced in many regions and seasons. Also, according to the Global Risks Report 2018 published by the World Economic Forum, extreme weather events such as storm surges, droughts and natural disasters have been identified as the top risks that pose a serious threat to global stability. [2]

1.3 Globally, annual emissions of carbon dioxide (CO_2) have risen dramatically over the past decades. With more CO_2 accumulated in the atmosphere, the atmosphere traps more thermal energy on the Earth. The more carbon we pump into the atmosphere, the higher the average temperature of the planet will be, and we expect to see **more frequent extreme weather events causing sustained and serious impacts on health, the economy and the environment.**

Global Temperature Change



Source: NASA [3]



Carbon Emissions

Carbon emissions are sometimes used as a shorthand for referring to the emissions of CO_2, or greenhouse gases (GHGs) in general. Strictly speaking, gases that absorb and trap heat on the planet are called GHGs. The main GHGs in the Earth's atmosphere are **CO_2, methane (CH_4), nitrous oxide (N_2O) and ozone (O_3).**

CO_2 is the most common GHGs emitted by human activities, in terms of the quantity released and the overall impact on global warming. They are mainly produced from the activities that involve the burning of fossil fuels (e.g. coal and natural gas), including **electricity generation, travelling by car, ship and plane, etc.** To facilitate the measurement and comparison, the emissions of different GHGs are converted to CO_2-equivalent (CO_2e)* based on GHG's global warming potential.

Note: *CO_2-equivalent (CO_2e): A metric measure used to compare the emissions from various GHGs based upon their global warming potential (GWP). The CO_2e for a gas is derived by multiplying the tonnes of the gas by the associated GWP.

We Simply Don't Have Time

1.4 Scientists have warned that **we have some 10 years left to limit climate change catastrophe.** According to the special report published by the IPCC in October 2018, the projected climate change impacts are substantially worse at 2°C compared with 1.5°C. Meanwhile, it is necessary to acknowledge that achieving the 2°C target of the Paris Agreement is indeed challenging. The key issue will be on the discussion of how to meet the target through the more aggressive proposals and its feasibility. [4]

1.5 Like other coastal cities, Hong Kong faces multiple climate-related threats, including rising temperatures and more extreme weather phenonmena such as violent storms and flooding rains. **Unless the world takes bolder and swift actions to reduce GHG emissions, these intensifying impacts are expected to take place at an even more rapid pace in the coming decades.** Hong Kong, as a responsible member of the global community, is taking proactive steps to combat climate change.

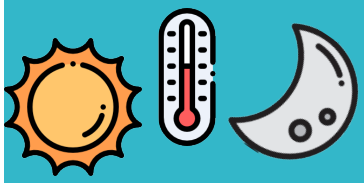
Projections for 2100

Global Average Temperature Rise

	1.5°C	VS	2°C
Extreme Heat Global population exposed to severe heat at least once every 5 years	↑ 14%		↑ 37%
Sea Level Rise Contribution to sea level rise by 2100	↑ 0.4 Metre		↑ 0.46 Metre
Plant Species Loss Plants that lose at least half of their range	↓ 8%		↓ 16%
Crop Yields Reduction in maize harvests in tropical areas	↓ 3%		↓ 7%
Fisheries Decline in marine fisheries	↓ 1.5 Million Tonnes		↓ 3 Million Tonnes
Coral Reefs Further decline in coral reefs	↓ 70-90%		↓ 99%

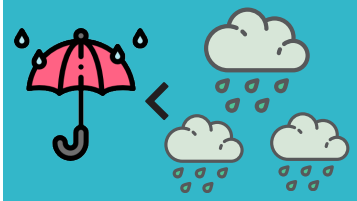
Source: IPCC

Hong Kong Is Not Immune To Climate Change

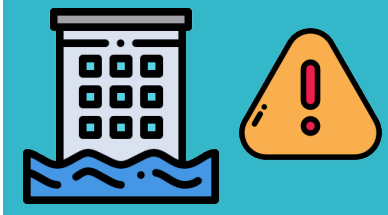


More very hot days and hot nights
Over the past hundred years, the annual number of very hot days and hot nights in Hong Kong has increased from 2.2 to 15.7 and from 0.6 to 21.8 respectively. Under the high GHG concentration scenario, it is expected that the number of hot nights will add up to nearly 3 months by the middle of this century, and increase to about 5 months by the end of this century. [5]

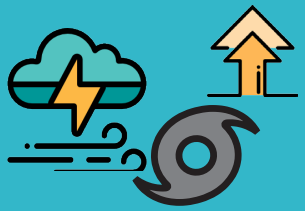
Annual number of heavy rain days increases
Days with hourly rainfall more than 30 mm increased at an average rate of 0.2 days per decade from 1947 to 2018 in Hong Kong. Under the high GHG concentration scenario, the projected annual maximum 3-day rainfall will increase by about 40% at the end of this century. [6]



Fewer rain days but average rainfall intensity increases
Extreme precipitation events have become more frequent. The hourly rainfall record at the Hong Kong Observatory headquarters was broken several times in the past decades. The current hourly rainfall record was 145.5 mm in 2018 at the Hong Kong Observatory headquarters. [7]



Rise in sea level
On average, the mean sea level in Victoria Harbour went up 31 mm per decade during 1954-2018. It is expected that extreme sea level events that are rare today will become more frequent at the end of this century. [8]



Increase in storm surge threat
Only between 2017 and 2018, there were two super typhoons necessitating the issuance of the Hurricane Signal No. 10, both with significant storm surges. [9]

If you still remember..... this is not a movie scene!

Storm surge induced by Super Typhoon Hato in 2017 and Super Typhoon Mangkhut in 2018 caused flooding across various districts

Mitigating Climate Change For Survival and Well-beings Of Our Current and Future Generations

What Can We Benefit From Climate Change Mitigation?

Better health and less premature deaths

- Researchers found that dramatic cuts in global GHG emissions could help prevent 300,000 to 700,000 premature deaths annually by the year 2030. [10]
- A study published on Hong Kong Medical Journal in 2018 indicated that as the global warming worsened, the number of city dwellers suffering from allergic diseases has risen by three to five fold in recent decades. [11]

Creating employment opportunities and green growth

- A recent report by Stern and other authors highlighted the opportunities arising from ambitious climate mitigation actions in five key economic systems—energy, cities, food and land use, water, and industry—that can drive growth and meet the development objectives. It also reported that transitioning to the low-carbon, sustainable growth path could **deliver a direct economic gain (US $26 trillion)** by 2030 compared with business-as-usual, **generate over 65 million new low-carbon jobs** in 2030. [12]

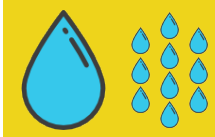
Business prospects

- For individual business, one of the major benefits of reducing GHG emissions is to save costs through more efficient use of resources, particularly energy, that cut utility bills. Besides, companies taking ambitious climate actions could **enhance their reputation amongst stakeholders** and thus **foster business development**. For the business sector, mitigating climate change could **create new business opportunities in new and emerging markets** such as in the clean energy sector. It may also **reduce risks and costs of damage to assets as a result of extreme weather events.**

Costs Of Inaction Are Terrifying

Damage to infrastructure; economic loss

- The Super Typhoons Hato and Mangkhut slammed Hong Kong in 2017 and 2018 respectively and caused massive damage, including **flooding in many coastal and low-lying areas, huge amount of fallen trees, suspension of the public transport, and interruptions of the water and power supply.** Under climate change, the number of super typhoons are also expected to increase. [13]



Unstable water supply

- A study conducted jointly by researchers at CUHK and the Commonwealth Scientific and Industrial Research Organisation in Australia suggested that the continued growth in GHG emissions throughout this century could bring about **more frequent and intensive floods and droughts** in **the Pearl River Basin** in the last three decades of this century. [14]

Instability of crop production; rising food prices

- Researchers from the Earth System Science Programme at CUHK predicted that the rise in temperature would **reduce global food production by more than 10% and increase undernourishment rates by more than 30%.** [15]

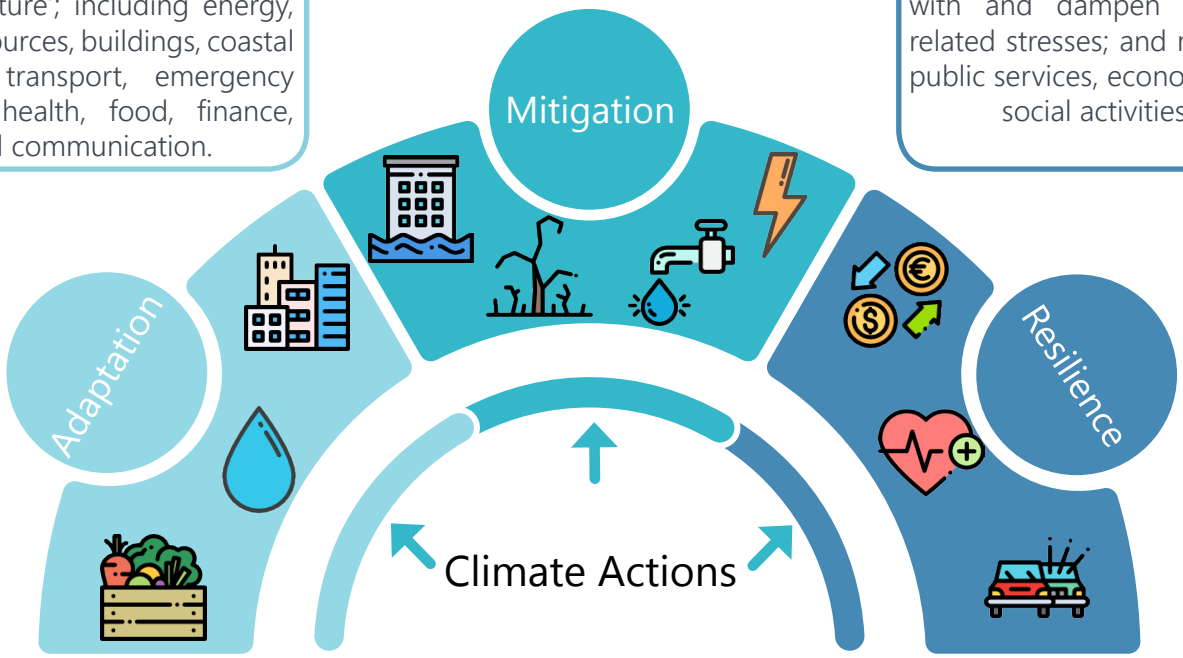
Global Response To Climate Change

Climate Actions: The Three Main Concepts

To reduce or prevent GHG emissions for alleviating effects of climate change such as heat waves and droughts, extreme storms, pressure on water resources and crop yields, damage to corals, sea level rise etc.

To prevent or minimise the damage already or may be potentially caused by climate change by strengthening our 'infrastructure'; including energy, water resources, buildings, coastal facilities, transport, emergency services, health, food, finance, and communication.

To maintain functionality of the society under the inevitable effects of climate change; cope with and dampen climate-related stresses; and maintain public services, economic and social activities.



Absolute Carbon Emissions VS Carbon Intensity

Carbon intensity **is the volume of emissions per unit of GDP.** Reducing carbon intensity means that less carbon emissions are being produced per unit of economic output. In the past, if GDP grows so do the total emissions. But taking advantages of the reduction in technology cost, enhanced awareness about climate change, etc., there are signs of marked decoupling of emissions and economic growth.

A more concrete measure of carbon emissions reduction is "absolute reduction"**,** meaning the reduction in the total emissions. To mitigate climate change, total emissions must be decreased in the long run.

Carbon Emissions Per Capita

Meanwhile, looking at the total carbon emissions alone does not tell the full story of a city's contribution to global warming.

A more useful measurement is carbon emissions per capita (person). Under this measurement, we can compare the CO_2 per capita of different places around the world.

The Paris Agreement

1.6 Succeeding the Kyoto Protocol, the Paris Agreement* is an ambitious multilateral treaty agreed in December 2015 by 196 signatories with a view to combating climate change and taking actions towards **a low-carbon, resilient and sustainable future.** China formally signed it on Earth Day, 22 April 2016.

Every 5 years, all signatories must formulate their own **"nationally determined contributions" (NDCs)** with targets and timelines to be set

Limiting the increase in the global average temperature to well **below 2°C** above pre-industrial levels and **pursuing efforts to limit the temperature increase to within 1.5°C above pre-industrial levels**

Note: *International shipping and aviation are not included in the Paris Agreement. International Maritime Organization and the International Civil Aviation Organization are responsible for carbon reduction of their respective sectors.

1.7 To limit the increase in the global average temperature to well below 2°C above pre-industrial levels, **the world will need to reduce absolute carbon emissions between 40% to 70% by 2050 compared with 2010 and to achieve net zero emissions of CO_2 and other GHGs before 2100.** The recent Special Report on Global Warming of 1.5°C of the IPCC has provided scientific evidence that limiting warming to 1.5°C could further reduce climate risks compared with limiting it to 2°C. Yet, it is already an audacious plan to limit global warming to 2°C. To go further beyond to 1.5°C will require global carbon emissions reaching net zero around 2050.

Our Response to The Paris Agreement

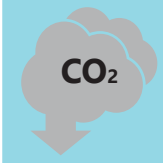
1.8 The Paris Agreement came into force on 4 November 2016. As decided by the Central People's Government, the Paris Agreement applies to the Hong Kong Special Administrative Region. We are obliged by 2020 to formulate a long-term decarbonisation strategy up to 2050. We are also obliged to review our climate change efforts every 5 years. As of now, we are on track to **achieving the carbon intensity target of 65% to 70% by 2030 using 2005 as the base.**

China's NDC by 2030

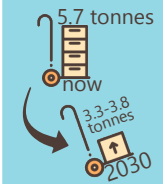
- To achieve the peaking of carbon dioxide emissions around 2030 and making best efforts to peak early
- To lower carbon dioxide emissions per unit of GDP by 60% to 65% from the 2005 level
- To increase the share of non-fossil fuels in primary energy consumption to around 20%
- To increase the forest stock volume by around 4.5 billion cubic meters on the 2005 level

Hong Kong's Carbon Emissions Reduction Measures by 2030

- 'Peak Carbon' – local electricity generation is by far the biggest contributor to carbon emissions making up about 67%. Hong Kong's **emissions will peak in or before 2020** when we have more electricity generation from natural gas in our fuel mix.



- **Carbon Intensity and Absolute Reduction** – our current decarbonisation path will help **reduce the carbon intensity by around 50% by 2020**. Our 2030 target would take us to **65% to 70% carbon intensity reduction from the 2005 level**. [16]



- **Per capita carbon emissions** – our per capita calculation is derived from dividing the total carbon emissions with the population, which works out to be around **5.7 tonnes in 2016**. Our target is to reduce Hong Kong's per capita carbon emissions to less than 4.5 tonnes by 2020; and further to about **3.3-3.8 tonnes by 2030**.

The Public Engagement Process

1.9 Through this public engagement (PE) process, the Council for Sustainable Development hopes to arouse public awareness of the impact of carbon emissions, and gauge the views of the community in formulating Hong Kong's long-term decarbonisation strategy, charting practical pathways and developing feasible actions to achieve that target, thereby contributing to the global decarbonisation efforts.

1.10 Given the long-term low greenhouse gas emission development strategies envisaged under the Paris Agreement only covers mitigation, this PE exercise will focus on gauging public views on **mitigation actions*** relating to reducing carbon emissions that suit the geographical, social and economic contexts of Hong Kong.

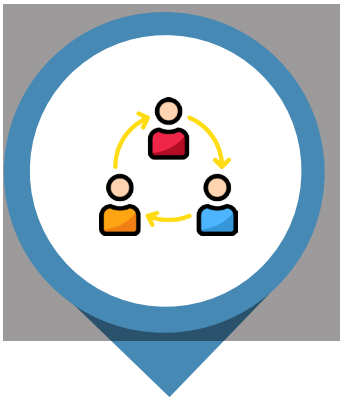
Objectives of the Public Engagement

Enhance Public Awareness

To raise awareness of the impact of carbon emissions and the serious consequences of inadequate actions to reduce carbon emissions.

Consensus Building and Recommendations

To seek public views on mitigation actions relating to reduction of carbon emissions bearing in mind the additional cost and behavioural changes required; and to promote community actions including changes in lifestyle and consumption behaviour to mitigate climate change.



Stakeholders Participation and Cooperation

To identify the roles of different stakeholders and foster collaboration opportunities among them and gauge their views on mitigation actions against climate change.

Note: *We have not included adaptation and resilience measures in the PE exercise because the timetable to complete the exercise is tight, and many of the measures are relatively technical and involve operational details. Besides, an interdepartmental Climate Change Working Group on Infrastructure has been formed to review the design standards and examine necessary measures for strengthening our infrastructure. The Contingency Plan on Natural Disasters is also being reviewed by Security Bureau.

2

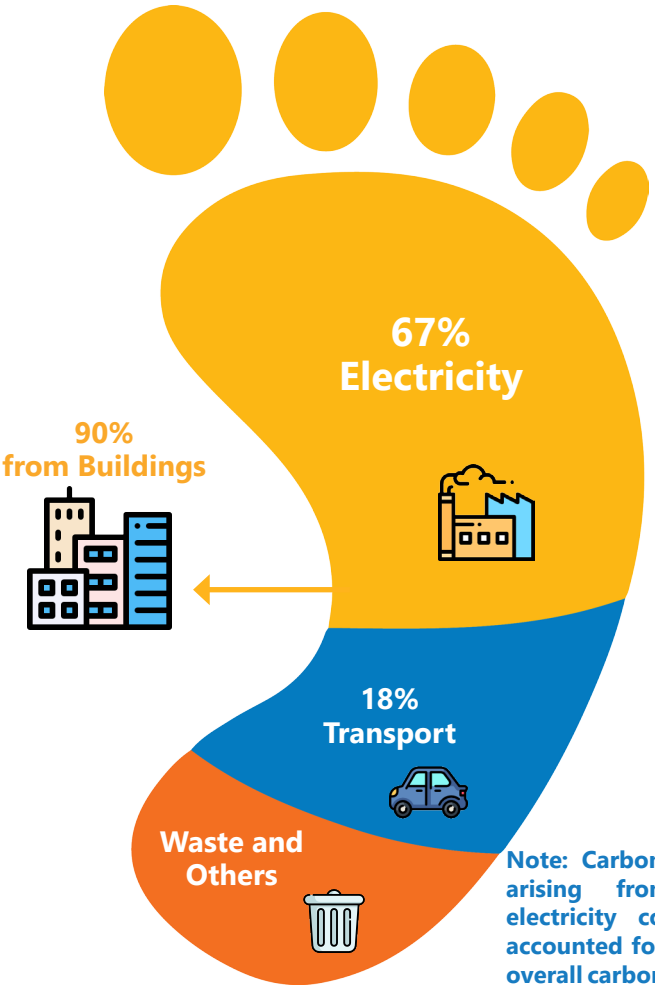
Combating Climate Change: Where Do We Start?

Prevailing Situation

2.1 Currently about **67% of Hong Kong's carbon emissions come from electricity generation**, of which the electricity is generated to meet the demand of the public and the industrial and commercial sectors. Apart from demand side energy saving measures, the Government has been promoting the use of cleaner fuel and renewable energy in power generation to reduce the emissions. In 1997, the Government decided not to build any new coal-fired electricity generation plants.

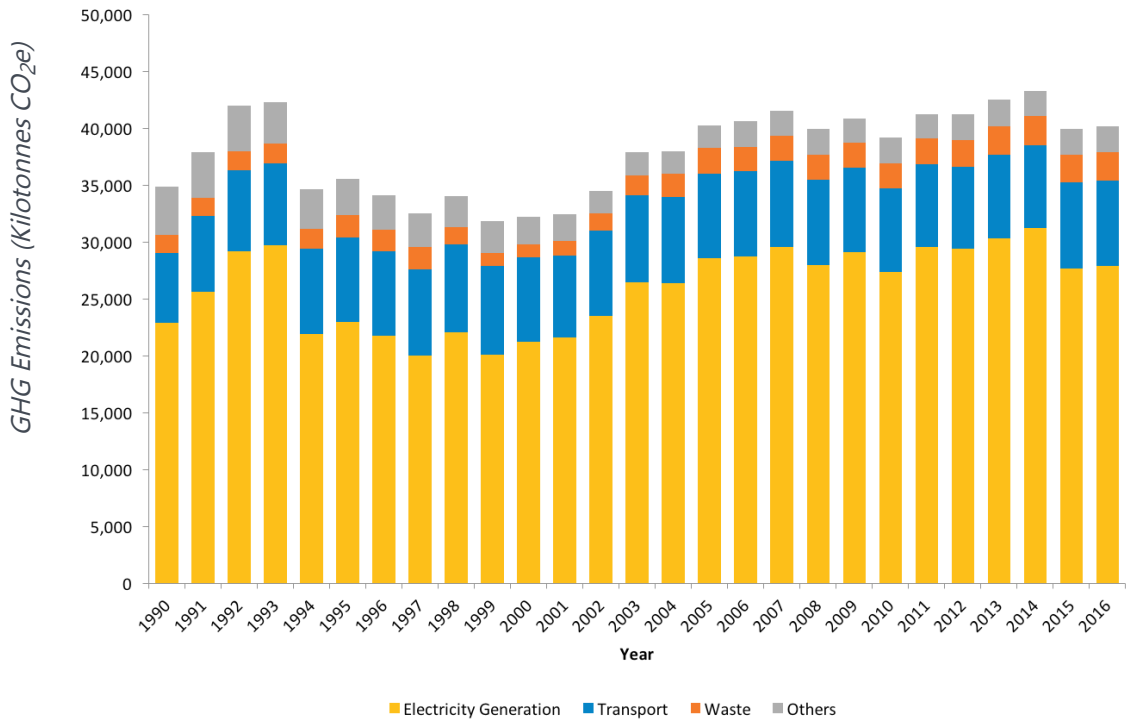
2.2 The most appropriate and available large-scale technology to replace coal and reduce carbon emissions for Hong Kong at the moment is natural gas-fired electricity generation. Back in 1996, the first gas-fired electricity plant was built, and today there are 10 plants in Hong Kong providing 27% of electricity requirement in 2015. By around 2020, natural gas will generate about half of our electricity while coal will drop to about 25%. This will help us achieving the target of 50% to 60% reduction in carbon intensity in 2020 using 2005 as the base, equivalent to about 20% of absolute carbon emissions reduction. [17]

2.3 However, **burning natural gas will continue to generate carbon emissions.** We cannot solely rely on local eletricity generation by natural gas if we need to achieve **more progressive carbon reduction target**.



Note: Carbon emissions arising from railway electricity consumption accounted for 2% of the overall carbon emissions, which are counted in the electricity generation sector

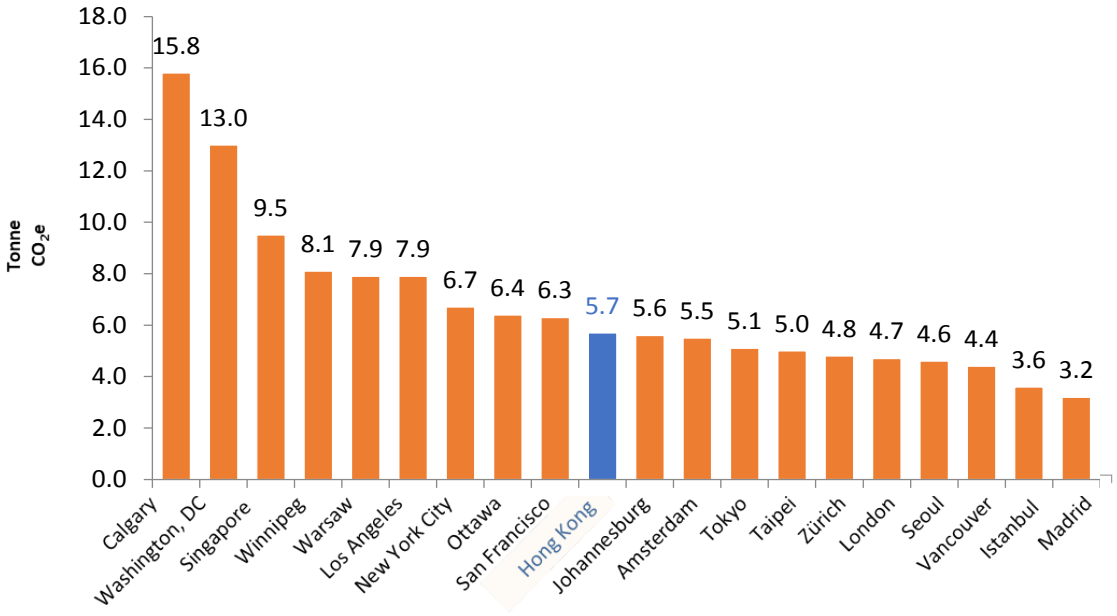
Greenhouse Gas (GHG) Emissions Trends in Hong Kong 1990 - 2016



Source: Environmental Protection Department, HKSARG [18]

How Are We Doing Compared With Other Cities?

Comparing Per Capita GHG Emissions in 2016



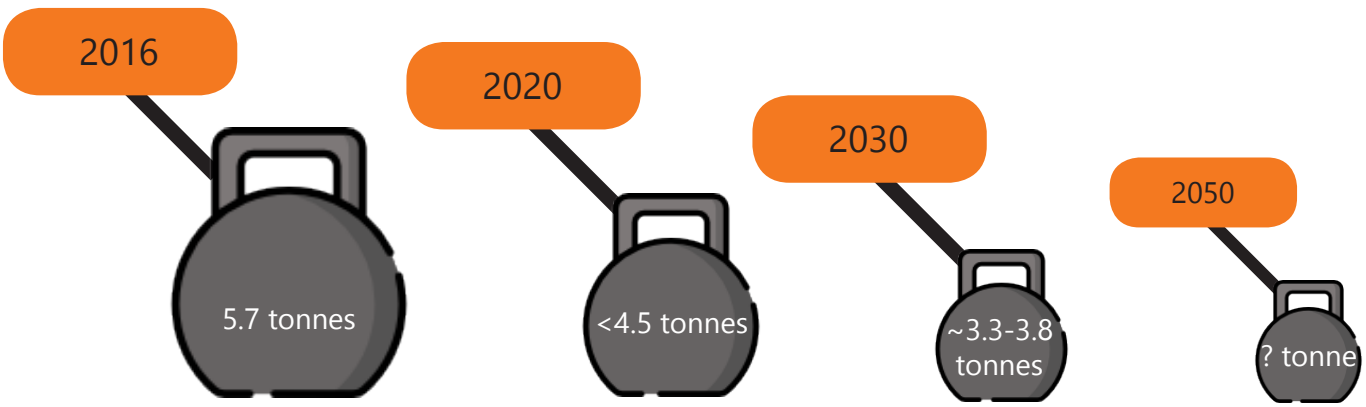
Source: CDP Worldwide; Environmental Protection Department, HKSARG

2.4 The per capita calculation is derived from dividing the total GHG emissions with the population, which worked out to around **5.7 tonnes** for Hong Kong in 2016, and was between the levels in New York City (6.7 tonnes) and London (4.7 tonnes). Given that the global population in 2050 is projected to reach around 9 billion (7.5 billion in 2015), if the world is to achieve the well below 2°C target, it implies the per capita emissions for the world should average around 2 tonnes CO_2e*. For Hong Kong, based on a projected population of about 8.15 million in 2050, this would mean a 60% reduction of absolute carbon emissions compared with the 2005 level by 2050.

Note: *To reduce absolute CO_2e emissions between 40% to 70% by 2050 compared with 2010, global per capita carbon emissions would need to fall to about 1.4 to 3 tonnes CO_2e by 2050. The median is about 2 tonnes CO_2e.

2.5 Our current target is to reduce Hong Kong's per capita contribution to less than **4.5 tonnes** in 2020; and to further reduce it to about **3.3-3.8 tonnes** in 2030. When compared with the 2005 level, Hong Kong's 2030 target in terms of absolute carbon emissions reduction **(26-36%)** is comparable to those of other major Asian cities such as Seoul (40%), Tokyo (~32%) and Taipei (25%), and is higher than that of Singapore (it is expected that Singapore's carbon emissions will continue to increase until 2030 and will begin to decrease after 2030). Yet, there would still be a long way to go for Hong Kong to reach around 2 tonnes per capita further into the future, and will be more challenging to reach net zero around 2050 if we are to limit global warming to 1.5°C in response to the recent IPCC's Special Report on Global Warming of 1.5°C.

2.6 Hence, combating climate change requires participation of the entire community and cross-sectoral actions.



3

Time To Step Up Action Now, How Do We Move Forward?

Setting Carbon Reduction Target For 2050

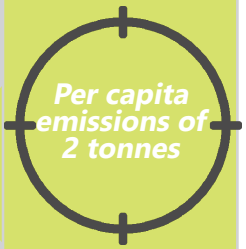
3.1 As a responsible global citizen, Hong Kong has to formulate the long-term decarbonisation strategy and action plan up to 2050. According to the Paris Agreement, the strategy can include specific and quantifiable targets (including phased targets), while setting visionary goals is also considered as a viable option. Different actions are required to limit the total carbon emissions at varying levels.

3.2 Different actions are required in general to achieve the target. However, depending on the progress of individual actions, it may not be sufficient to achieve the target even if all of the following actions are fully implemented:

Towards Basic Level of Carbon Emissions Reduction

Limit global average temperature rise to 2°C through reducing carbon emissions by 60% by 2050 (2005 as base year)

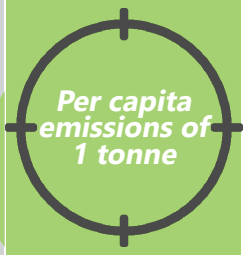
- **Changing habits** to reduce energy use and carbon emissions
- **Wider implementation** of energy saving retrofitting and retro-commissioning* for existing buildings
- **About 80%** zero carbon energy and very close energy regional cooperation is necessary
- **Improvements** in energy efficiency and conservation through tightening energy-related standards and behavioural changes
- New energy vehicles (e.g. electric vehicles (EVs)) to **gradually replace** conventional fuel-driven vehicles
- **Shift to** procure low-carbon products
- **Technological breakthrough and advancements** to reduce and offset carbon emissions



Pursuing Efforts to Achieve A More Audacious Carbon Reduction Targets

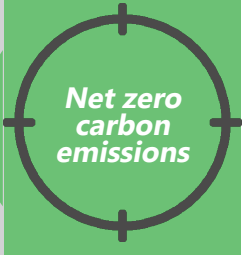
Limit global temperature rise to between 1.5°C and 2°C through reducing carbon emissions by 80% by 2050 (2005 as base year)

- **Changing patterns of behaviour** proactively to further reduce energy use and carbon emissions
- **Mandating** all large existing buildings to implement energy saving retrofitting and retro-commissioning
- **More than 80%** zero carbon energy and very close energy regional cooperation is necessary
- Marked improvements in energy efficiency and conservation through **mandatory energy-related measures and standards**, as well as behavioural changes
- New energy vehicles (e.g. EVs) as the **key modal choice**
- **Mandating** low-carbon green procurement
- **Significant technological breakthrough and advancements** to reduce and offset carbon emissions



Limit global average temperature rise to 1.5°C through achieving Net Zero Carbon Emissions (Carbon Neutral) by 2050

- **Lower-carbon lifestyle for all**
- Energy saving works (e.g. retrofitting and retro-commissioning) **mandatory** for all existing large buildings
- 100% zero carbon energy is **mandatory** and very close energy regional cooperation is necessary
- **Mandatory** energy saving measures
- Mandating all new buildings to be **net zero carbon emissions**
- Mandating zero emission vehicles to **replace all conventional fuel-driven vehicles**
- **Rigorous technological breakthroughs and advancements** to reduce and offset carbon emissions



Note: *Retro-commissioning is a systematic and cost-effective process to periodically check an existing building's energy and other performances such as equipment conditions, how equipment and systems function together, the effectiveness of operation and maintenance strategies, etc. The process identifies operational improvements that can save energy. The process can be performed alone or with a retrofit project, such as replacing less energy efficient appliances with more efficient ones.

International Experience

3.3 Many cities and countries are exploring ways to cut their emissions. Despite different geographical conditions, economic progress and political contexts, their carbon reduction efforts focus on several key areas, including **enhancing education and public awareness**, **enhancing building energy efficiency, deep decarbonisation in the energy sector and promoting green transport**, as well as other measures such as industrial upgrading (e.g. use of low-carbon materials and production methods), better waste management (e.g. waste reduction, waste-to-energy technologies) and adoption of carbon removal measures (e.g. carbon capture and storage technologies, reforestation and afforestation).

3.4 Tackling the climate change challenges requires full collaboration across sectors. A global trend is to **explore different financing mechanisms,** such as issuance of green bonds and setting of carbon pricing to channel private sector investment into projects and activities in renewable energy, energy efficiency, green buildings, and other eco-friendly industries that contribute to a low carbon economy.

Education and Public Awareness

- To launch climate change awareness campaigns by using the media
- To strengthen policy-oriented and enabling more environment researches
- To include climate change topics in school curricula

Example: Berlin (refer to p.41 at Annex for details)

Economic Opportunities and Financing Mechanisms

- To accelerate the transition to low carbon economy to ensure long-term sustainable development and progress towards a low-carbon future
- To mobilise private sector investment in support of projects or activities that contribute to low-carbon and climate-resilient economy

Example: Scotland and The United Kingdom (refer to p.42 at Annex for details)

Enhancing Building Energy Efficiency

- To renovate, retrofit, and refurbish the existing buildings and facilities to improve the energy efficiency of space cooling/heating, lighting, building envelope and other building energy systems, etc
- To tighten energy efficiency and performance standards of buildings
- To adopt district cooling/heating systems
- To adopt heat pumps, combined heat and power (co-generation) and tri-generation systems (cooling, heating and power)
- To install renewable energy devices at different venues

Example: New York City and Tokyo (refer to p.41 at Annex for details)

Promoting Green Transport

- To adopt smart city strategies and plans; infrastructure improvements to promote walkability and a bicycle-friendly environment
- To improve fuel efficiency of vehicles
- To accelerate the adoption of new energy vehicles such as EVs, and promote the use of biofuels in heavy goods vehicles, etc.
- To set a vision and/or target year for phasing out fossil fuel vehicles

Example: Norway and Seoul (refer to p.42 at Annex for details)

- Should there be regulatory requirements to ensure companies and organizations meeting the designated carbon reduction targets? Should tax incentives and/or penalties be imposed to ensure compliance?
- What are the functions of green bonds, carbon tax and cap-and-trade scheme, etc., in carbon reduction in Hong Kong?

Decarbonisation in the Energy Sector

- To use renewable energy and nuclear energy as the major fuel sources, supplemented by fossil fuel generation equipped with carbon capture and storage technology
- To adopt carbon pricing and emission trading to instigate behavioural change for stepping up energy saving
- To provide incentives for the development of clean energy
- To explore the possibility of power import and pursuing enhancement in energy regional cooperation

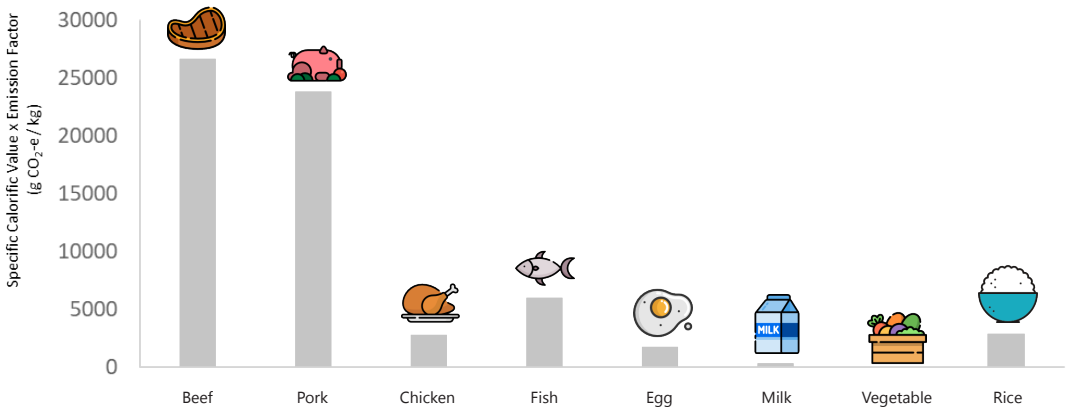
Example: Germany, Denmark and Seattle (refer to p.41-42 at Annex for details)

Participation By All Citizens

3.5 According to 2019 data, we need more than **4 Earths** if everyone in the world follows the lifestyle of Hong Kong people.[19] We can explore room for improvement and can do better in reducing our carbon footprint in order to combat climate change. **A less wasteful and energy saving lifestyle** is a "must" way to begin with.

3.6 Everything we need in daily lives has a carbon footprint and food is no exception. **Food's carbon footprint** is the GHG emissions produced by **growing, rearing, farming, processing, transporting, storing, cooking and disposing** of the food we eat. **Changing our dietary patterns** (e.g. more vegetables, less meat), choosing **locally grown produce**, and minimising our **food waste** can have a big impact on our carbon footprint.

Food Carbon Emissions



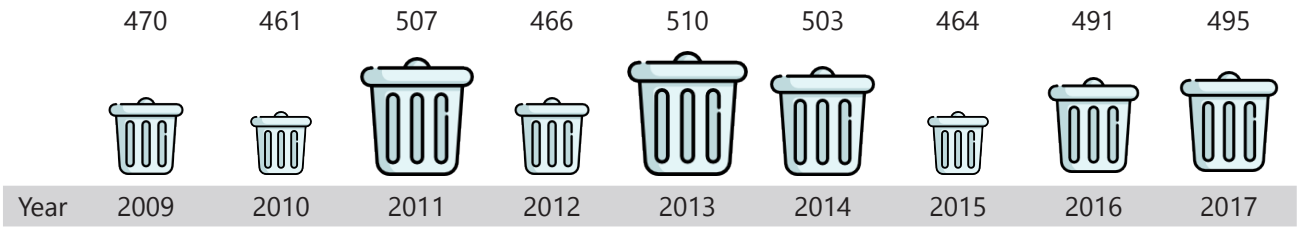
Source: Leung, et al., (2010) [20]

Food Waste: An Overlooked Driver of Climate Change

3.7 Globally, food wastage creates about 8% of all human-induced GHG emissions. [21] We can always take small steps to curb our emissions at source by consuming food wisely, reducing and delivering surplus to those in need, shopping wisely and turning food waste into energy.

Are you aware of the relationship between your daily activities and carbon emissions? How can we facilitate you to have a better grasp of the related information?

Food Waste Disposal (in gram per person per day in Hong Kong)



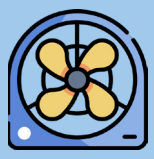
Average per capita food waste disposal was 485g between 2009 and 2017

Food Wise Hong Kong Campaign

Why not just order the right portion of food when you eat out?

How about you only cook the portion that you will eat, so that you can save money as well as food?

Your Every Step Counts!

Buy 5 new cotton T-shirt in each season	 75 Kg CO_2e [22] Assuming you will wear and wash it 50 times	Reduce ~80% CO_2e	Buy 1 new cotton T-shirt in each season	 **15** Kg CO_2e [23] Assuming you will wear and wash it 50 times
Eat a 90g palm size steak	 2.4 Kg CO_2e [24]	Reduce ~90% CO_2e	Eat a 90g potato	 **0.26** Kg CO_2e [25]
Switch on a 1HP (9,000 BTU/h) air conditioner for 8 hours	 3.8 Kg CO_2e [26]	Reduce ~95% CO_2e	Switch on a portable fan for 8 hours	 **0.2** Kg CO_2e [27]
One litre of petrol burnt in a car engine - from Chai Wan to Kennedy Town	 2.5 Kg CO_2e [28] Assuming it is a midsize car/large family car	Reduce ~99% CO_2e	Take MTR from Chai Wan to Kennedy Town	 **0.03** Kg CO_2e [29]

Big Waster or "Hanson"?
You always have a choice!

Low-carbon Living Calculator

It assesses your carbon emissions in respect of clothing, food, living and travel in the past year through 14 multiple-choice type questions. Low-carbon living tips are also provided to drive behavioural change.

https://www.carboncalculator.gov.hk/en

- What can help you switch to a low-carbon lifestyle? How can the goods and services providers facilitate your behavioural change?
- What are the obstacles for you to switch to a low-carbon lifestyle?
- What kind of education and publicity activities should be put forward in promoting low-carbon lifestyle?

Hello! I behave like Big Waster! I live with my family of four on Hong Kong Island. Here are my family practices and living habits :

	Average
Electricity bill per month:	$1,000
Gas bill per month:	$1,000
Water bill per month:	$400
Daily waste per day:	45L (around 3 typical plastic shopping bags from supermarket)
Total mileage of my private vehicle powered by petrol:	10,000 km (one year)
Public transport:	Nil
Leisure trip:	1 to Asia and 1 to Europe per year
Eating:	Eating 100g of meat per day per person (about the portion of 1 palm size steak)
Pre-packaged drinks:	10 servings per week per person
New clothes and shoes:	1 item per month per person

About 9.5 tonnes CO_2e per person in a year

Hello! I behave like "Hanson"! I live with my family of four on Hong Kong Island. Here are my family practices and living habits:

	Average
Electricity bill per month:	$150
Gas bill per month:	$50
Water bill per month:	$50
Daily waste per day:	15L (around 1 typical plastic shopping bag from supermarket)
Private vehicle:	No
Public transport:	12 hours spending on MTR per week per person
Leisure trip:	Local trips in Hong Kong as far as possible
Eating:	More vegetables, less meat (especially red meat)
Pre-packaged drinks:	Nil
New clothes and shoes:	1 item per quarter per person

About 2.6 tonnes CO_2e per person in a year

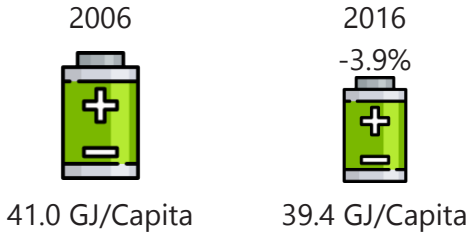
How Do We Consume Our Energy?

3.8 Energy is an essential part of our daily lives and is also important for our economic activities. To embark on our low-carbon transition journey, it is important to know how energy is used by **households, industrial and commercial organisations and the transportation sector.**

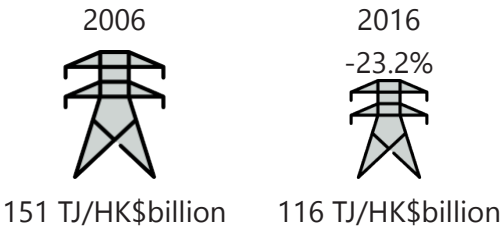
3.9 In Hong Kong, over 50% of the total annual energy use is in the form of electricity consumption. Buildings (i.e. more than 40,000) accounted for about 90% of the city's electricity use and some 60% of total GHG emissions. [30]

3.10 While new buildings can be designed to incorporate energy-smart elements, it is equally important for owners/occupants of existing buildings (especially commercial and residential buildings) to go green as they have great potential to perform better through energy **saving, energy audit, carbon audit, retro-commissioning and retrofitting**.

Energy Consumption Per Capita

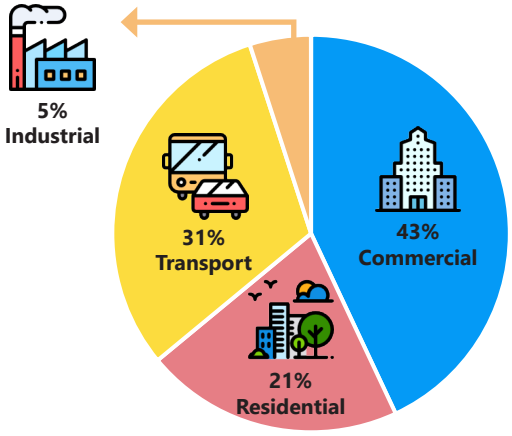


Energy Consumption Per Unit of GDP



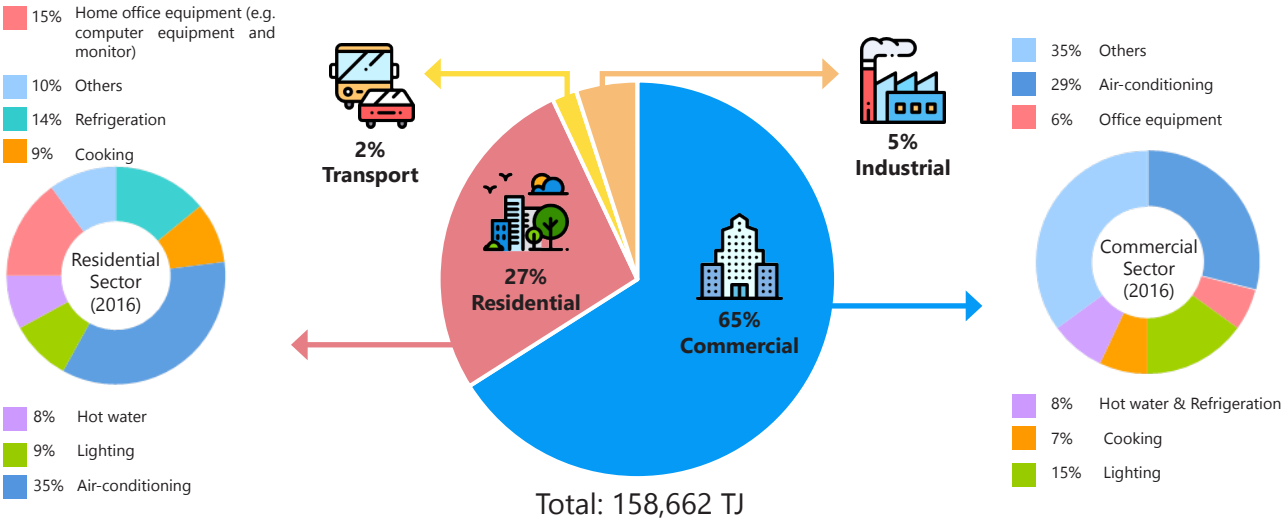
Source: EMSD, HKSARG

Energy Consumption By Sector, 2016



Total: 289,219 TJ

Electricity Consumption By Sector, 2016



Total: 158,662 TJ

Source: EMSD, HKSARG

What Are We Doing To Promote Energy Saving And Efficiency?

3.11 To achieve long-term carbon reduction, the community must take collective actions to change our behaviour and to invest in more energy efficient products, technologies and practices. Since the 1990s, the Government has made considerable efforts in collaboration with building professionals and other stakeholders to promote green buildings and enhance buildings' energy efficiency.

3.12 Some specific measures include: progressively tightening the statutory energy efficiency standards in buildings, accelerating tax deduction for renewable energy and energy-efficient building installations, promoting different energy-saving measures and technologies to the industry, conducting regular energy and carbon audits on major government buildings, encouraging bureaux and departments to apply for green building certification for buildings under their management, and organising the "Energy Saving for All" Campaign, etc. (See Annex 5 for details).

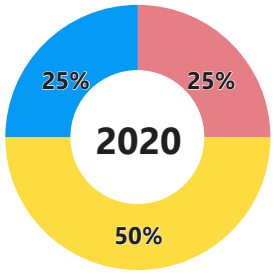
Building is one of the main sources of carbon emissions in Hong Kong. What can we do further to promote energy saving and reduce building-related carbon emissions?

- What measures may be considered to encourage or regulate building owners and tenants to raise energy efficiency of the whole buildings (i.e. including non-communal units/ areas)?
- What measures may be considered to encourage building owners to develop more on-site renewable energy installations?
- What passive energy saving design elements (e.g. natural ventilation) may be considered to enhance building energy efficiency in the long run? What incentives should be provided to further encourage developers and owners to adopt passive energy saving design elements?

Further Carbon Reduction In Electricity Generation

3.13 Currently, about **67%** of Hong Kong's carbon emissions comes from electricity generation. Hence, **decarbonising the electricity generating sector** plays a key role in our decarbonisation strategy.

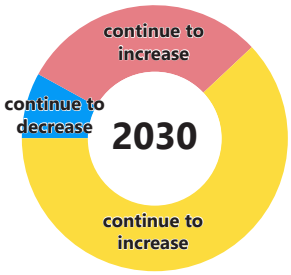
Fossil or non-fossil fuels, what will you choose? For the benefits of both the current and future generations, what are your considerations in deciding the future fuel mix for Hong Kong?



Source: Hong Kong's Climate Action Plan 2030+

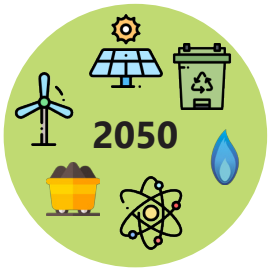
From Now to 2020

3.14 In 2015, coal (48%) remained the largest share of the fuel for electricity generation in Hong Kong, followed by natural gas (27%) and non-fossil fuels (including imported nuclear) (25%). By around 2020, it is expected that natural gas will generate about half of our electricity.



Mid-term Decarbonisation (2030)

3.15 To help meet our carbon intensity reduction target of 65% to 70% by 2030, Hong Kong is phasing out coal-fired electricity generation in the next decade. Natural gas-fired electricity generation is a reliable and available large-scale technology to replace coal and reduce carbon emissions but it still generates carbon emissions and cannot help us achieve a higher carbon reduction target.



Long-term Decarbonisation (2050)

3.16 To achieve a carbon reduction target of well below 2°C in 2050 that is in compliance with the Paris Agreement, it is estimated that about 80% of our electricity would need to come from zero carbon energy sources (including renewable energy and imported nuclear energy). If we are to achieve beyond the Paris Agreement's well below 2°C target, the use of zero carbon energy source has to be further increased. As Hong Kong has very limited renewable energy potential, regional cooperation plays a crucial role in helping us achieve a higher carbon reduction target beyond 2030.

3.17 Hong Kong should take a practical approach to obtain significant carbon reduction in the 2030s using today's technology, and aim for further reduction towards 2050 when we might benefit from emerging and future technologies over time.

3.18 Longer term decisions about the precise pathways up to 2050 can only be taken later in the light of the further developments in technology around 30 years down the road which will affect the cost, availability and performance of different fuel types. Nevertheless, major considerations when determining our long-term strategy to decarbonise the electricity generating sector towards 2050 will include: environmental performance, reliability, safety and affordability. Details of these major considerations are set out in Annex 7.

Renewable Energy

- The development of renewable energy locally is being optimised as far as possible. The Government is taking the lead in developing renewable energy. It has earmarked $2 billion to implement relevant projects at government premises, and will install solar power systems of a larger scale at suitable reservoir and landfill locations. The Government has also introduced Feed-in Tariff (FiT) and implemented different facilitation measures, including suitably relaxing the restrictions on "village house" rooftop installations, launching Solar Harvest to assist eligible schools and welfare non-governmental organisations in installing solar photovoltaic panels, etc, to encourage and assist the private sector in adopting renewable energy.
- However, given the geographical constraints of Hong Kong (mainly due to the scarcity of land), the Government's latest assessment is that we only have **modest realisable renewable energy potential** (including wind, solar and waste-to-energy) **at around 3-4%** arising from currently available renewable energy technologies that can be exploited between now and 2030 locally.
- Significant increase in the local renewable energy percentage will only be possible with the emergence of future renewable energy technologies.
- While renewable energy will keep minimise the environmental impact of energy use, most renewable energy is intermittent in nature and requires the support of stable fuel sources. The total cost involving use of renewable energy is therefore significantly higher than other fuels.

What can we do to further enhance the development of renewable energy locally?

Further enhancement of regional cooperation for increasing the proportion of zero carbon energy in our fuel mix is an inevitable step towards achieving higher carbon reduction targets in 2030 and 2050. What are your views on this in the face of the threat of climate change?

Regional Cooperation

- Regional cooperation is an approach that is/will be commonly adopted by other world cities in decarbonising the energy sector, e.g. Seattle City (United States) imports hydroelectricity from other places in the State of Washington. It is also not new to Hong Kong as we have been importing about 25% of our electricity from Daya Bay Nuclear Power Station (DBNPS). Regional cooperation is an approach that must be considered if we are to achieve a higher carbon reduction target given that zero carbon energy (including local and imported renewable energy and imported nuclear energy) has to be our dominant fuel source beyond 2030 and our local renewable energy potential is very limited.
- More renewable energy is becoming available in the Mainland as it reduces its own fossil fuel generation, and **regional cooperation may allow us to tap into renewable energy available in the Mainland.** Having said that, Hong Kong' s ability to get priority for renewable energy over other Mainland cities is uncertain.
- Our **current agreement to import nuclear electricity runs up until 2034** and hence we will continue to have around a quarter of our electricity coming from a carbon free source until at least then. There are overseas examples for nuclear generating units to have life of service extended to allow them to run for 60 years (2054 in the case of DBNPS). Nuclear plants employ sophisticated and careful operational safety and waste management measures, and many other nuclear plants are being built or operating in Southern China, regardless of whether Hong Kong imports nuclear power.
- As an example of strengthening regional cooperation, CLP Power Hong Kong Limited's existing **Clean Energy Transmission System network** with China Southern Power Grid and DBNPS is being enhanced. When completed in 2025, the strengthened network will give Hong Kong the capability and flexibility to **use more zero carbon energy from the region** of up to around 30-35% of our fuel mix, thereby advancing Hong Kong's achievement of its original carbon reduction target for 2030 by as much as five years.
- The Government will commission a study with the power companies from 2020 to study the detailed arrangements for further strengthening the interconnection between the Mainland and Hong Kong, as well as that between the existing grids in Hong Kong.

Reliability

- Highly reliable supply is critical to Hong Kong given that Hong Kong is an international financial and commercial centre operating in a densely populated environment with significant concentration of high-rise buildings. Reliability of supply is expected to become far more important in future as Hong Kong moves towards "Smart Cities" and our lives will depend on billions of interconnected electric chips.
- Even if feasible, most renewable energy (such as solar and wind) is intermittent, for example, when the sun does not shine or the wind is not blowing. So the use of renewable energy as our main source of zero carbon energy would require back-up support from other stable fuel sources (e.g. fossil fuel and nuclear power) to ensure reliability, when sufficient volumes of renewable energy are not available or cannot be delivered to Hong Kong.
- Reliability of regional cooperation is **affected by the type of electricity we import and how we import it.** Reliability can be enhanced significantly by importing power through dedicated transmission line with decoupling arrangement.

Security and Availability

- Avoid dependence on single fuel type and source for **ensuring energy security** and gaining **better bargaining power** over purchase price and terms.
- Based on current technology, the local renewable energy potential is relatively limited. If technological developments enable us to adopt more local renewable energy in the 2030s and 2040s, we may plan flexibly to cope with a greater volume of local renewable energy.
- Importing renewable energy from the Mainland is an option for future power supply. Having said that, Hong Kong's ability to get priority for renewable energy over other Mainland cities is uncertain.

Affordability

- Based on current prices and technology, coal-fired generation has the lowest unit cost of electricity, followed by nuclear power and gas-fired generation. Renewable energy is in **general a few times more expensive than electricity generated from fossil fuels**. The use of renewable energy also requires the back up support from other stable fuel sources hence involves additional costs.
- Most of the existing coal and gas fired generating plants will have to be retired in the run up to 2050. As old plants retire and are replaced with new cleaner supply sources, whether from power import or local generation, the cost of electricity supply would be expected to increase due to the replacement of the retiring plants and higher cost of cleaner energy. Since the cost impact would depend on a host of factors, including the retirement schedule of existing generation units, the choice of replacement supply sources, the capital investment required, the means of financing new infrastructure, fuel costs, operation costs, sales volume, etc., it is premature to make any meaningful assessment of the tariff implication for 2050.

Environmental Performance and Response to Climate Change

- Electricity generation is a major source of carbon emissions in Hong Kong. Given the threats posed by climate change, one of the key measures is to use more zero carbon energy for electricity generation in order to reduce our carbon emissions. We are also required to adopt energy conservation, green commuting and waste reduction practices for meeting the targets of the Paris Agreement.

How would you rank the importance of different considerations (including reliability, security and availability, affordability, and environmental performance and response to climate change, etc.) when considering the long-term strategy to decarbonise the electricity generating sector towards 2050 for Hong Kong?

Travel Patterns and Carbon Emissions In Hong Kong

3.19 Transportation is an important component of Hong Kong's economy, which accounted for around 31% of total energy end-use in 2016. [31]

3.20 Although Hong Kong has a well-developed public transport system with railway as its backbone, the transport sector as a whole produced 18% of the total carbon emissions locally (railway electricity consumption accounted for another 2% of the overall carbon emissions which are covered in the electricity generation sector).

Adopting Multi-pronged Approach To Reduce Carbon Emissions In The Transport Sector

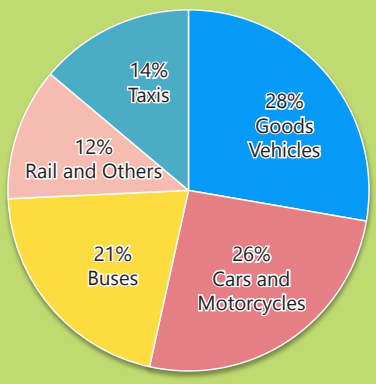
Railway as a Backbone

- Over the years, the Government has been adopting a public transport-oriented policy with railways as the backbone, and has been actively developing different public transport services to provide the public with more choices for added convenience.
- Transport and Housing Bureau (THB)/ Transport Department have been taking forward progressively a host of short, medium and long-term recommendations by the Transport Advisory Committee in its Report on Study of Road Traffic Congestion in Hong Kong (TAC Report). THB will also actively explore measures to manage the fleet size of private cars as recommended by the TAC Report, including fiscal measures.

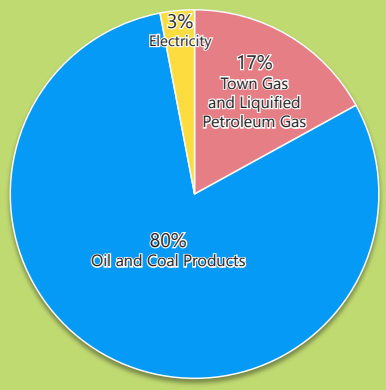
New Energy Vehicles

- Electric vehicles are more efficient than conventional internal combustion engines in converting the energy in fuel to mechanical power. Based on the fuel mix of electricity generation of 2015 (i.e. 27% natural gas; 48% coal and 25% non-fossil fuels, including imported nuclear), the trial results of the Pilot Green Transport Fund show that **commercial electric vehicles (EVs) have about 30% less carbon emissions on average than their conventional counterparts (tank-to-wheel) on the same mileage travelled**.
- To further reduce our carbon footprint and air pollutant emissions from power plants, the Government will revise its fuel mix in 2020 to increase gas-fired generation to about 50% and reduce coal-fired generation to about 25%. Hence, by then, EVs should emit even less carbon dioxide on average than their conventional counterparts (tank-to-wheel) on the same mileage travelled.
- The Government will continue to **promote the adoption of new energy vehicles,** including EVs. The number of EVs in Hong Kong has increased to 11,496 as at the end of December 2018 from less than 100 at the end of 2010.
- The 2018 Policy Address has announced that the Government may consider ceasing the first registration of diesel private cars subject to consultation with stakeholders as the first step to encourage the use of new energy vehicles.

Transport Sector Energy End-use, 2016



Energy Consumption of the Transport Sector by Fuel Type, 2016



Total: 89,891 TJ

Source: EMSD, HKSARG

Green Innovative Technology

- A $300 million **Pilot Green Transport Fund** (the Fund) has been put in place since March 2011 to encourage the public transport sector and goods vehicle operators to test out green innovative transport technologies. As of end December 2018, the Fund approved 140 trials, amounting to a total subsidy of about $139 million. Of them, 75 and 57 were electric commercial vehicles (e-CVs) and hybrid commercial vehicles (h-CVs) respectively, involving a total of 106 e-CVs and 89 h-CVs. Others involve trials of 1 set of solar air-conditioning system for bus, 4 sets of electric inverter air-conditioning systems for buses and 3 diesel-electric propulsion systems for ferries.
- In the 2018 Policy Address, the Government has revealed plans to review the scope of the Pilot Green Transport Fund with a view to further facilitating the transport sector's wider use of green innovative transport technologies that are suitable for use in Hong Kong.

Mobility and Walkability

- The Government will continue to **promote walkability** so as to reduce the use of mechanised transport for short-distance commuting.
- Foster a "**bicycle-friendly**" **environment** in new towns and New Development Areas.
- For energy saving in buildings, a more reliable and effective means is to **switch off some elevators during off-peak hours**. Government buildings have been implementing this practice for a number of years and achieved good results.

- How to promote wider use of green and innovative transport technologies?
- What other measures would you suggest to further reduce our transport-related carbon emissions? For example, would you consider short-distance commuting instead of travelling by vehicle and replace face-to-face meetings with video conferencing?

4

Your Views Matter

Your Views Mean A Lot

4.1 The climate crisis touches every aspect of our lives. We are running out of time to avoid or mitigate catastrophic impacts of climate change.

4.2 To adequately address the climate crisis, we must urgently reduce our carbon emissions. It requires cross-sectoral actions on lifestyle/consumption, buildings, transport, energy, water and waste systems, etc. with wide participation from the community, the business sector and the Government at all levels.

4.3 The Council for Sustainable Development (SDC) sincerely invites you to send your views on issues related to the formulation of the long-term decarbonisation strategy for Hong Kong. Please complete and return the views collection form in Chapter 4 on or before 20 September 2019. Please also visit SDC's dedicated website at www.susdev.org.hk for updated information on the public engagement activities.

4.4 Please note that the SDC would wish, either during private or public discussion or in any subsequent reports, to be able to refer to and attribute views submitted in response to this Public Engagement document. Any request to treat all or part of a response in confidence will be respected, but if no such request is made, it will be assumed that the response is not intended to be confidential and the SDC may disclose or publish all or part of the views received as well as the identity of the source.

Decarbonisation is for human survival and the well-being of our future generations.

There is no time to waste in the fight against climate change. We need to act NOW and plan AHEAD!

Every measure counts! Your views are appreciated! We look forward to receiving your views.

Views Collection Form

This is an anonymous form for the purpose of gauging public views about Hong Kong's long-term decarbonisation strategy.

Preamble – Let's revisit the following background information before completing this views collection form

- To combat climate change, the Paris Agreement has set a carbon reduction target – holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.
- To meet this target, the whole society needs to step up efforts by implementing a host of measures, including adopting a low-carbon lifestyle, enhancing energy efficiency and using more zero carbon fuel sources for electricity generation, coupled with technological advancements, in order to further reduce carbon emissions. (See P. 14; 17-21; 41-42 of the PE document)
- This means the pattern of our daily lives and behaviour is required to adapt to the transition towards low-carbon lifestyles, including the adoption of "Use Less, Waste Less" practices, low-carbon diets, energy and water conservation, and low-carbon transportation for daily and holiday journeys. (See P. 22-26; 30-31 and 44 of the PE document)
- Currently, about 67% of Hong Kong's carbon emissions come from electricity generation (See P. 17 of the PE document). In this regard, further carbon reduction in electricity generation is one of the key factors in overall carbon reduction for Hong Kong. In the long run, to comply with the decarbonisation target, we must increase the proportion of zero carbon energy in our fuel mix through very close regional cooperation, meaning importation of more electricity including renewable and / or nuclear energy from the Mainland. The gradual replacement of old power plants running up to 2050 by the use of cleaner energy is timely to help progress the decarbonisation journey. Regardless of the fuel type and sources to be chosen, the cost of electricity supply would increase due to the replacement of the retiring plants and the higher costs of cleaner energy. However, as the cost impact would depend on a host of factors, it would be premature to make any meaningful assessment on the tariff impact for 2050. (See P. 29 of the PE document)
- It is noteworthy that, according to the Paris Agreement, while Hong Kong has set, and is on track to achieve, the 2030 carbon reduction target, to formulate and reach a 2050 target is rather challenging. To pursue a more aggressive target would be an even more formidable challenge, entailing more significant costs for society and more substantial changes to the lifestyles and behavioural patterns of the public.

General Information

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

☐ **Professional bodies**

- o Building construction
- o Engineering
- o Transportation
- o Others

☐ **Public organisations**

☐ **Others**

☐ **Real estate**

- o Real estate developers
- o Brokerage and agencies
- o Property management companies

☐ **Commercial tenants**

☐ **Others**

Which age group do you belong to?

☐ Below 18 ☐ 31-60

☐ 18-30 ☐ Above 60

Are you a private commercial/industrial property owner?

☐ Yes ☐ No

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

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) (See P. 27-29; 48-50 of the PE document)

☐ Reliability

☐ Security and availability

☐ Affordability

☐ Environmental Performance and Response to Climate Change

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. (See Preamble of this views collection form)

☐ 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

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	☐	☐	☐	☐
	(ii) Purchase energy-efficient electrical office appliances (e.g. those with energy labels), such as computers, printers, LED light bulbs, etc.	☐	☐	☐	☐
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	☐	☐	☐	☐
	(iv) Retrofit office premises to improve energy efficiency, such as installing new lighting system and air-conditioning system	☐	☐	☐	☐
	(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	☐	☐	☐	☐
	(vi) Carry out energy / carbon audits with a view to identifying and implementing measures to reduce energy consumption and carbon emissions	☐	☐	☐	☐
Transportation	(vii) Instead of taking business trips, conduct video conferencing or use emails to reduce carbon footprint from flights	☐	☐	☐	☐
	(viii) Use new energy vehicles (e.g. electric vehicles) as company vehicles	☐	☐	☐	☐
Policy Formulation	(ix) Formulate (or update) waste reduction and recycling policy (e.g. paper and plastic recycling materials)	☐	☐	☐	☐
Others	(x) Please specify:	☐	☐	☐	☐

For Individuals

(only applicable to respondents who answer this views collection form in their personal capacity)

		Very likely	Likely	Unlikely	Very Unlikely
Clothing / Wsaste Reduction	(i) Buy fewer clothes	☐	☐	☐	☐
	(ii) Buy products with minimal packaging	☐	☐	☐	☐
	(iii) Practise waste reduction at source and clean recycling	☐	☐	☐	☐
Eating	(iv) Avoid purchasing/ordering more food than needed	☐	☐	☐	☐
	(v) Buy local / neighbouring areas' food as far as practicable which consumes less energy arising from transportation	☐	☐	☐	☐
	(vi) Eat more vegetables and fruits and less meat	☐	☐	☐	☐
	(vii) Avoid buying plastic bottled drinks, etc. and bring your own bottle	☐	☐	☐	☐
Accommodation	(viii) Purchase energy-efficient electrical appliances (e.g. those with Grade 1 energy labels), such as inverter type air conditioners and LED light bulbs, etc.	☐	☐	☐	☐
	(ix) Use natural ventilation/fans instead of air conditioners as far as possible	☐	☐	☐	☐
	(x) Maintain air-conditioned average room temperature between 24 °C and 26 °C or above in summer	☐	☐	☐	☐
	(xi) Switch off power source to the electrical appliances that will not be in use to avoid energy consumption in standby mode	☐	☐	☐	☐
	(xii) Turn off the lights when not in use	☐	☐	☐	☐
	(xiii) Install a low-flow shower-head and take shorter showers	☐	☐	☐	☐
	(xiv) Wait until there is a full laundry load before using the washing machine	☐	☐	☐	☐
Commuting	(xv) Use public transportation as far as possible	☐	☐	☐	☐
	(xvi) Walk for short-distance commuting as far as possible	☐	☐	☐	☐
	(xvii) Minimise outbound travel via air and cruise trips. Enjoy our local / neighbouring areas' recreational facilities as far as possible, such as country parks, etc.	☐	☐	☐	☐
Review Progress	(xviii) Use Environment Bureau's Low-carbon Living Calculator from time to time to assess personal carbon footprint and identify room for carbon reduction	☐	☐	☐	☐
Others	(xix) Please specify:	☐	☐	☐	☐

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? (See P. 25-26 of the PE document)

New buildings:

_____

_____

_____

_____

_____

Existing buildings:

_____

_____

_____

_____

_____

Question 6 The Government has rolled out various measures to promote green buildings. (See Chapter 3 of the PE document) 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? (See P. 26, 45-46 of the PE document)

☐ There is a need (Please specify the policy instruments and incentives that should be implemented)
☐ No need

New buildings:

_____

_____

_____

_____

_____

Existing buildings:

_____

_____

_____

_____

_____

Question 7 What are your views on promoting the wider use of green and innovative transport technologies? (See P. 30-31 of the PE document)

_____

_____

_____

_____

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? (See P. 30-31 of the PE document)

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 practise low-carbon lifestyle? (See P. 22-24 of the PE document)

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? (See Chapter 3 of the PE document)

– END –

Thank you for your participation!

Contact Us

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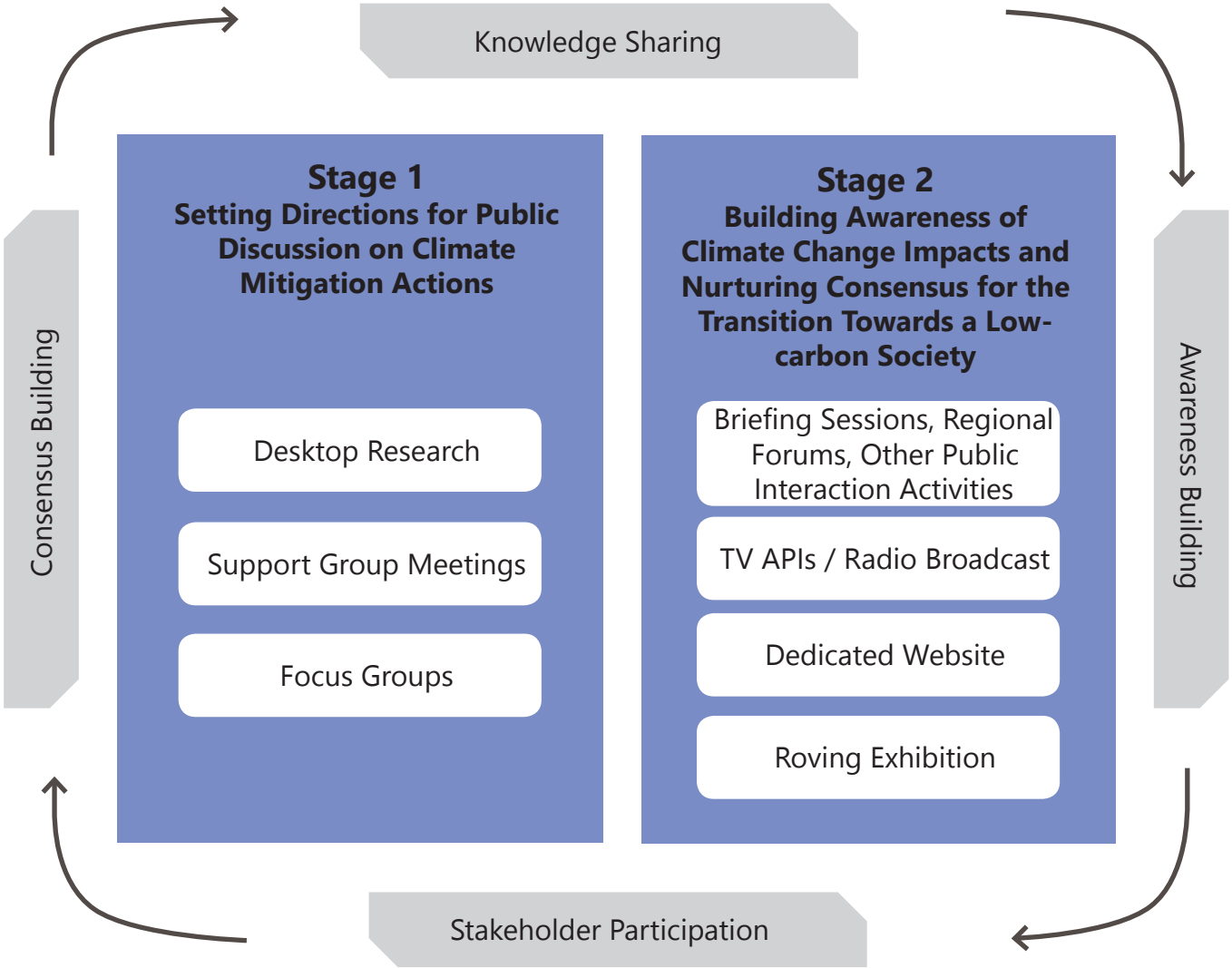
Annex 1: The Public Engagement Process

The public engagement (PE) adopts a bottom-up and stakeholder oriented approach based upon a two-stage framework: Stage 1 - Setting Directions for Public Discussion on Climate Mitigation Actions; and Stage 2 - Building Awareness of Climate Change Impacts and Nurturing Consensus for the Transition Towards a Low-carbon Society.

In Stage 1, a Support Group (SG) comprising experts from different fields was formed in May 2018 to provide advice to the Council for Sustainable Development (SDC) on a more definitive scope of the PE. Towards this end, the SG organised six Focus Groups from July to August 2018 with various stakeholders including professional organisations, academics, green groups, youth organisations, business organisations, transport operators, property management companies, representatives from District Councils and relevant government advisory bodies and committees, etc. The stakeholders were invited to give their initial views on the overall direction of the PE, with a view to outlining key issues for public discussion and suggesting ways to encourage public participation.

Based on the views collected from the focus groups and advice of the SG, the SDC has compiled this PE document to further engage the public and stakeholders in Stage 2. In this stage, the SDC, with the support of the Policy for Sustainability Lab of the Centre for Civil Society and Governance at The University of Hong Kong, will introduce this PE document to the wider community and organise a number of briefing sessions, regional forums and other public interaction activities to gauge the views of the community in formulating Hong Kong's long-term decarbonisation strategy. In order to reach out to the wider public, the public interaction activities will be promoted through the networks and connections of the Supporting Organisations (SOs) of this PE. At the same time, the SDC will publicise the PE through TV Announcements in the Public Interest (APIs), radio broadcast, promotional posters, dedicated website, and roving exhibitions at designated locations.



Annex 2: International Experience - Measures And Examples

Education and Public Awareness

32

In order to promote climate-aware behaviour, Berlin has put forward a broad spectrum of **education and communications strategies for the public and businesses:**

- A "**climate saving book**" is to promote energy efficiency and sufficiency. It contains tips about climate-friendly consumption and behaviour
- Measures aimed at changing everyday habits: Berliners could collect points for environment-friendly consumption using a **green bonus card** and then cash them in, e.g. when they repair defect products instead of disposing them or when they use climate-friendly modes of transport
- To launch pilot projects and initiatives, e.g. "**climate-neutral campus**"; turn climate neutrality into **mainstream concept** and through communication activities and campaigns aimed at groups, e.g. "Energy Efficiency Campaign for Berlin" targeted at the general public
- To **provide advice and expand the network of SMEs for climate-friendly innovations**; and establish **energy and climate protection fund** to support the industry

Enhancing Building Energy Efficiency

New York City (NYC) 33

In 2019, NYC passed the legislation to set **carbon emissions caps for large buildings from 2024.** The mandate would set increasingly stringent limits on carbon emissions for buildings over 25,000 ft^2 (2,322m^2), with the goal of achieving a 40% reduction in their emissions by 2030 and 80% by 2050.

To meet the target, it will require energy efficiency upgrades to the heating and air conditioning systems, windows and insulation, etc. of the buildings. **Owners of non-compliant buildings will be fined with the amount according to the size of the building and the levels that exceed the carbon caps**.

Tokyo 34

In 2010, Tokyo launched its **Cap-and-Trade Program**. It is the world's first urban Cap-and-Trade Program at the city level, requiring carbon reduction from large commercial and industrial buildings (i.e. CO_2 emitting facilities that consume energy in the amount of 1,500 kiloliters or more (crude oil equivalent) per year).

Building owners are required to meet the allotted reduction targets through **on-site energy efficiency measures** or **the emission trading scheme**. The total cap was set **at 6% below base-year emissions*** for the first compliance period (2010-2014). The cap for the second period (2015-2019) was **raised to 17% reduction below base-year emissions,** taking into account technological innovations, market efficiencies, and planning for long-term investments.

Note: *Average emissions of any 3 consecutive years from 2002-2007

Decarbonisation in the Energy Sector

Germany 35

In January 2019, the Germany government announced that it would **phase out coal-fired electricity generation by 2038**. The decision is subject to review in 2032.

By 2050, Berlin aims to reduce its carbon emissions by 85% compared with the level in 1990. In October 2017, Berlin was the first federal state of Germany to pass law which seeks to phase out the usage of coal, **putting an end to coal based electricity and heat generation by 2030.** To replace the coal-fired power stations as they are closed down, by building **decentralised gas-based Combined Heat and Power (CHP) plants** which will generate both electricity and district local heating.

Denmark 36

Denmark is a world leading country in wind energy production. In 2017, **nearly 44% of Denmark's electricity consumption was supplied by land and sea wind turbines.** Additional wind farms will contribute to further increases in Danish wind power production in the future.

On the other hand, the interconnections with a number of surrounding grids such as Norway, Sweden and Germany allow Denmark to **export excessive wind power when necessary**, and to import Norwegian hydropower, Swedish nuclear power and German solar power when the wind is still.

Decarbonisation in the Energy Sector

Seattle

In the United States, about 70% of the State of Washington's electricity is derived from renewable energy sources. [37] In 2017, hydroelectric dams supplied 91% of the energy demand in Seattle [38], the largest city in the State of Washington. Seattle City Light, a public energy utilities provider, provides about half of Seattle's electricity demand through the Skagit River Hydroelectric Project and the Boundary Dam. The remaining energy demand is filled by a mix of other renewable sources (notably wind) and nuclear, and the purchase of power on the wholesale market operated by the Federal Energy Administration. At present, the Federal Energy Administration sells power generated from government-operated hydroelectric dams and nuclear plants to public and private utilities companies located across the wider Pacific Northwest region (including the States of Idaho, Oregon and Washington etc.).

Promoting Green Transport

Norway [39]

In 2016, Norway announced its proposed **ban on fossil fuel cars**, planning to prohibit selling all petrol and diesel vehicles by 2025. The country introduced a **'polluter pays' tax system** that was designed to discourage the sales of new petrol or diesel cars and increase the number of EVs. The system posed extra charges for fossil fuel cars using toll roads and ferries depending on emission rates, whereas the services were free for zero or low emission cars.

Oslo, the Norwegian capital, planned to permanently ban all cars from its city center by 2019. To achieve this, Oslo will invest heavily in public transportation and replace 35 miles (about 56 km) of roads previously dominated by cars with bike lanes.

Seoul [40]

Car sharing service, based on the concept of 'co-drivership' and the notion of 'sharing economy', has experienced a rising boom in recent years. It differs from traditional car rentals in that the users can reserve a car over the Internet or through a smartphone app, and can then drive it for only the reserved period of time.

Car sharing can help us save resources and expenses incurred by owning a vehicle. Seoul **launched the Car Sharing Program (Nanum-Car) in 2013** as part of its transportation demand management policy. In an effort to encourage the use of eco-friendly cars, Seoul also initiated an electric car sharing service. Socar, the largest car-sharing service provider in South Korea, stated that the number of subscribers has reached over 3 million in 2017. It was estimated that one out of every 10 Koreans with a driving license is a Socar user.

Economic Opportunities and Financing Mechanisms

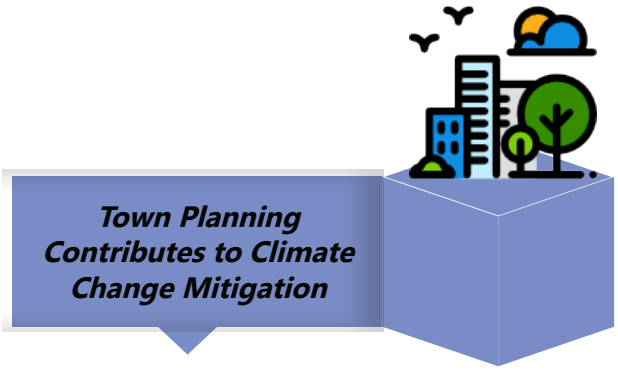
Scotland [41]

Transitioning to a low carbon economy can lead to significant economic growth while reducing the impacts of climate change. The Scottish Government formulated the **Low Carbon Economic Strategy** (LCES) as an integral part of the overall economic strategy to secure sustainable economic growth, and to meet Scotland's climate change targets and secure the transition to a low carbon economy. Key focus areas include **Business Environment and Overall Economy, Energy, Built Environment, Transport and Scotland's Resources.**

The United Kingdom (UK) [42]

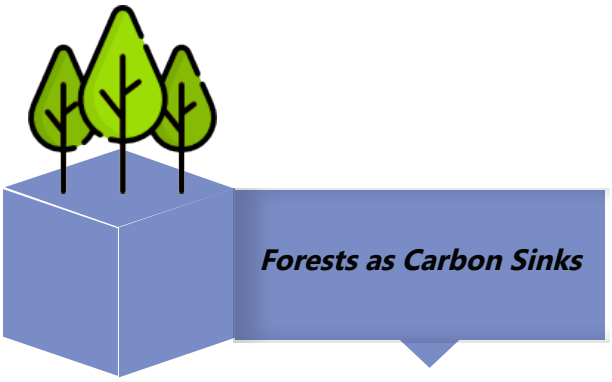
The UK has a world leading stock market. **80 green bonds** were listed on the London Stock Exchange, raising more than US$24 billion across seven currencies. In 2018, the UK government announced that it will fund a new Green Finance Institute (the Institute), together with the City of London Corporation, to champion sustainable finance in the UK and abroad. The Institute was one of the policy recommendations by the Green Finance Task Force to boost investment in the low carbon economy and set the UK economy on a path to deep decarbonisation. It aims to **bring together the UK's existing capabilities** and create new business opportunities, so that firms from all over the world can gain access to this **one-stop platform for linking up world-leading climate science and capital**.

Annex 3: Other Measures For The Transition Towards A Low-carbon Society



Town Planning Contributes to Climate Change Mitigation

The proposed spatial framework of "Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030", a planning study to update the territorial development strategy, comprises among others the creation of economic activities and employment nodes in new strategic growth areas to enhance the distribution of population and employment, create jobs for a range of skills, and bring jobs closer to home that could relieve traffic pressure while reducing vehicular carbon emissions, in order to achieve the goal of building a low-carbon city. We should consider bringing different types of job opportunities in areas with limited economic activities as a town planning strategy. [43]



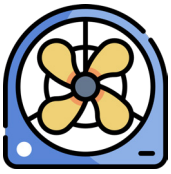
Forests as Carbon Sinks

Carbon sinks are natural systems that soak up and store CO_2 from the atmosphere. Forests are great examples. During photosynthesis, trees and plants sequester or absorb CO_2 from the atmosphere, using it as food for growth. The carbon from the CO_2 becomes part of the plant and is stored as wood, stems and leaves. Although forests do release some CO_2 in their natural succession, a healthy forest typically stores carbon at a greater rate than it releases carbon.

In Hong Kong, over 70% of the land is covered by vegetation, which acts as a major carbon sink for our city. The total GHG uptake by carbon sinks in Hong Kong in 2016 was 454,000 tonnes of CO_2e, which compares to about 1% of the total GHG emissions in Hong Kong.

Annex 4: Energy Saving Tips

10 Energy Saving Tips For Home [44]

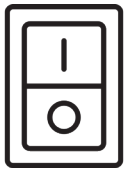


Use fans instead of air conditioners as far as possible.

Choose home appliances with "Grade 1" energy label.

Adopt inverter type air conditioners which can save up to 40% annual electricity consumption comparing with non-inverter type air conditioners in general.

Switch off power source of the electronic appliances that are not in use to avoid leaving them in standby mode.



Turn off the lights when not in use.

Check door seals to make sure they are airtight. Avoid opening the refrigerator door too frequently.

Fully load the washing machine – a half load of clothes uses about the same amount of energy as full load.

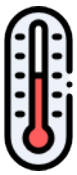
Replace incandescent bulbs with more efficient LED light bulbs.

Take showers instead of baths uses 50% less hot water and energy.

Choose fan-forced electric ovens which can save more energy over conventional electric ovens.

10 Energy Saving Tips for Office [45]

Turn off lights if there is sufficient natural daylight.



Set and maintain air-conditioned average room temperature between 24 °C and 26 °C or above in summer.

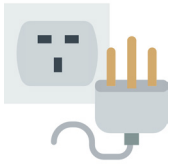
Procure energy efficient office equipment.

Switch off power source of the office equipment that are not in use. Avoid leaving them in standby mode.

Reduce the brightness level of the screen to the lowest comfortable level.

Install occupancy/ motion sensors to automatically switch on and off the air-conditioning and lighting in areas infrequently used.

Dress light to minimise the use of air conditioning.



Unplug all equipment chargers and adapters when they are not in use.

Carry out regular maintenance on office equipment for optimal energy efficiency performance.

Arrange the last-person-out to check and switch off the power source to all air conditioning, lighting and office equipment that are not in use.

Annex 5: What Are We Doing To Promote Energy Saving And Efficiency?

Law and Regulations

- The Government will progressively tighten the **statutory energy efficiency standards** in buildings, and review the Building Energy Code (BEC) every three years. The latest standards (the 2018 BEC) will be fully effective in August 2019 and bring about 18% improvement when compared with the 2012 edition.

Labelling Schemes

- In May 2018, legislative amendments were passed to introduce the third phase of the **Mandatory Energy Efficiency Labelling Scheme** (MEELS). Starting on 1 June 2018, more types of domestic electrical products have been included in the MEELS. With a 18-month grace period, the third phase of MEELs will be fully implemented from December 2019.

Tax Concessions

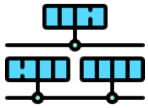
- Further **acceleration of tax deduction** for renewable energy and energy-efficient building installations from five years to one year.

Funding

- Under the respective post-2018 Scheme of Control Agreements signed between the Government and the two power companies, the amount of the existing **energy efficiency funds** of the power companies has been increased to support energy saving and retro-commissioning projects, including implementing smart/IT technologies in buildings. New funds have been established to support the replacement or upgrading of electrical appliances to more energy efficient models. Power companies will also conduct free energy audits for non-residential premises to identify potential energy saving opportunities.

Technology Advancement and Innovation

- EMSD promotes different energy-saving measures and technologies to the industry, such as **retro-commissioning and smart energy-saving** devices.
- EMSD launched the online platform E&M InnoPortal to promote energy efficiency and conservation as well as renewable energy through innovation and technology (I&T). The platform matches the I&T wishes of the Government, public bodies and the trades with solutions offered by start-ups and academic institutes. EMSD also provides Government premises to field-test matched solutions.
- The two power companies will launch a 7-year programme to replace their electromechanical meters with smart meters and backend facilities by 2025. Smart meters will help achieve energy saving by providing customers with power consumption information, which help induce behavioural change to save energy.



District Cooling Systems

- The Government is implementing by phases a district cooling system (DCS) at the Kai Tak Development. It will also study the provision of DCS in new development areas such as the Tung Chung New Town Extension.

Passive Energy Saving Building Designs

- The Buildings (Energy Efficiency) Regulation requires commercial and hotel buildings to meet the **Overall Thermal Transfer Value ("OTTV") standards** to reduce energy consumption for air-conditioning. The Government further promulgated a **new Residential Thermal Transfer Value ("RTTV") standard** for residential buildings which took effect in April 2015. The OTTV standard and the RTTV standard are subject to regular reviews and the former will be reviewed twice before end 2025.

Energy and Carbon Audits

- EMSD completed energy audits on about **340 major government buildings** in 2016 and 2017 to identify energy management opportunities.
- Starting from April 2017, bureaux and departments are required to start conducting **regular carbon audits on major government buildings** with a view to exploring room for carbon reduction and to disclose their carbon emissions information.

HKGBC 香港綠色建築議會

Green Building Certification

- A new BEAM Plus rating with the option of selective assessment in addition to comprehensive assessment has been developed for existing buildings to encourage building owners to consider applying for BEAM Plus Existing Building certification when retrofitting and/or managing buildings. The Government has committed that all new government buildings of construction floor area above 5,000 m^2 with central air-conditioning, or above 10,000 m^2, should aim to obtain the second highest grade **(i.e. "Gold" rating) or above** under BEAM Plus.
- The Chief Executive's 2018 Policy Address also encourages bureaux and departments to apply for green building certification for buildings under their management to demonstrate the Government's commitment to low-carbon growth.

Publicity and Education

- ENB and EMSD have organised the "Energy Saving for All" Campaign to encourage energy saving in the business sector, non-governmental organisations, as well as schools and tertiary education institutions. A dedicated website (www.energysaving.gov.hk) has been set up to promote energy saving by providing information such as energy saving tips.
- EMSD has also organised an Energy Saving Charter in which signatories pledge to practise energy saving measures such as switching off electrical appliances when not in use; and a 4T Charter under which participants pledge to set an energy saving target with a timeline, ensure transparency to track the result, and encourage people to work together on the target. The Government has also launched a dialogue platform with major stakeholders in the built environment to encourage them to set energy saving target and timeline for their building stocks.

Annex 6: Estimated Carbon Emissions Reductions Upon Implementation Of All Energy Saving Measures

Estimated total annual reduction in carbon emissions arising from all energy saving measures is about 1.7 million tonnes, equivalent to about 4% of Hong Kong's total annual carbon emissions in 2016.

	Emissions reduced annually (tonnes)
About 750 new buildings and 7,000 major retrofitting works in existing buildings have complied with the statutory energy efficiency standards since 2012.	= 1,050,000
The three phases of Mandatory Energy Efficiency Labelling Scheme cover eight types of domestic electrical products which together account for about 70% of the annual electricity consumption in the residential sector.	= 437,500
Government buildings have achieved an overall electricity saving of about 4.9% since 2015 and on track to achieve the 5% target.	= 50,000
Relevant departments will carry out energy saving measures, etc. in Government infrastructure to achieve the aggregate 4% electricity consumption saving target by 2019-20.	= 30,000
The latest (2018) edition of Building Energy Code achieves a further energy saving of about 18% compared with the 2012 edition.	= 17,000
The three phases of District Cooling System at the Kai Tak Development upon completion by 2025 will result in an estimated energy saving of 85 million kWh a year.	= 60,000
The new proposed District Cooling System at the Kai Tak Development upon completion will result in an estimated energy saving of 53 million kWh a year.	= 37,000

Annex 7: More About The Electricity Generating Sector

Energy Policy Objectives 46

In considering our long-term fuel mix, we should take into account our four key policy objectives to ensure that the energy needs of the community are met **safely, reliably and at reasonable prices** as well as to **minimize the environmental impact** of energy production and use.

Reliability

We have higher proportion of high rise buildings than anywhere else in the world with more than 50% of Hong Kongers live or work above the 15th floor. We also have more than 5 million passenger trips a day on electric transit services. Our road network, airport or even elevators in our buildings could not function without electricity; nor could water supply, which is dependent upon electricity to power its pumps.

Hong Kong has been enjoying a world-class standard of supply reliability with the average unplanned interruption of less than three minutes a year.

Safety

The two power companies have been maintaining a high safety record in the whole electricity supply chain.

Apart from the safe operation of local generation facilities, Hong Kong has been importing nuclear power safely from Daya Bay for the last 25 years with a proven track record.

Affordability

Our electricity tariff is lower than that of many major cities in the world.

Households in Hong Kong on average spent less than 2% of their total expenditure on electricity bill.

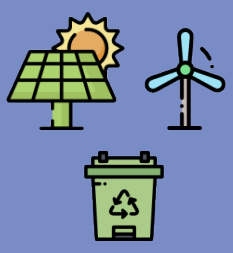
Environmental Performance

The Government has not allowed the power companies to build new coal-fired power plants since 1997.

The two power companies have met the increasingly stringent emissions caps set by the Government. It is also anticipated that carbon emissions will peak before 2020 with our phasing down of coal-fired electricity generation.

Getting To Know More About Our Fuel Types [47]

Note: The assessment of different fuel types is based on existing technology.

Fuel Types	Reliability	Environmental Performance	Cost	Availability
Coal 	High Can be stored on site and quick response to meet demand changes	Poor High carbon and other air pollutant emissions	Low	Adequate supply
Natural Gas 	High Quick response to meet demand changes	Medium Outperforms coal in carbon and other air pollutant emission performance but still generates carbon emissions and cannot help meet higher carbon reduction target	High and volatile	Adequate supply
Nuclear 	High Enable large scale steady base-load electricity	Good Zero carbon and will not produce other air pollutant emissions, but need to handle nuclear waste	Medium	Available regionally
Renewable Energy 	Low Most renewable energy is intermittent in nature and requires supports from other stable fuel sources (e.g. fossil fuel or nuclear)	Good Low carbon and generate low level of air pollutant emissions	High The current cost of RE generation is comparatively high and requires additional cost for back up support from other fuel sources	Available regionally to a certain extent. Relatively limited local availability

Public sector taking the lead

- $2 billion earmarked for installation of small-scale renewable energy systems in government buildings, venues and community facilities.
- Large scale renewable energy projects adopted such as constructing waste-to-energy facilities and exploring the installation of floating PV systems at suitable reservoirs and PV panels at suitable landfills.

Facilitate the private sector to adopt renewable energy

- Feed-in Tariff (FiT) Scheme introduced to provide incentives for the non-governmental sector to invest in renewable energy.
- Buildings-related requirements in relation to the installation of PV systems relaxed.
- New programme "Solar Harvest" to be introduced to provide technical and financial support to schools and NGOs for installation of small-scale renewable energy systems.
- Tax incentive provided so that the capital expenditure on renewable energy installations may be fully deducted in the first year of purchase.
- Legislative amendments pursued to provide for exemption from the requirements of business registration and profits tax in respect of participation in the FiT Scheme.

- Apart from the performance of different fuel types, the way we import electricity also affects the reliability of power supplies for Hong Kong.
- At present, CLP imports power from the **Guangzhou Pumped Storage Power Station** through the **non-dedicated Guangdong transmission system** and from **the Daya Bay Nuclear Power Station** (DBNPS) through **dedicated transmission lines** with decoupling arrangement in place.
- Both transmission systems have been reliable in the past but the dedicated transmission lines with **decoupling arrangement offers additional reliability**. The DBNPS is directly connected so its output can be directly delivered to the CLP's system. In case the Guangdong grid becomes unstable, CLP can implement a decoupling arrangement to disconnect its power system from the Mainland to avoid being affected. Moreover, when CLP's system is disconnected from the Guangdong grid, the generating units at the DBNPS can be retained in CLP's system through the dedicated lines to maintain the supply of electricity from the DBNPS to Hong Kong.

Planning Of Power Systems

- The electricity demand of a power system varies from time to time depending on the overall electricity usage pattern of consumers. Usually on hot and humid summer days, demand reaches peak level, normally termed "maximum demand".
- **Power companies need to have sufficient capacity to produce the energy customers want to use at all times, whenever they want to use it.** The capacity is from firm capacity, which can be readily dispatched to deliver electricity on demand.
- Local coal and gas generations provide firm capacity but burning coal and gas generates carbon emissions. Different types of zero carbon energy provide different levels of firm capacity – our present imported nuclear power supply provides firm capacity while for renewable energy, apart from waste to energy, many other sources such as solar and wind are intermittent and the available energy at any one time is unpredictable (e.g. cloud cover or wind speed varies from minute to minute). In other words, it is uncertain whether enough renewable energy would be available to meet customer demand at all times. Therefore, to ensure high level of supply reliability, we cannot solely rely on renewable energy in meeting our demand. A twin-track strategy needs to be adopted, which is to import much more renewable energy at times when good supplies are available but switch to local gas generation and use other firm and decoupleable zero carbon energy sources when renewable energy supplies are limited or reduced, so as to maintain Hong Kong's world-class reliability.

Annex 8: List Of Organisations Supporting This Public Engagement Exercise

Public Bodies

- Airport Authority Hong Kong
- Consumer Council
- Hong Kong Housing Authority
- Hong Kong Housing Society
- Hong Kong Productivity Council
- Urban Renewal Authority

Universities, Tertiary Institutions and Education Sector

- Chu Hai College of Higher Education
- City University of Hong Kong
- Hong Kong Baptist University
- Hong Kong Shue Yan University
- Lingnan University
- The Chinese University of Hong Kong
- The Education University of Hong Kong
- The Hang Seng University of Hong Kong
- The Hong Kong Academy for Performing Arts
- The Hong Kong Polytechnic University
- The Hong Kong University of Science & Technology
- The Open University of Hong Kong
- The University of Hong Kong
- Vocational Training Council

Research Institutions/Think Tanks

- Centre of Architectural Research for Education, Elderly, Environment and Excellence Limited (CARE)
- Civic Exchange

Vehicles-related Organisations

- Environmental Vehicle Repairers Association
- Federation of Automobile Services Industry Hong Kong
- H.K.L.H.D. Motors Association Limited
- Hong Kong Automobile Association
- Hong Kong E-Vehicles Business General Association Limited
- Hong Kong Taxi & PLB Association
- Public Omnibus Operators Association
- Right Hand Drive Motors Association (Hong Kong) Limited
- The Motor Traders Association of Hong Kong

Professional Organisations

- Asian Institute of Intelligent Buildings
- BEAM Society
- Building Services Operation and Maintenance Executives Society
- Canadian Society for Civil Engineering Hong Kong Branch
- Chartered Institute of Housing Asian Pacific Branch
- Engineers Australia Hong Kong Chapter
- Environmental Management Association of Hong Kong
- Hong Kong Association of Energy Engineers
- Hong Kong Environmental Industry Association
- Hong Kong Green Building Council
- Hong Kong Institute of Qualified Environmental Professionals
- Hong Kong Institute of Urban Design
- International Facility Management Association Hong Kong Chapter
- Professional Building Surveying Consultants Association of Hong Kong
- Professional Green Building Council
- The Association of Consulting Engineers of Hong Kong
- The Chartered Institute of Building (Hong Kong)
- The Chartered Institute of Logistics and Transport in Hong Kong
- The Chartered Institution of Building Services Engineers Hong Kong Branch
- The Chartered Institution of Water and Environmental Management Hong Kong
- The Energy Institute Hong Kong (Branch)
- The Hong Kong Association of Property Management Companies
- The Hong Kong Institute of Facility Management
- The Hong Kong Institute of Housing
- The Hong Kong Institute of Landscape Architects
- The Hong Kong Institute of Planners
- The Hong Kong Institute of Surveyors
- The Hong Kong Institution of Engineers
- The Society of Operations Engineers, Hong Kong Region

Business-related Organisations

- Federation of Hong Kong Industries
- Hong Kong Construction Association
- Hong Kong Hotels Association
- Junior Chamber International Hong Kong
- New Territories General Chamber of Commerce
- New Zealand Chamber of Commerce in Hong Kong
- The American Chamber of Commerce in Hong Kong
- The British Chamber of Commerce in Hong Kong
- The Chinese General Chamber of Commerce
- The Chinese Manufacturers' Association of Hong Kong
- The French Chamber of Commerce & Industry in Hong Kong
- The Hong Kong General Chamber of Commerce
- The Hong Kong General Chamber of Small and Medium Business
- The Real Estate Developers Association of Hong Kong

Non-governmental Organisations/
School Sponsoring Bodies

- Caritas Hong Kong
- Chinese Young Men's Christian Association of Hong Kong
- Christian Family Service Centre
- English Schools Foundation
- Hong Chi Association
- Hong Kong Christian Council
- Hong Kong Federation of Women
- Hong Kong Sheng Kung Hui
- Hong Kong Women Development Association Limited
- Hong Kong Women Workers' Association
- Hong Kong Young Women's Christian Association
- New Life Psychiatric Rehabilitation Association
- School of Everyday Life
- Soap Cycling
- St James' Settlement
- The Boys' Brigade, Hong Kong
- The Chinese Muslim Cultural and Fraternal Association
- The Confucian Academy
- The Hong Kong Buddhist Association
- The Hong Kong Council of Social Service
- The Hong Kong Federation of Youth Groups
- The Hong Kong Girl Guides Association
- The Hong Kong Jockey Club
- The Hong Kong Taoist Association
- The Salvation Army
- Tung Wah Group of Hospitals
- Women Service Association
- Yan Chai Hospital
- Yan Oi Tong
- Young Men's Christian Association of Hong Kong

Concern Groups

- 350HK
- Business Environment Council
- C40 Cities Climate Leadership Group, China Representative Office
- CarbonCare InnoLab
- Environmental Association
- Friends of the Earth (HK)
- Green Council
- Green Power
- Green Sense
- Greeners Action
- Hong Kong Bird Watching Society
- Hong Kong Green Strategy Alliance
- Kadoorie Farm & Botanic Garden
- Smart City Consortium
- Sustainable Development Solutions Network Hong Kong
- The Conservancy Association
- The Green Earth
- The Jane Goodall Institute Hong Kong
- The Jockey Club Museum of Climate Change
- V'air Hong Kong
- World Green Organisation
- World Wide Fund for Nature Hong Kong

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Annex B

Long-term Decarbonisation Strategy

Public Engagement

可持續發展委員會
Council for Sustainable Development

JUNE 2019

Impacts Of Climate Change

More very hot days and hot nights

Increase in annual number of heavy rain days

Fewer rain days but average rainfall intensity increases

Rise in sea level

Increase in storm surge threat

Decarbonisation Target And The Paris Agreement

Hong Kong's Decarbonisation Target

2030

Absolute Carbon Emissions Reduction target

26-36%
(using 2005 as base year)

2050

?

Hong Kong has to formulate the long-term decarbonisation strategy up to 2050 by 2020

The Paris Agreement

Well below 2°C above pre-industrial levels

2050

The world needs to reduce absolute carbon emissions by

40-70%
(using 2010 as base year)

2100

Achieve net zero emissions of carbon dioxide and other greenhouse gases before 2100

How To Transition Towards A Low-carbon Society?

Low-carbon Living

Be A Big Waster Or Hanson?

Come and calculate your carbon emissions!

How To Promote Energy Saving And Enhance Efficiency?

Electricity Consumption In Hong Kong

67% of carbon emissions come from electricity generation

~90% of electricity is consumed by buildings

Energy Saving

Individuals

Households

Workplaces and Leisure Points

Enhancing Energy Efficiency

- Green Buildings
- Labelling Schemes
- Technology Advancement
- Publicity and Education
- District Cooling Systems

How To Use More Zero Carbon Energy For Electricity Generation?

Improving Fuel Mix For Electricity Generation

2020 → 2030

	2020	2030
Coal	~25%	Continue to phase down
Natural Gas	~50%	Continue to increase
Non-fossil fuels, including imported nuclear and renewable energy	~25%	Continue to increase

2050 ?

Key Considerations:

- Reliability
- Security and Availability
- Affordability
- Environmental Performance and Response to Climate Change

How To Promote Low-carbon Transport?

Low-carbon Commuting

Develop public transport
Manage the fleet size of private cars

Review the scope of the Pilot Green Transport Fund

Promote walkability
Foster a "bicycle-friendly" environment

Promote the adoption of new energy vehicles

Your Views Matter

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