Environment Bureau, HKSAR Government

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I Love Hong Kong
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Hong Kong's Climate Change Strategy and Action Agenda

Consultation Document


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Climate change brings about more severe weather and poses an unprecedented challenge for us. Scientists told us that if we make concerted and imminent mitigation efforts, we could avert the impact at lower cost.

Being part of the international community, we should contribute to the solution. In the 2008/09 Policy Address, the Chief Executive announced that the Government will make early preparations to meet the challenge of climate change. In particular, we will enhance energy efficiency which will not only reduce energy usage, but also save on energy bills. At the same time, using clean fuels and relying less on fossil fuels also help reduce our carbon footprint. Across the world, promoting low carbon economy – an economy based on low energy consumption and low pollution – has emerged as a new driver of economic growth.

The Environmental Protection Department commissioned a consultancy study in 2008 to review and update the local inventories of greenhouse gas emissions and removals; assess the impacts of climate change in Hong Kong; and recommend long-term strategies and measures to reduce greenhouse gas emissions as well as to adapt to the unavoidable effects of climate change. The Consultants have carried out a series of topical studies and taken into account views of major stakeholders expressed at technical workshops.

This consultation paper presents the proposals drawn up from the consultancy study. We would like to seek comments from the people of Hong Kong on our city's climate change strategy and action agenda for the coming decade, including our proposal on a carbon intensity reduction target for Hong Kong by 2020. The delivery of the target requires joint efforts of the community. I look forward to your input and support as we chart the way forward for Hong Kong as a low carbon city.

Edward Yau
Secretary for the Environment
September 2010

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SECTION I – **OUR VISION**

1.1 Climate change poses an unprecedented, global challenge for everyone. For a more sustainable future, there is an urgent call for immediate, community-wide action to reduce greenhouse gas (GHG) emissions and combat climate change. Being part of the international community, we should contribute to the solution.

1.2 In this consultation paper, we are proposing a specific target for reducing Hong Kong's carbon intensity and charting the way for going low-carbon, with a clear vision to –

- promoting a low carbon living;
- tapping the potential of developing a low carbon economy; and
- positioning Hong Kong, in the context of the Pearl River Delta, as the greenest region of China.

1.3 Deep in these social, economic and environmental aspirations is a firm belief that our society would grow and prosper in a sustainable manner for the benefit of this and many more coming generations. Let us join hands in pursuit of this vision.

"Bluer skies, greener mountains, cleaner waters, and fresher air together create finer sketches!"

– LAU Kin-gi (*a young artist*)

Low Carbon Living

1.4 Low carbon living is a simple concept, but we must all make conscious efforts in order to put it into practice. Here, we are calling for a change in value and culture, as well as actions from every member of the community. If we can all look beyond immediate convenience and comfort and adjust our lifestyle, the world will be a lot more beautiful for the future generations.

Low Carbon Economy

1.5 Low carbon way of living is not about forgoing economic growth. Instead it opens up a new window of green business opportunities. Green technologies and products such as renewable energy, electric vehicles (EVs) as well as energy efficient and green consumer products have emerged in large numbers in the market in recent years. Around the world, major economies are competing on new energies, EVs and energy efficiency solutions. Such trend foretells a paradigm shift that would reshape the way industrial, commercial and financial markets work. It is also about powering our economy with low carbon energy and using less to achieve more.

1.6 For business operators, emissions-cutting measures such as better building insulation, more efficient lighting, etc. pay for themselves over time through lower energy bills. Prospering in the new low carbon economy is essentially making economic sense of the challenge of climate change. Not only will it enhance competitive edge of businesses, it also points to a new direction for future economic development that no one could afford to ignore.

"Amplify your proactive attitude towards positivism and green. Think, act and live this way and our world will be healed one day."

– Ronald LO
(founder of a chic green enterprise)

Low-carbon Regional Development

1.7 Hong Kong is part of the Pearl River Delta (PRD), an economically affluent area which aspires to become the greenest region in China. The Framework Agreement on Hong Kong/Guangdong Co-operation signed in April 2010 provides a firm basis for building a Green PRD Quality Living Area with cleaner air, less pollution and a lower carbon environment. This is not just a bilateral agreement between two places, but the concept of a Green PRD is expected to find a home in the national plan.

1.8 Environmental problems go beyond geographical boundaries. Increasingly, people recognise the importance of regional collaboration in tackling environment-related issues, such as climate change. Hong Kong and the Mainland have become more closely integrated in the last decade. By going green, we would help maintain our competitiveness as an international city in the Region.

"In order for our next generation to have a clean environment, we have to alter throw-away lifestyle and start to lead a simple way of life closer to the nature."

– YIP Chung-sing
(teacher of a primary school that adopts a sharing nature philosophy)

Government Commitment

1.9 In the 2008/09 Policy Address, the Chief Executive announced that the Government would make early preparations to meet the challenge of climate change. In particular, we will enhance energy efficiency, use clean fuels, rely less on fossil fuels, and promote a low carbon economy – an economy based on low energy consumption and low pollution. Subsequently, the Government has rolled out a series of initiatives to pursue this policy goal, such as introducing the Building Energy Efficiency Funding Scheme and promoting electric vehicles (EVs).

1.10 To strengthen co-ordination of efforts in tackling climate change within the Government, an Inter-departmental Working Group on Climate Change (IWGCC) led by the Environment Bureau was set up in 2007, comprising representatives from five bureaux and 16 departments. Annex 1 sets out the terms of reference and membership of the IWGCC.

1.11 At the same time, the Government commissioned a consultancy study to assess the impacts of climate change on Hong Kong; review and update the local inventories of GHG emissions; and recommend long-term strategies and measures to reduce GHG emissions as well as to adapt to the unavoidable effects of climate change. The Consultants have now largely completed the study analysis and outlined comprehensive proposals for mitigating GHG emissions and adapting to climate change.

Public Consultation

1.12 This consultation paper sets out the major findings of the consultancy study and invite comments from members of the public on Hong Kong's climate change strategy and action agenda for the next decade. In particular, we would like to receive feedback on the following proposals –

- setting for Hong Kong a target to reduce carbon intensity by 50-60 % by 2020 when compared with 2005;

- taking forward an action agenda to further reduce local GHG emissions through various means, including community-wide participation in enhancing energy efficiency and wider use of clean, low carbon fuels for electricity generation in order to achieve the proposed target; and

- setting the broad direction for adaptation measures for major sectors identified to be more vulnerable to climate change.

"Gold lined clouds, scudding across the blue sky, birds singing with flowers in sweet fragrance, restful surroundings and mild weather – everyone of us enjoys such a pleasant environment. We need to make this sustainable, for the benefit of our next generation. Let's cherish natural resources, protect the natural environment and take steps to change our lifestyle."

– Eddie CHAN Wing-lai

(IT professional who leads a low-carbon life in a self-designed village house)

SECTION II – **ABOUT CLIMATE CHANGE**

Causes of Climate Change

2.1 In 2008, the global atmospheric concentrations of CO_2 have reached 385 parts per million (ppm), which far exceed pre-industrial levels of about 280 ppm.

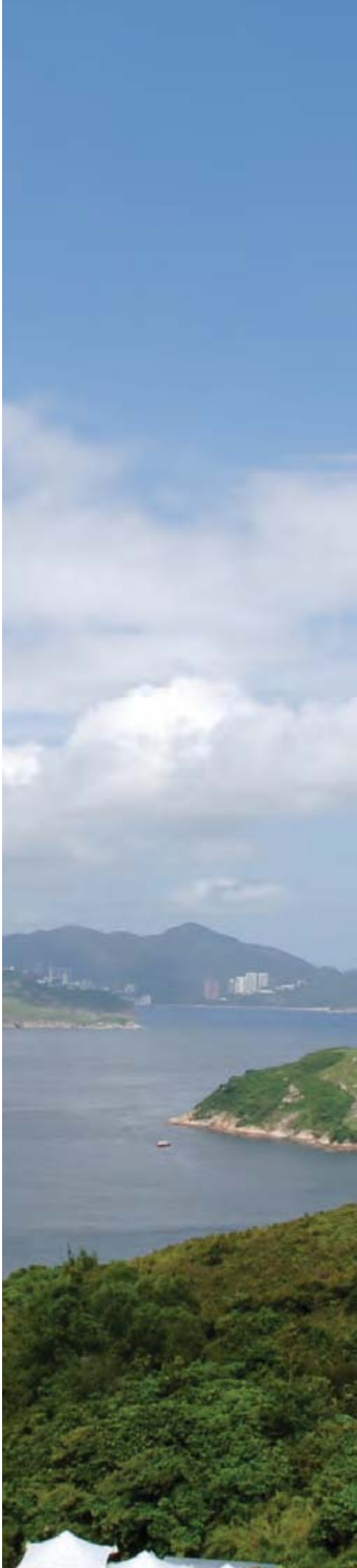
2.2 The United Nations' Intergovernmental Panel on Climate Change (IPCC) has confirmed that the global increases in GHG concentration are primarily due to human activities, e.g. use of fossil fuels and change in land use. The burning of ever-greater quantities of fuel oil, gasoline, and coal, the logging of forests, and the practice of intensive farming methods during the past 150 years have increased the amount of GHGs emitted into the atmosphere. GHGs affect the absorption, scattering and emission of radiation within the atmosphere and at the Earth's surface and, in increasing quantities, they are raising the global temperature to artificially high levels and altering the natural climate cycle.

Global Impacts of Climate Change

2.3 The topic of climate change has received unprecedented attention internationally in recent years. Rises in global average temperature accelerate the melting of glaciers in the Arctic and Antarctica and trigger a chain of climatic changes. The impact of climate change is felt in every continent and by everybody. The most noticeable impact is the occurrence of extreme weather conditions, from hotter and colder days and nights to more serious and destructive inclement incidents. But the reach of climate change goes far beyond just extreme weather conditions. Longer term, it has a bearing on issues such as food security, the resilience of our ecosystems and, in fact, the sustainability of human development.

What is Greenhouse Gas?

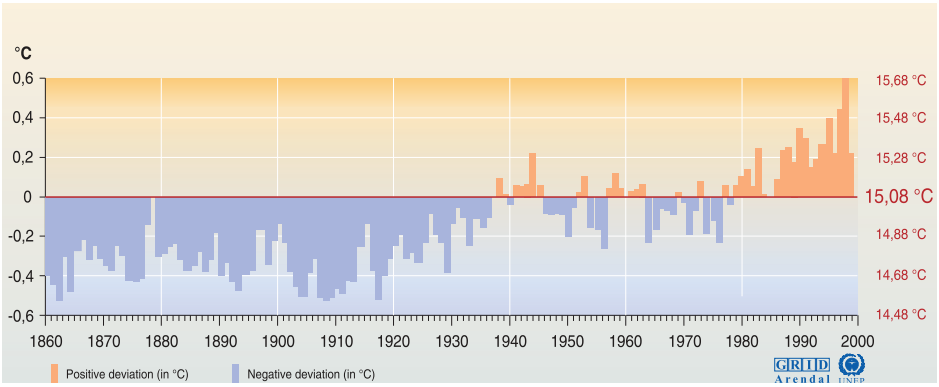
Greenhouse Gas (GHG) is widely recognized as the primary cause of climate change. By broad categorization, there are 6 types of GHG of concern, namely carbon dioxide (CO_2), methane, nitrous oxide, and three types of synthetic gases produced during certain industrial processes. Overall speaking, carbon dioxide accounts for a substantial share of total GHG emissions. For the sake of simplicity in measuring GHG emissions, other GHGs may be expressed in terms of carbon dioxide equivalent (CO_2-e).



Global Warming

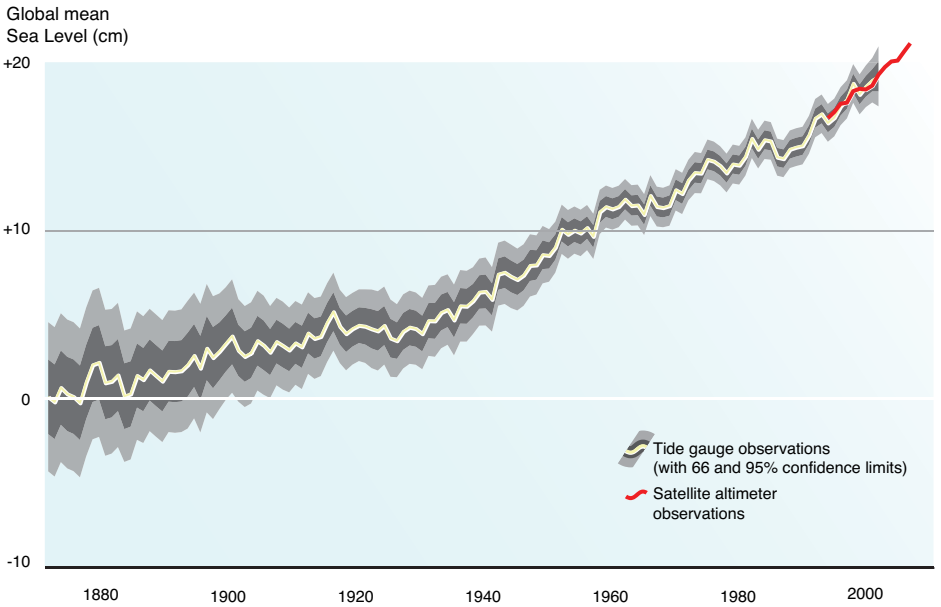
2.4 According to the IPCC, during the period 1906 to 2005, the global average temperatures have risen by 0.74 °C. For the period 1995 to 2006, 11 of the 12 years in this period were amongst the 12 warmest years on record since 1850. Average Arctic temperatures have increased at almost twice the global average rate in the past hundred years. Observations made since 1961 show that the average temperature of the global ocean has increased. There have been observed decreases in the snow and ice extent, as well as increases in sea level which are consistent with warming.

Figure : 1 Increasing trend in average global surface temperature



Source: UNEP/GRID-Arendal
Cartographer / Designer: Philippe Rekacewicz, UNEP/GRID-Arendal

Figure 2 : Rising trend in average sea level



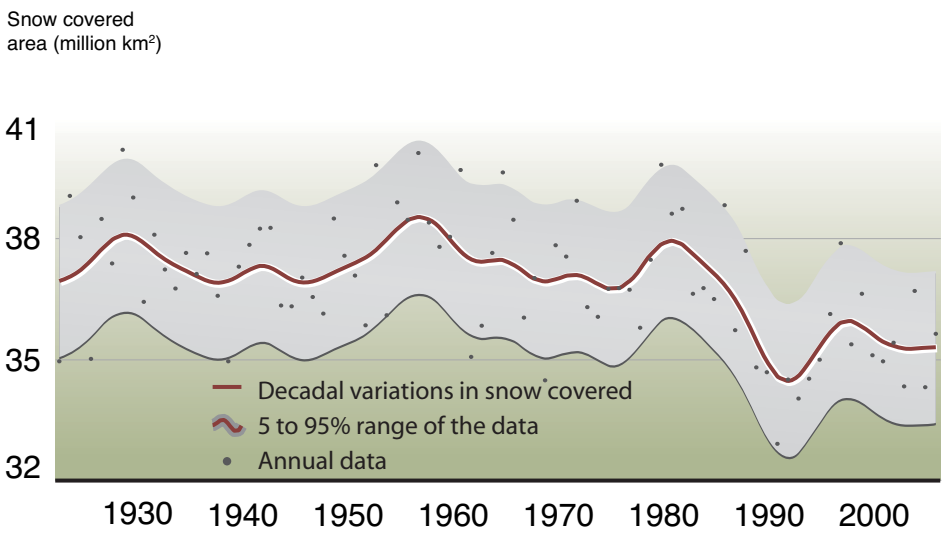
Source: UNEP/GRID-Arendal
Cartographer / Designer: Hugo Ahlenius, UNEP/GRID-Arendal

2.5 Continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system in the current century. Some of these changes would very likely be larger than those observed during the 20th century. Depending on the level of GHG to be emitted, climatologists predict increases in global temperature during this century in a range from 2 to 6°C. For the next two decades, it is projected that each decade would be 0.2 °C warmer than the previous one.

More Severe Weather

2.6 At the low end of these possibilities, there will be more severe weather, and it is very likely that hot extremes, heat waves and heavy precipitation events will become more frequent. Extra-tropical storm tracks are projected to move poleward, with consequent changes in wind, precipitation and temperature patterns. Disturbance associated with climate change includes flooding and droughts in various locations, wildfires, insects, ocean acidification, permanent and irreversible partial or total loss of numerous natural habitats; and corresponding impact on species, etc.

Figure 3 : Decreasing trend in Northern Hemisphere Snow Cover



Source: UNEP/GRID-Arendal
Cartographer / Designer: Hugo Ahlenius, UNEP/GRID-Arendal

Impacts on Hong Kong

2.7 Hong Kong Observatory began making systematic observations of climatic variables more than 120 years ago. There are observable changes in many weather patterns which correspond to the changes experienced by many global climatic systems observed over the same period. Table 1 summarises some of the major observed climatic changes in Hong Kong.

Table 1 : Observed Climate Changes in Hong Kong from the last century to 2009

Climatic Variables	Observed Change per Decade
Annual mean temperature	Increasing by 0.12 °C (1885 – 2009)
Mean diurnal range	Decreasing by 0.24 °C (1947 -2009)
Hot nights (minimum temperature ≥28 °C) in Jun-Aug	Increasing by 3.5 nights (1947 – 2009)
Cold days (minimum temperature ≤ 12 °C) in Dec-Feb	Decreasing by 2.3 days (1948 – 2009)
Annual rainfall	Increasing by 51 mm (1947 – 2009)
Thunderstorm days	Increasing by 1.8 days (1947 – 2009)
Heavy rain days (hourly rainfall > 30 mm)	Increasing by 0.4 days (1947 – 2009)
Mean sea level (Victoria Harbour)	Rising by 26 mm (1954 – 2009)

Source: Hong Kong Observatory

2.8 The rising trend in temperature in Hong Kong is likely to continue in the future. The number of very hot days is projected to increase for the rest of the 21st century, and conversely the number of cold days is going to fall dramatically. Table 2 summarises the key impacts of projected future climate change.

Table 2 : Some of the Climatic Factors Projected for Hong Kong by end 21st Century

	Current Conditions (1971 – 2000)	Impact (2090 – 2099)
Decadal mean annual temperature (°C)	23.1	24.5 - 32.3
Hot nights (i.e. minimum temperature of 28 °C or above) in Jun-Aug	12.2	22.0 – 68.7
Very hot days (i.e. maximum temperature of 33 °C or above) in Jun-Aug	8.2	9.6 – 23.5
Cold days (i.e. minimum temperature of 12 °C or below) in Dec-Feb	16.3	<1

Source: Hong Kong Observatory
Note: Projected figures may be fine-tuned as scientific data and information are updated

2.9 In addition, there is likely to be greater variability in rainfall patterns with a higher frequency of extreme conditions, i.e., extremely wet years and extremely dry years are expected to become more frequent for the rest of the 21st century. The number of heavy rain days is likely to increase. It is expected that the mean sea level rise in the South China Sea, including Hong Kong waters, would increase to tally with the global average in the late 21st century.

2.10 In order to slow down the climate change impacts projected above, it is necessary to take immediate and co-ordinated mitigation actions at all levels of government, private and public organizations, as well as communities in the developed and developing economies to control GHG emissions. The proposed strategy and action agenda for Hong Kong is detailed in Part 1 of Section V.

2.11 The sectors or areas of Hong Kong that are likely to be seriously affected by such climatic changes are referred to as vulnerable areas. As detailed in Part 2 of Section V, such key vulnerable areas will be influenced by the impacts of climate change, and Hong Kong society will have to correspondingly cope with challenges in the environmental, social and economic aspects. These entail biodiversity, food and water resources as well as human health etc. An early identification of their vulnerable areas and study of their implications would enable relevant considerations to be incorporated into the respective policy formulation process. Recognition of the vulnerability of Hong Kong in the process of climate change also reinforces the case for strenuous actions to tackle climate change.

Question 1

Do you notice more extreme weather in Hong Kong, such as more hot days and heavier rainfall? Do you think climate change is affecting us?

SECTION III – **GHG EMISSIONS IN HONG KONG**

Past Trend

3.1 Every human activity and development bears a carbon footprint. To ensure consistency, the United Nations (UN) have promulgated a set of clear guidelines for calculating the footprint of nations and economies.

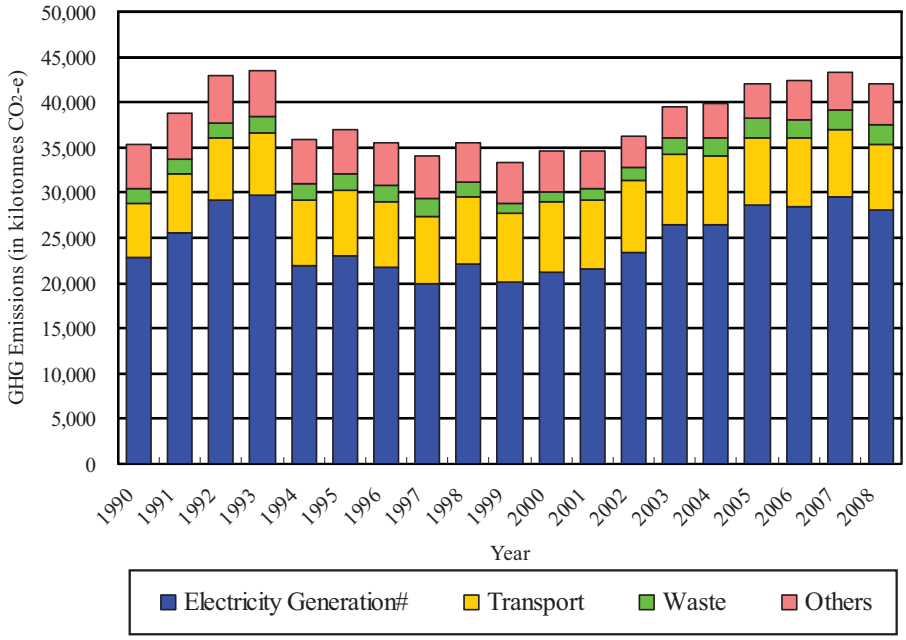
3.2 In accordance with the UN guidelines, we have taken stock of annual GHG emissions in Hong Kong from 1990 to 2008. During this period, total annual emissions ranged from 33.3 to 43.4 million tonnes of CO_2-e, per capita emissions from 5 to 7.4 tonnes, and carbon intensity from 0.025 to 0.048. Annex 2 provides the breakdown by year.

Table 3 : GHG emissions in Hong Kong – historical peak and latest position in 2008

	Historical peak	2008
Total GHG Emissions (CO_2-e)	43.4 million tonnes (in 1993)	42 million tonnes
Per Capita GHG Emissions (CO_2-e)	7.4 tonnes (in 1993)	6 tonnes
Carbon Intensity (CO_2-e per HK dollar GDP)	0.048 kg (in 1992)	0.025 kg

3.3 It is noteworthy that GHG emissions in Hong Kong witnessed a rather substantial drop in 1994 as Hong Kong started to import nuclear electricity from the Mainland and reduce local generation. Figure 4 below shows the trend of GHG emissions in the past two decades.

Figure 4 : GHG Emission Trends of Hong Kong from 1990 – 2008



 # Including Towngas production which accounts for only about 1% of GHG emissions caused by energy production

Present Situation

3.4 In 2008, the total GHG emissions of Hong Kong were about 42 million tonnes CO_2-e, or around 6 tonnes on a per capita basis, accounting for about 0.1% of global emission or slightly less than that of Hong Kong's population as a share of the world's total.

3.5 In terms of sectoral contribution to Hong Kong's GHG emissions, electricity generation is the largest source of local GHG emissions. For instance, it accounted for about 67% of our total emissions in 2008. It is worth noting that close to 90% of our city's electricity consumption is related to buildings. In other words, electricity consumed by buildings contributes to about 60% of Hong Kong's GHG emissions. The second largest source of local GHG emissions comes from the transport sector, representing 18% of our total emissions. Other emission sources include waste treatment (5%), industrial processes and agriculture (4%), etc. Annex 3 provides a breakdown of the total GHG emissions by sector for the period of 1990 to 2008.

How are GHG emissions measured?

Total GHG emissions / Carbon footprint

Measurement of total GHG emission levels and regularly taking stock of them provide a useful basis for formulating public policies and concrete measures for tackling climate change. The IPCC has drawn up internationally recognized guidelines for estimating emissions and removals of GHG for different emission sources. The emission levels are expressed in terms of tonnage of CO_2-equivalent emissions, and are more generally referred to as "carbon footprint".

Per capita GHG emissions

It is also common to measure GHG emissions that each person of an economy is accounted for. The so-called "per capita GHG emission" can be an easy reference when comparing GHG levels of economies of different size or at different levels of development.

Carbon intensity

Recognising that GHG emissions are highly associated with economic activities, some economies are measuring the effectiveness of their emission reduction efforts in terms of carbon intensity, i.e. the amount of GHG or carbon emissions per unit of gross domestic product (GDP).

3.6 As compared with other places, the GHG emissions in Hong Kong is characterised by its highly centralised pattern, which owes partly to our unique city configuration. The built-up area takes up only about 25% of our total area of 1,100 km^2. This means most of the activities of our 7 million population, or their daily routines, are confined to just about a quarter of Hong Kong's land, where most of our 40,000-strong building stock are erected.

3.7 The compact city layout is at the same time conducive to a highly-efficient public transportation system and low car ownership. Since end 1970s, Hong Kong has been expanding its railway transportation infrastructure on which millions of passengers commute every day; and indeed the majority of local citizens travel by public transport.

GHG emissions elsewhere

Per capita GHG emissions elsewhere

The global GHG emissions in 2004 were about 49 billion tonnes, or about 7.7 tonnes per capita. Per capita GHG emission in Hong Kong (6 tonnes) was lower than most developed economies, e.g. Australia (26 tonnes), USA (23 tonnes), UK (10 tonnes), Japan (10 tonnes) and Singapore (9 tonnes).

Carbon intensity elsewhere

The World Bank compares the carbon intensity of different economies by expressing GDP in terms of US dollars according to purchasing power parity (PPP). Using this common measure, Hong Kong's carbon intensity level compares with most developed economies.

Table 4 : Comparison of carbon intensity of Hong Kong with other major economies in 2006

Economies	Carbon Intensity (2006) (in kg CO_2 per US Dollar (2005 Purchasing Power Parity))
USA	0.45
UK	0.28
Switzerland	0.15
Australia	0.52
Japan	0.33
Singapore	0.28
Hong Kong	0.15
World Average	**0.48**

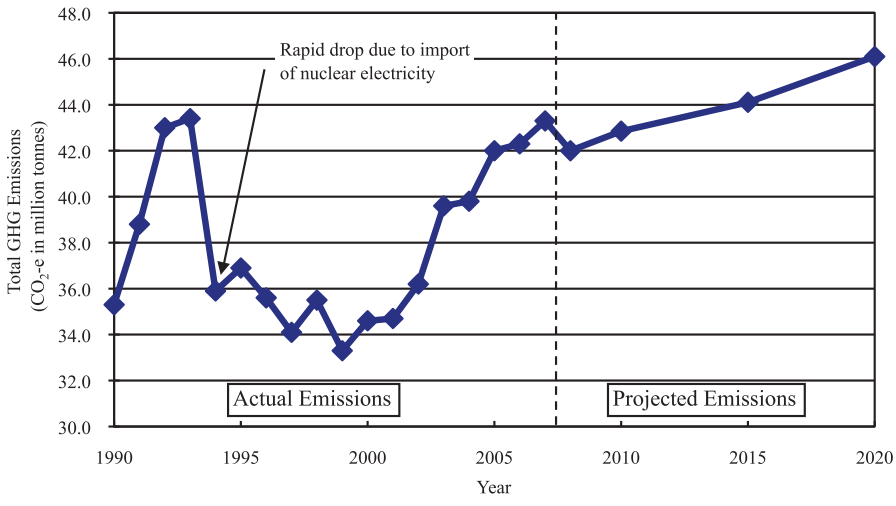
3.8 While the percentage of GHG emissions arising from waste management is not particularly high, there exists much room for reduction. In Hong Kong, local waste treatment differs from that of other major cities in a significant way; that is all of the municipal solid waste produced in our city is disposed at landfills. The GHG generated from landfills (namely methane) has a much higher global warming effect than usual CO_2 emissions.

3.9 In considering the climate change action agenda for Hong Kong, we have to take into account these characteristics in mapping out specific measures for mitigating GHG emissions or adapting to climate change.

Future Projection

3.10 According to scientists' and climatologists' projections and modelling analyses, climate change impacts will occur at an even faster rate if global GHG emissions continue to increase unabated. In the local context, despite our relatively low per capita GHG emissions (as compared with other major developed economies), we have to be constantly on the guard about increases in GHG emissions as we continue to pursue development. In Hong Kong if there were no other new measures for tackling climate change after 2005, i.e. under the so-called "business-as-usual" scenario, total GHG emissions are projected to reach 46 million tonnes in 2020. Figure 5 below shows the projected trend of GHG emissions in the next decade. The projected trend calls for concrete actions to suppress GHG emissions.

Figure 5 : Past and Future GHG Emission Trends of Hong Kong under the business-as-usual scenario (1990-2020)



SECTION IV – **JOINING HANDS TO COMBAT CLIMATE CHANGE**

International Dimension

4.1 Climate change is a global phenomenon, and international action is needed to reduce emission worldwide to prevent a material risk to society and its sustainable development, and more importantly, our future generations. Joint efforts to combat climate change have continued to strengthen over the past decade.

United Nations Convention and Protocol

4.2 The United Nations Framework Convention on Climate Change (hereafter referred to as "the Convention" or UNFCCC), which entered into force in March 1994, is an overall framework for intergovernmental efforts to tackle the challenges posed by climate change. The Kyoto Protocol (the Protocol) is an international agreement linked to the Convention. Under the principle of "common but differentiated responsibilities", industralised countries (Annex I Parties) are required to stabilize their GHG emissions while remaining countries are required to continue to step up actions to control their GHG emissions and to adapt to the climate change impacts. The Protocol was adopted in December 1997, entered into force in February 2005 and has been ratified by 188 Parties to date.

4.3 China is a Party to the Convention and the Protocol. As a non-Annex I Party, China is required to fulfill the following obligations -

- gathering and sharing information on GHG emissions, national policies and best practices;
- launching national strategies for addressing GHG emissions and adapting to expected impacts; and
- co-operating in preparing for adaptation to the impacts of climate change.

Following consultation with the Hong Kong Special Administrative Region (SAR) Government, the Central People's Government (CPG) notified the United Nations that the Convention and the Protocol would be extended to the SAR with effect from May 2003.

The United Nations Climate Change Conference 2009 held in Copenhagen

4.4 The 15th session of the Conference of Parties to UNFCCC (COP15) held in Copenhagen, Denmark in December 2009 marked an important milestone in respect of international co-operation on climate change under the UN framework. The meeting was attended by over 190 nations. Although COP15 fell short of delivering a legally-binding agreement to chart the way forward for tackling climate change, it has reaffirmed the international commitment to tackle the problem and highlighted the urgency of doing so. The Copenhagen Accord sets out the consensus to hold the increase in global temperature below 2°C, as well as the financial undertaking by Annex I Parties to help developing economies in mitigating and adapting to the impact of climate change.

The APEC Target

4.5 In addition to the UN collaboration framework, some regional co-operation fora have attached increasing importance to the issue of climate change, e.g. Asia-Pacific Economic Co-operation (APEC). In 2007, APEC economies pledged at the APEC Leaders' Declaration on Climate Change, Energy Security and Clean Development to seek to achieve a reduction in energy intensity (i.e. total primary energy supply per unit of GDP) of at least 25% by 2030, with 2005 as the base year (the APEC Target). As a member economy of the APEC, Hong Kong is committed to achieving the APEC Target. The APEC Target represents the consensus among the 21 member economies. It makes reference to energy intensity and measures the energy efficiency of an economy, which is important, but without specific bearing to GHG emissions as a major cause of climatic changes.

Co-operation among Large Cities

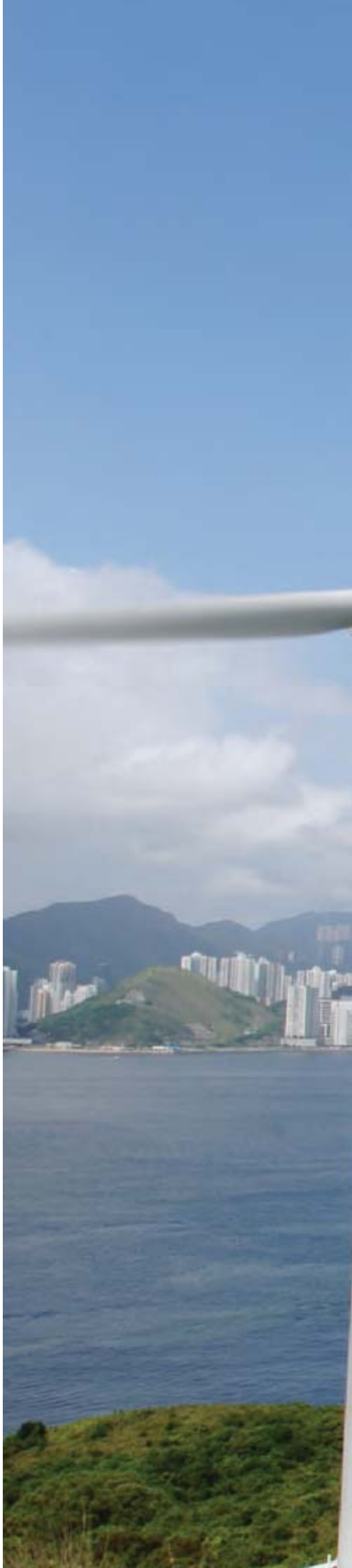
4.6 Efforts in combating climate change are not limited to nations and economies alone. Throughout the world, cities are also undertaking initiatives to contribute to the reduction of GHG emissions with a view to slowing the temperature rise. Considering that cities account for about 70% of the world's CO_2 emissions, their involvement is crucial to the implementation of concrete measures to combat climate change.

4.7 Hong Kong is a member of the C40 Cities Climate Leadership Group (C40), a partnership of large cities committed to reducing carbon emissions with concrete actions. The C40 group believes that cities could contribute significantly to combating climate change by working together to share ideas and experiences. We believe the C40 is a useful platform for collaboration among cities to complement international agreements and efforts forged between sovereign nations.

National Perspective

4.8 As a non-Annex I Party under the Kyoto Protocol , China (including Hong Kong) is not required to meet any mandatory GHG emissions limits or reduction targets. This notwithstanding, the CPG announced on 26 November 2009 a voluntary national target (the National Target) to reduce the CO_2 produced for each yuan of national income by 40% - 45% by 2020 as compared with the 2005 level. The National Target will mainly be achieved by intensifying effort to conserve energy and improve energy efficiency; vigorously developing renewable energy and nuclear energy; increasing forest coverage and stepping up efforts to develop a low-carbon economy. This is a progressive target among those put forward by other members of the international community, in particular the fellow non-Annex I countries, and it underlines China's commitment to combating climate change. In putting forward the National Target, the CPG has stressed the importance of continuously upholding the principle of "common but differentiated responsibilities" and respective capabilities enshrined in the Convention, and the ongoing international collaboration framework on the basis of equity and in the context of sustainable development, taking into account the state of social and economic development of developing economies.

4.9 As a Special Administrative Region of China, Hong Kong does not assume independent obligations under the international sovereign-based UN cooperation regime over climate change. Our GHG emissions inventory, as well as our actions derived from our mitigation and adaptation strategies will form part of the national communications to the UN. On the determination to maximize the room for controlling GHG emissions, the Hong Kong SAR stands as one with the CPG in combating climate change.



4.10 Hong Kong's economic development is at a more mature state compared with other places in China, and we possess relatively more potential to further reduce our emissions. We believe that Hong Kong could adopt a strategy that seeks to maximise our scope for GHG reduction. Due to the different stages of development, and taken into account our stage of economic development, Hong Kong has the capacity to adopt a more aggressive carbon intensity reduction target and contribute to the nation's efforts in tackling climate change. Indeed, as the national financial and services centre, to embrace a more progressive reduction target in our overall emission reduction strategy will help demonstrate the nation's determination in promoting work in this area.

Setting Hong Kong's Target

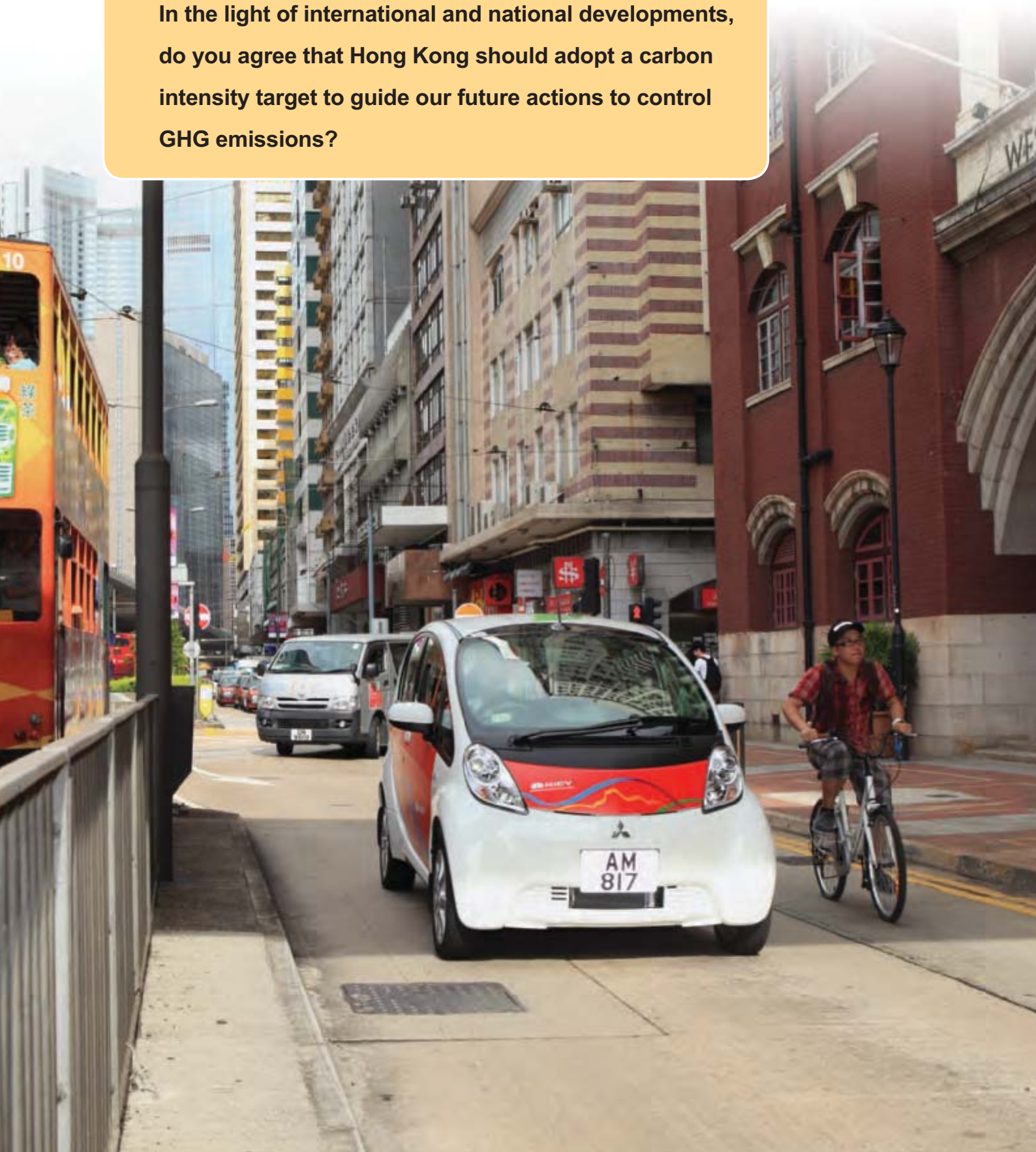
4.11 In Hong Kong, public awareness for climate change is building up. In recent years, the Government, as well as the business and non-government organisation sectors have stepped up efforts to educate their respective constituents on the impact of climate change. The first-movers have sought to incorporate climate change into their business and organizational development plans, and new businesses have been started to capture the low carbon opportunities.

4.12 In setting a carbon intensity reduction target for Hong Kong, it is important to conduct objective analyses on the mitigation potential of various measures that the community is prepared to support. The proposed target should be a progressive target, representing the aspirations of Hong Kong in moving towards a low carbon city and economy. We are also mindful that the proposed target should be realistic and attainable. It should be and underpinned by a concrete action agenda having balanced the potentials and constraints of Hong Kong.

4.13 In a wider perspective, the proposed target should befit Hong Kong's position as an international advanced city, and bring reduction in GHG emissions by 2020 and beyond, as compared with the base year of 2005.

Question 2

In the light of international and national developments, do you agree that Hong Kong should adopt a carbon intensity target to guide our future actions to control GHG emissions?



SECTION V – **HONG KONG'S CLIMATE CHANGE STRATEGY AND MEASURES**

Climate Change Strategy

5.1 Hong Kong has to adopt a proactive strategy in tackling climate change. Our mitigation strategy has to be directed at our emission characteristics. It should be forward-looking to demonstrate Hong Kong as a leading global financial centre, that we are participating in and contributing to international community and city-wide efforts in combating climate change. Our strategy should integrate the low-carbon notion with economic development, unleashing the economic potential that is enfolded in low-carbon lifestyle, promoting energy conservation and enhancing Hong Kong's competitive advantage. During the process, we need to draw together participation and support from various sectors of our community. This will enable Hong Kong to go along the pathway of sustainable development, remain resilient to possible risks brought by climate change, and play a pivotal role in realizing the vision of transforming the PRD into a quality living area.

Climate Change Action Agenda

5.2 The Consultants have put forward a comprehensive action agenda for Hong Kong in combating climate change. Along with international practice, there are two major parts of it, namely mitigating GHG emissions; and adapting to possible impacts of climate change in major vulnerable areas identified.

Part 1 : GHG Reduction Measures

5.3 Although Hong Kong accounts for a relatively small share of the global GHG emissions, the consultancy study finds that there is scope for us to do more and better to reduce our carbon footprint. In formulating the action agenda, our major considerations are as follows -

- Hong Kong is an international city and we should act responsibly with the international community to address the global challenge of climate change;
- Hong Kong is a highly advanced economy and we should take actions that befit our position;
- use of waste-to-energy technologies, cleaner fuels and green transportation will bring complementary benefits. The use of clean energy will bring cleaner air and making better use of "waste" will help alleviate the pressure on our landfills;
- going low-carbon will generate new economic opportunities in green and energy efficient technologies and applications, which could be a promising economic growth area in the coming decade; and

- more importantly, many measures that reduce GHG emissions such as energy efficient building installations will drive down household electricity bills and commercial operating cost, and hence possibly rendering cost savings in the long term, achieving a "win-win" situation.

5.4 Annex 5 provides a list of the GHG emissions reduction measures already or being implemented by the Government and the progress thus far.

5.5 The Consultants further propose a comprehensive action agenda covering additional measures in different sectors. Since local GHG emissions are primarily a result of combusting fossil fuels for electricity, the main planks of our strategy to reduce GHG emissions are to target the energy sector, e.g. through switching to cleaner, low carbon fuels for power generation, raising energy efficiency in particular for buildings, exploring the potential of renewable energy and turning waste to energy, as well as developing efficient and environment-friendly public transportation system. We would also like to underscore the importance of community-wide participation and adoption of a low-carbon lifestyle in order to achieve the desired outcomes. Behavioural changes in our everyday life like avoiding food wastage, practicing recycling, supporting greening and conserving water and energy etc. are small steps that, taken together, will bring significant changes.

5.6 Our strategy and the respective action agenda for mitigating GHG emissions are set out below. They include -

(a) maximising energy efficiency;

(b) greening road transport;

(c) promoting use of clean fuels for motor vehicles;

(d) turning waste to energy; and

(e) revamping fuel mix for electricity generation.

Maximising Energy Efficiency

Share of total emissions

5.7 Buildings take up approximately 90% of the electricity consumed in Hong Kong. That is, on the demand side, energy consumption in buildings is responsible for at least 60% of Hong Kong's GHG emissions. In recent years, energy consumption in Hong Kong has been growing at a slower rate than before, primarily because of enhanced energy efficiency. For example, between 2005 and 2009, local electricity consumption increased by 3.6% only while our GDP grew by 13%. Across the world, enhancement of energy efficiency has proven to be a win-win strategy for both the owners/users of buildings and for the environment. Depending on the status of buildings, energy efficiency enhancement works can bring very substantial savings in electricity bills.

Proposed Action Agenda

5.8 The Consultants consider that substantial GHG emissions reduction can be realised in buildings and electrical appliances in the next decade through various measures by -

(a) expanding the scope and tightening the requirements of the Building Energy Codes, such that by 2020 major electrical equipments in all new commercial buildings will be up to 50% more energy efficient as compared with 2005 building stock;

Building energy efficiency : Experience in the US

In the U.S., two sets of building energy codes are being revised every three years. The U.S. Department of Energy has set the goal for tightening them by 30% in terms of energy efficiency between 2004 – 2010 and 2006 – 2012, respectively.

(b) expanding the use of district cooling or water-cooled air conditioning, such that by 2020 up to 20% of all commercial buildings will be up to 50% better in refrigeration performance compared with buildings using regular air conditioners;

District cooling system : Kai Tak Development

Implementation of a district cooling system (DCS) in Kai Tak Development will bring about significant environmental benefits. Given its high energy efficiency (35% more energy-efficient than traditional air-cooled air-conditioning system), the maximum annual saving in electricity consumption will be 85 million kilowatt-hour (kWh), with a corresponding reduction of 59,500 tonnes of CO_2 emission per annum for the planned total public and private non-domestic air-conditioned floor area of about 1.73 million square meters. As such, DCS can contribute to air quality improvement and the vision of achieving low carbon economy .

(c) reducing energy demand in new buildings by various means such as tightening the overall thermal transfer value (OTTV) standards and promoting wider adoption of green roofing, such that by 2020 all new commercial buildings will reduce their energy demand by up to 50% as compared with new buildings in 2005;

Local OTTV standards

OTTV is a measure of the energy consumption of a building envelope. Since July 2000, all new private commercial buildings and hotels in Hong Kong are required to be designed and constructed with external walls and roofs meeting a suitable OTTV. In the case of the tower and podium, the OTTV should not exceed 30 watts per square metre (W/m^2) and 70 W/m^2 respectively. With the advancement in building technology and innovative design of the external facade in recent years, there is room for improvement of the OTTV standard.

(d) improving energy efficiency in commercial buildings through good housekeeping, information technology products and intelligent building environmental management system, such that by 2020, 25% of existing commercial buildings can be 15% more energy efficient compared with 2005; and

Building environmental management system

A building environmental management system consists of energy meters, sensors and communication links to help control and avoid energy waste by major equipment in the building. The monitoring data are useful to evaluate performance and to diagnose problems for ensuring that the building operates efficiently. In the US, a survey found that, in general, 15% energy could be saved in existing commercial buildings after conducting proper process of detecting and remedying deficiencies of energy systems.

(e) expanding the scope and tightening the energy efficient electrical appliance standards for domestic use, such that by 2020 all appliances sold in the market will be 25% more energy efficient compared with 2005.

Energy efficiency standard for electrical appliances : Experience elsewhere

Since the 1990s, 57 countries have legislated energy efficiency standards and/or labels, applied to a total of 46 products as of 2004. The IPCC recognises that standards and labelling programmes are among the most cost effective instruments to reduce GHG emissions. In Australia, for instance, standards, labels and minimum energy performance standards have enabled five types of household appliances to improve energy efficiency by 8% - 43% between 1993 and 2005.

5.9 In addition, we have been looking into the issue of energy wastage of external lighting as well as how to promote more efficient lighting systems, such as progressively restricting sale of incandescent light bulbs, with a view to formulating detailed proposals for public engagement at a later stage.

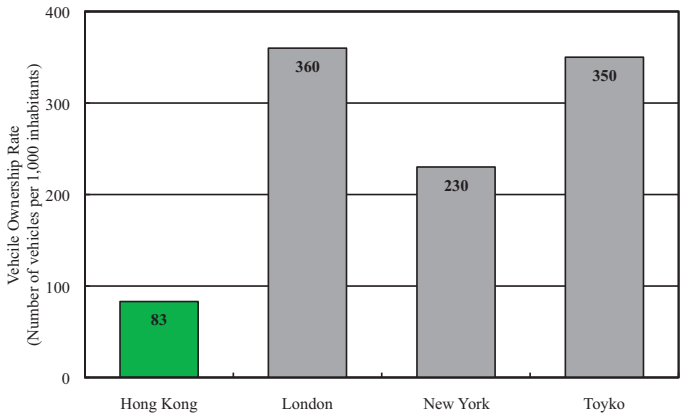
Greening Road Transport

Share of GHG emissions

5.10 The transport sector in Hong Kong accounts for about 18% of GHG emissions. Road transport dominates the emissions in this sector.

5.11 With wide use of mass transportation system at the community level and a low car ownership rate (see Figure 6), the portion of road transport in our carbon footprint is less than those in other international cities like London (about 21%), Tokyo (about 25%), and New York (about 22%).

Figure 6 : Vehicle ownership rate in major international cities



Data sources:
Hong Kong: Transport Department and Census & Statistics Department
London: UK Department of Transport and The Office for National Statistics
New York: New York State Department of Motor Vehicles and New York City Department of City Planning
Tokyo: Statistics Division Bureau of General Affairs, Tokyo Metropolitan Government

Promotion of EVs : Experience elsewhere

Experience in UK :
There are currently 1 700 EVs in London with around 240 charging points. There is a plan to achieve 25 000 charging points by 2015 and 100 000 EVs by 2020 or earlier if possible.

Experience in Japan :
At present, there are more than 80 charging points in Tokyo. Furthermore, it is the country's plan that EVs, hybrid vehicles and cars running on natural gas will make up 50% of new cars in the market by 2020. By then, 20% of all cars in the country will be running on these technologies.

Proposed Action Agenda

5.12 The Government will continue to invest in the mass transportation systems and improve public transport to maintain a low carbon contribution from this sector. Furthermore, access to public transportation will be stepped up, and pedestrian areas and covered walkways, etc. will be set up to reduce transport needs.

5.13 In addition, the Consultants envisage that advancement of technology can possibly offer further emission reduction opportunities in the following ways -

(a) wider use of motor vehicles running on alternative fuel such that 30% of private cars, 15% of buses and goods vehicles are hybrid and EVs or other vehicles with similar performance by 2020; and

(b) implementation of importers' average fleet efficiency standards such that new vehicles will be 20% more energy efficient than the 2005 market average.

5.14 The adoption of greener transportation requires community-wide support. The Government has been encouraging major EV manufacturers and agents around the world to introduce a greater variety of EVs to Hong Kong, and collaborating closely with other organisations to expand the charging network for EVs.

5.15 Greening road transport cannot solely be a government initiative. We have to look to the general public to join in this green effort by leading a low-carbon living style. We encourage people to walk as far as practicable, and if not, to take public transport. If a private car is needed, we suggest that an environment-friendly, zero or low carbon emitting one be considered.

Low carbon vehicles : Experience elsewhere

Public procurement, offering incentives for customers / manufacturers, supporting expansion of infrastructure are currently commonly used by other economies to transform the markets towards low carbon car development.

In the U.S., new cars in the market are required to meet increasingly stringent fleet-wide average CO_2 emission standards between 2012 and 2016. Similarly, the EU and Mainland China are in the process of setting fleet-wide average standards for CO_2 emissions or on fuel efficiency. Fleet-wide average standards provide manufacturers or importers with the flexibility of simultaneously meeting the demand of a wide spectrum of customers and the overall environmental performance required for the fleets produced or sold.

Question 3

Do you agree that the community should conserve energy and use greener transport to reduce local GHG emissions? What do you think you could do as an individual or as a business enterprise?

Promoting Use of Clean Fuels for Motor Vehicles

Share of GHG emissions

5.16 Almost all motor vehicles in Hong Kong rely on fossil fuels, including petrol, diesel and liquefied petroleum gas. About 16% of GHG emitted in Hong Kong is derived from these fuels.

5.17 Biodiesel is a form of renewable energy. The CO_2 emitted during its combustion will be absorbed via photosynthesis by plants producing the feedstock for making biodiesel.

Proposed Action Agenda

5.18 Following the international trend and technological improvement, the Consultants consider that our reliance on fossil fuels for motor vehicle use may be further reduced by 2020 by requiring petrol and diesel to be blended with 10% of ethanol and biodiesel respectively. In particular, we will look into the possibilities of better utilising waste cooking oils in producing biodiesel locally.

5.19 In the international arena, the European Union (EU) has already mandated 10% renewable energy (mainly through use of biofuels) in its transport fuels by 2020. This will boost the global production of biofuels and enable Hong Kong to have access to adequate supply of biofuels by 2020.

Turning Waste to Energy

Share of GHG emissions

5.20 Hong Kong is a small city with a large population, and solid waste management has been an issue of concern. Current treatment of the waste produced by our society accounts for about 5% of Hong Kong's total GHG emissions. Most of these emissions are methane (a GHG which is 21 times worse than CO_2 in terms of global warming effect) generated when organic materials decay at the landfills.

Use of biofuels elsewhere

Many countries are providing petrol or diesel blended with ethanol and pure biodiesel for motor use. In the EU, many member states have set mandatory limit of biofuels in their motor fuel sales. For example, the limit set for the United Kingdom is 3.25% in 2010/2011.

In Mainland China, some provinces have required petrol sold to be blended with 10% of ethanol. Biodiesels, at different blending levels, are available in APEC economies such as Australia, Canada, Indonesia, Japan, Republic of Korea, Thailand and the United States.

Proposed Action Agenda

5.21 The substantial amount of waste generated as a result of urban life in Hong Kong can be used for power generation. The Consultants recommend that the construction and operation of waste-to-energy facilities and better utilization of landfill gas as an energy source before 2020 can help reduce GHG emissions. The specific measures are as follows -

(a) development and full operation of one integrated waste management facility (IWMF), two organic waste treatment facilities (OWTFs), and one sludge treatment facility; and

(b) full utilisation of the recovered landfill gas and gas generated from waste water treatment.

5.22 The Government plans to develop IWMF in phases by adopting advanced incineration with energy recovery as the core waste treatment technology. The first phase will have a daily treatment capacity of 3 000 tonnes of waste and can supply about 480 million kilowatt-hours (kWh) of surplus electricity to the power grid per year, which is sufficient for use by over 100 000 households. This is equivalent to 440 000 tonnes less GHG emissions. The detailed engineering and the Environmental Impact Assessment (EIA) studies for the IWMF are being conducted to ascertain the suitability of two potential sites. We expect to consult the public at a later stage on the first phase of IWMF for commissioning in mid 2010s.

Overseas experience in turning waste to energy

Thermal treatment technology has been playing a key role in waste treatment. In Germany 34% of municipal solid waste (MSW) is treated by thermal treatment technologies. The percentage in Japan is as high as about 67%. For Singapore, it operates four waste-to-energy plants and incinerates almost all its waste to minimise the amount of waste dumped into the landfills. Furthermore, new large scale MSW incineration plants continue to be commissioned in recent years, for example, in Frankfurt, Germany; Issy-les-Moulineau, France; and Naples, Italy.

It is of interest to note that the waste-to-energy plant at Malmö, a Swedish city with a population of 280 000 combusts 550 000 tonnes of waste generated by the city and its 13 neighbouring municipalities every year. In the process, the plant produces 250 million kWh of electricity and heats up 70 000 small houses every year. Similar facilities are also set up in the Mainland and in Macau. Current advanced technologies are capable of significantly reducing pollutant emissions from incineration.

5.23 Moreover, we plan to develop OWTFs in two phases by 2020. On completion, the facilities will have a total daily treatment capacity of 400 to 500 tonnes of organic waste. The biogas generated in the treatment process can also be used for power generation. It is estimated that for the two phases of OWTF, about 28 million kWh of surplus electricity can be supplied to the power grid per year, which is adequate for use by 6 000 households and expected to reduce GHG emissions by about 50 000 tonnes per year.

5.24 In addition, we will continue to construct and operate a sludge treatment facility, and strive to achieve full utilisation of the recovered biogas at our landfills and our wastewater treatment facilities.

Revamping Fuel Mix for Electricity Generation

Share of GHG emissions

5.25 Electricity generation accounts for a significant share of local GHG emissions, i.e. about 67% of total emissions. Revamping the fuel mix for local electricity generation is an essential step to maximise the scope for suppressing Hong Kong's GHG emissions and carbon intensity.

Current Fuel Mix in Hong Kong

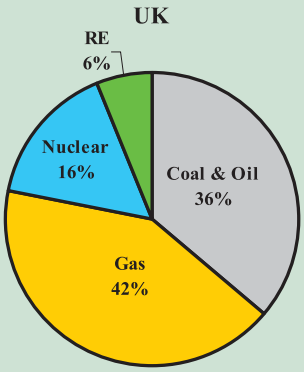
5.26 Because of scarcity in resources, Hong Kong has long relied on import of energy as fuel for local electricity generation. In 2009, coal dominates the fuel mix for electricity generation in Hong Kong (about 54%), followed by natural gas (about 23%) and nuclear electricity imported from the Mainland (about 23%).

Retiring coal-fired power plants

5.27 Amongst the various fuel components, coal assumes the highest carbon emission factor, and is a primary source of air pollution. The majority of local coal-fired power plants have come into operation since the 1980s, and will start to retire in phases in the run-up to 2020. The rest will also be completely retired by early 2030s, as starting from 1997 power companies in Hong Kong had not been allowed, for environmental reasons, to build new coal-fired power plants.

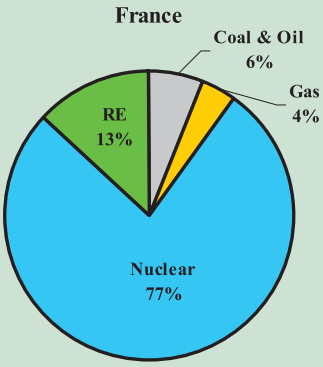
5.28 Regionally and internationally, there is very keen competition for fuel for power generation. Alternative sources of cleaner, low carbon fuels will have to be identified in time to replace coal to meet the local demand for electricity supply. We should also grasp the opportunity to improve our fuel mix with a view to reducing GHG emissions and combating climate change. Because of the long lead-time required for planning and building the necessary infrastructure, revamping the fuel mix for electricity generation has become more imminent than before.

Fuel mix elsewhere



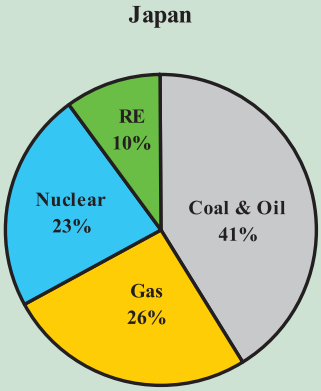
UK

During the period of 1990 to 2008, the proportion of coal in electricity generation in the United Kingdom has fallen from over 60% to around 30%, while the proportion of natural gas has increased from nearly a zero base to over 40%. The balance of the fuel mix is nuclear, oil and renewable energy (RE). The switch from coal-fired to gas-fired power generation has led to significant emission reductions and was identified as one of the main contributors to the country's achievement of its 2012 GHG emissions reduction target.



France

In France, there are currently 58 nuclear reactors producing about 77% of electricity consumed. Combined with an additional 13% of electricity generated from renewable energy (primarily hydropower), about 90% of electricity generated in the country has zero GHG emission, one of the highest in developed economies. The balance of the fuel mix is coal, oil and natural gas. France is planning to build two more reactors to meet the projected 40% increase in energy demand in the next two decades.



Japan

In Japan, currently 70% of the electricity consumed is generated by fossil fuels (coal, oil and natural gas), 23% by nuclear energy, and the rest by renewable sources such as hydropower. There are now 54 nuclear reactors. In its latest energy plan to support a low carbon society, Japan is planning to build 9 more nuclear reactors before 2020 such that the share of nuclear power will be more than 40% while about 30% and about 20% of electricity will be generated by fossil fuels and renewable sources, respectively.

Data source: APEC energy database

Increasing use of clean, low carbon energy

5.29 The Consultants have assessed the implications of varying the fuel mix on the GHG emissions, which is key to reducing local GHG emissions. In seeking to improve the fuel mix, we will continue to uphold our energy policy objectives to ensure reliable, safe and efficient energy supplies at reasonable prices, while minimising the environmental impact caused by the production and use of energy. In summary, our objective is to underpin the continuous economic development and prosperity of Hong Kong with clean, low carbon energy sources.

5.30 In August 2008, the HKSAR Government and the National Energy Administration of CPG signed a Memorandum of Understanding on Energy Cooperation (MOU). The MOU provides a guarantee for continuous supply of clean energy including natural gas and nuclear energy to Hong Kong in the coming two decades.

Natural gas

5.31 Natural gas has lower GHG emission when compared to other fossil fuels such as coal, and has become a popular fuel for the generation of electricity. However, in considering the share of natural gas in the fuel mix, various factors have to be taken into account, including the availability of supply and fuel price.

5.32 CPG has pledged to increase supply of natural gas to Hong Kong from three sources, i.e. offshore gas, piped gas and a liquefied natural gas (LNG) terminal to be jointly built in the Mainland. Following the conclusion of the MOU, the Government and relevant energy enterprises on both sides have been working together to take forward the planning and development of the gas pipelines and the terminal in accordance with the relevant planning, regulatory and environmental regimes of the respective jurisdictions. With the Mainland's undertaking and assurance of adequate supply of natural gas for Hong Kong, we envisage that by 2020, it is possible to increase the proportion of natural gas to account for about 40% of Hong Kong's overall fuel mix for power generation.

Natural gas in Hong Kong

Electricity generated by natural gas emits 50% less GHG than traditional coal-fired units. As compared to coal-fired power generation, gas-fired power generation has helped avoid about 70 million tonnes of GHG emissions in Hong Kong between 1997 and 2009.

5.33 Our objective is to reduce the proportion of coal in the overall fuel mix. Accordingly, coal-fired generating units would be kept at a low utilization rate or as reserve before normal retirement; and coal is expected to account for less than 10% of the fuel mix by 2020. In this light, it is necessary to identify alternatives to power local electricity generation, especially in the circumstances that the quantity of gas supply from the Mainland in the near term future has been agreed. The question of how to meet the balance of about 50% of Hong Kong's overall fuel mix by non-fossil fuels, such as renewable energy (RE) and nuclear power, would need to be addressed.

Renewable Energy

5.34 The Government has been actively promoting the generation and use of RE, both in public works projects and in the private sector. Specifically, we have provided necessary incentives to the two local power companies under the Scheme of Control Agreements (SCA), in terms of a higher rate of return for their investment in RE facilities (11%), and a bonus in the range of 0.01 to 0.05 percentage point in permitted return depending on the extent of RE usage in their electricity generation.

What is renewable energy?

RE generally refers to energy sources that are, within a short time frame relative to the Earth's natural cycles, sustainable or capable to be naturally replenished. These include non-carbon technologies such as solar energy, hydropower, and wind, as well as carbon-neutral technologies such as biomass.

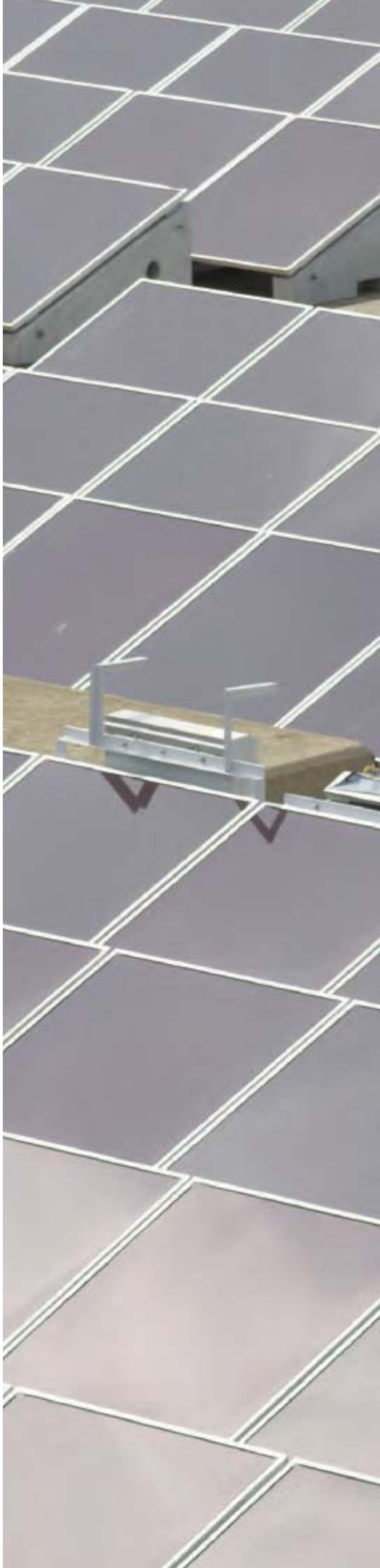
When compared to fossil fuels, RE is a clean fuel source, which does not cause air pollution or GHG emissions during the electricity generation process. The viability of most renewable energy types are, however, determined by locations. This is particularly true for solar, hydro and wind power, where the availability and adequacy of energy sources in the vicinity of generation essentially determines the scale of operation and economic viability.

Given the natural constraints and geographical limitations of Hong Kong, and generally the lack of adequate supply of RE resources and space for setting up relevant facilities, there may not be an economic case, at least under the current state of technology, to develop RE facilities in such a scale as to generate sufficient electricity supply for connection to the power grid for use by the majority of the community.

Wind energy

5.35 The wind energy sector has experienced significant growth worldwide in recent years. The wider adoption of wind power as a source of electricity supply would hinge on various factors, including the availability and reliable supply of wind resource, space for setting up the requisite facilities, commercial viability, etc.

5.36 Despite our geographical and natural constraints in developing wind energy, both power companies in Hong Kong have started to explore the feasibility of offshore windfarm projects, and are planning to install a total of about 100 wind turbines in the waters of Hong Kong to generate electricity of up to 560 million kWh at a total capital cost of about $8 to 10 billion. If put to operation as being planned, the windfarms are expected to meet 1-2% of our total demand for electricity by 2020.



Offshore windfarms

The two local power companies have carried out detailed studies on the construction of offshore wind farms. The selected site for the wind farm of the CLP Power Hong Kong Limited (CLP) is located approximately 9 km east of Clearwater Bay peninsula within the southeastern waters of Hong Kong. Its plan is to install 67 wind turbines at a capital cost of about $5 to 7 billion, with an estimated generation capacity of up to 200 MW for producing electricity of up to 390 million kWh per year. CLP has completed the EIA process and obtained an environmental permit for the proposal. A feasibility study, including the collection of field data, is being carried out at the selected site.

Hongkong Electric Company Limited (HEC)'s selected site is located approximately 4 km southwest of Lamma Island. HEC plans to install about 30 wind turbines at a capital cost of about $3 billion, with an estimated total generation capacity of around 100 MW for producing 170 million kWh of electricity every year. HEC's detailed EIA study report has been approved and the required environmental permit issued.

Solar energy

5.37 The global harnessing of the solar resource has made much progress in recent years. As a city blessed with relatively abundant sunshine, solar power may be put to wider application in Hong Kong. To showcase the benefits of using solar power, the Government has been leading by example by adopting solar technologies in government projects. The two power companies have also started to apply such technologies, although the scale is relatively limited in meeting the overall demand for electricity. These measures, nonetheless, would help reduce Hong Kong's GHG emissions from power generation and respond positively to calls for using more renewable energy.

Photovoltaic (PVC) installation

The Government has taken the lead to install a PVC system of 350 kW on the roof of the EMSD Headquarters in Kowloon Bay. To save power in water heating, we have also installed large-scale solar water heating installations on government buildings, including swimming pools.

On the other hand, the two local power companies have also set up photovoltaic panels to generate electricity for connection to their power grids. For instance, HEC has installed a PVC system of 550 kW at its Lamma power station to generate electricity of around 620 000 kWh for use by about 150 domestic households every year.

Waste-to-energy

5.38 The adoption of waste-to-energy as a source of electricity supply would largely depend on the potential of developing waste-to-energy facilities, as well as other technical and non-technical factors including social acceptability, etc. As mentioned earlier, in an effort to convert waste to energy and reduce GHG emissions, we are planning to construct and operate before 2020 an integrated waste management facility, two organic waste treatment facilities and a sludge treatment facility. If these projects are taken forward as planned, we expect them to be able to meet about 2% of total demand for electricity by 2020.

Nuclear Power

5.39 In addition to using more natural gas and RE for power generation, many countries have also included nuclear power as part of their low-carbon energy combination. For example, in France nuclear electricity accounts for nearly 80% of its electricity mix, and serves as a major source of its zero-carbon energy.

5.40 Since the early 1990s, nuclear electricity has been part of Hong Kong's overall fuel mix. One of our local electricity companies, through joint venture arrangement, had invested in and taken part in the management of nuclear power plants in Guangdong. Since full operation in 1994, the power plants in Daya Bay have been providing stable, reliable and relatively low cost electricity supply to Hong Kong. At present, nuclear power from the Mainland makes up 23% of our fuel mix.

5.41 In revamping the fuel mix for electricity generation, we will explore the possibility of importing more nuclear electricity from the Mainland. The development of more nuclear power generation capacity across the border provides us with new opportunities to combat climate change. Following our stepped reduction in respect of coal-fired electricity generation which is highly polluting and gives off high carbon emissions, it is possible to give consideration to importing more nuclear power to displace coal in the fuel mix. This is further supported by the MOU, which guarantees continuous supply of nuclear power in the coming two decades.

How mature is nuclear technology?

The nuclear fission technology which is now being widely used was first developed in the 1940s and 1950s. It is a proven technology that is being widely applied in 30 countries and around 440 power generating units (including nuclear power plants in Daya Bay). In Mainland China, the National Nuclear Safety Administration is the authority overseeing the environmental monitoring of the nuclear power stations and nuclear waste disposal. The national regulatory requirements for granting construction and operation license, and disposing of nuclear waste are in line with international standard.

5.42 Compared with natural gas, nuclear power is generally less expensive and more reliable, and emits no GHG during the electricity generation process. The increase in the import of nuclear energy would help achieve a more balanced fuel mix, which helps avoid over-reliance on natural gas as the largest single source of fuel supply. As compared with the alternative of using substantially more gas, increasing the import of nuclear power would minimise the impact of international shortage of gas supply or fluctuation of international gas prices.

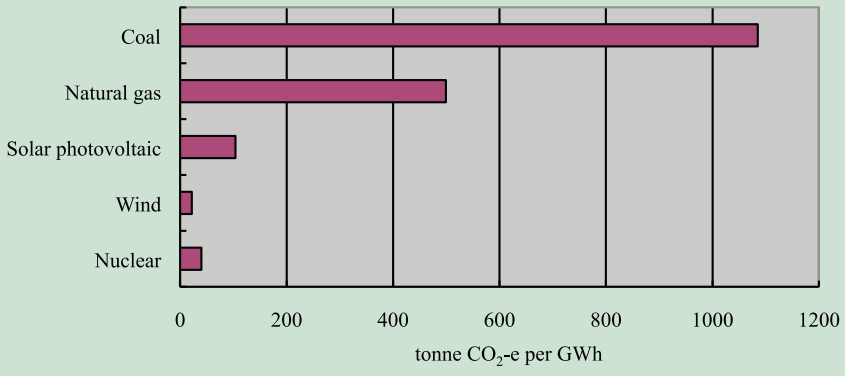
5.43 Energy security in Hong Kong could be further enhanced by strengthening cross-boundary interconnection under the Framework Agreement on Hong Kong/Guangdong Cooperation (Framework Agreement). Hong Kong and Guangdong will explore how to enhance the mutual supply of electricity and the security of power supply to Hong Kong. Energy enterprises on both sides will also have to work together to ensure reliability of energy supply through various means, e.g. long-term contracts, direct investment in the power plants, power transmission networks, grid support, etc. All these issues require careful planning and detailed analyses with a long lead time for implementation. If more nuclear power is to be imported from the Mainland, for instance, the requisite preparation, planning and development of cross-boundary transmission infrastructure may take as long as 8 years to complete.

Is nuclear power clean?

Nuclear power emits no GHG during the electricity generation process, and is generally considered as an effective GHG mitigation option. According to an assessment report issued by IPCC in 2007, even taking into account the "total life-cycle" of nuclear power, GHG emissions per unit of electricity produced are less than 40g CO_2-e/kWh, which is comparable to renewable energy sources if available.

"Total life-cycle" here covers resources extraction, production, transportation, operation, construction of infrastructure, disposal of wastes and decommissioning, etc.

Figure 7 : Life-cycle GHG emissions for different electricity generation systems



Source: World Energy Council, 2004: Comparison of energy systems using life cycle assessment - special report

Comparison of various fuel sources

5.44 The table below summarises the comparison of various fuel sources for power generation in Hong Kong with regard to the objectives of our energy policy.

Table 5 : Comparison of Fuel Sources for Power Generation in Hong Kong

Fuel	Availability	Reliability of performance	Affordability	GHG emission level
Non-fossil				
RE (wind and solar)	Constrained locally	Uncertain	High price	Low
Nuclear (uranium)	Adequate supply for centuries	High	Low price & stable	Low
Fossil				
Natural Gas	Enough supply for decades	High	Medium price & rising	Medium to High
Coal	Adequate supply for centuries	High	Low price & rising	High to Very High

Cost of electricity generation

Under the Government's policy, power companies are not allowed to build new coal plants since 1997. The current dominant use of coal in the fuel mix of local electricity generation will change over time as the existing coal-fired generation plants are being phased out. There is a need for Hong Kong to make new investments in our electricity generation infrastructure.

Electricity tariff in Hong Kong covers the costs of electricity generation, price of imported energy, the costs of electricity transmission and distribution, and other operating and management expenses, etc. incurred by the power companies. The overall tariff implications of alternative electricity supply, be it by local generation or through electricity import, therefore, could be better assessed when certain key parameters are finalised subject to further studies and discussion. Such parameters include investment in new infrastructure including generation plants and transmission lines, future movement of the prices of natural gas and nuclear electricity, etc.

For illustration purpose, the current unit price of nuclear electricity imported from the Mainland is about 50 cents/kWh. The power companies' current unit generation costs of coal-fired electricity are in the range of about 40-60 cents/kWh, and gas-fired electricity in the range of about 70-90 cents/kWh. Fuel costs are subject to market fluctuation, and future imported nuclear electricity prices, for instance, will be subject to commercial negotiation. They may change over time.

Indeed, the fuel price of natural gas is predicted to be rising and highly volatile in the coming decade. The price of nuclear electricity, on the other hand, is expected to continue to be lower than the unit cost of gas-fired electricity generation in the future.

Proposed fuel mix for power generation

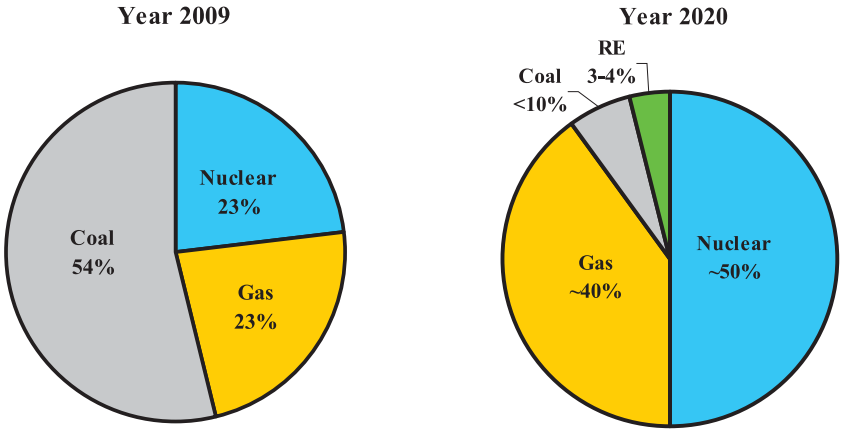
5.45 In the light of the above analysis, and in order to control GHG emissions, we **propose** to adopt the following strategy to revamp the fuel mix for power generation by 2020 –

- in view of the highly-polluting and high-carbon nature of coal, to suppress the percentage of coal-fired power in our fuel mix and keep coal-fired power plants at a very low utilisation rate or as reserve, such that coal would account for no more than 10% of the fuel mix ;

- taking into account the supply of natural gas secured under the MOU between Hong Kong and the Mainland, to maximise the use of natural gas and increase its share in the fuel mix to around 40%; and

- to substantially increase the share of non-fossil low carbon fuels, such that renewable energy would make up about 3-4% of the fuel mix, and the balance of about 50% would be met by imported nuclear power.

Figure 8 : Hong Kong's Fuel Mix for Power Generation in 2009 and 2020



5.46 We believe that the direction to suppress coal-fired power and increase the shares of clean and non-fossil fuels in our electricity generation mix would serve Hong Kong's needs by 2020 and beyond. The proposal set out in paragraph 5.45 will provide a low carbon formula for our fuel mix in 2020. It is reasonable and practicable, having balanced the various objectives of our energy policy.

Hong Kong's Target on Reducing GHG Emissions

Carbon intensity reduction target

5.47 To reduce Hong Kong's GHG emissions and transform our city to become low-carbon and green, the community has to act collectively towards a common goal. We **propose** to adopt a voluntary carbon intensity reduction target of **50% - 60%** by 2020 as compared with 2005 level (the Proposed Target). We believe that this is an attainable target for Hong Kong, through the implementation of the measures outlined above. This has taken into account the findings and analyses of the Consultants, technical viability of proposed carbon reduction measures in our overall action agenda for tackling climate change, as well as experience in other economies.

GHG emissions reduction

5.48 If the Proposed Target is achieved, we expect an absolute reduction in our total GHG emissions, from 42 million tonnes in 2005 to 28 - 34 million tonnes in 2020, representing a 19 - 33% reduction. Per capita emission is also expected to reduce from 6.2 tonnes to 3.6 - 4.5 tonnes.

Table 6 : Expected GHG emissions reduction in Hong Kong from 2005 to 2020

	2005	2020	Reduction
Carbon intensity (kg CO_2-e/HK dollar)	0.029	0.012 - 0.015	↓ 50-60%
Total GHG emissions (million tonnes)	42	28-34	↓ 19-33%
Per capita GHG emissions (tonnes)	6.2	3.6-4.5	↓ 27-42%

Question 4

Will you agree to the proposed strategy of reducing use of coal and increasing use of natural gas and non-fossil fuels in meeting local electricity demand? Do you think the proposed fuel mix is appropriate for Hong Kong in 2020, with regard to such considerations as better environment, availability, reliability and cost?

Comparison with other economies

5.49 The proposed target for Hong Kong to reduce carbon intensity from the 2005 level by 50-60% by 2020 sits well with the National Target of 40-45%. As a result, total GHG emissions in Hong Kong is expected to be reduced and also compares favourably with the targets pledged by some major industrialised economies. Our projected per capita GHG emissions would be one of the lowest when compared with the industrialised economies.

Table 7 : Comparison with major economies in projected GHG emissions reduction and per capita GHG emissions by 2020

Economies	Projected total GHG emissions reduction between 2005 and 2020	Projected per capita GHG emissions by 2020 (in tonnes CO_2-e) #
USA	17%	14.7 – 17.4
European Union	10% – 24%#	7.4 – 9.0
Japan	30%	7.4 – 7.8
Hong Kong	19% – 33%	3.6 – 4.5

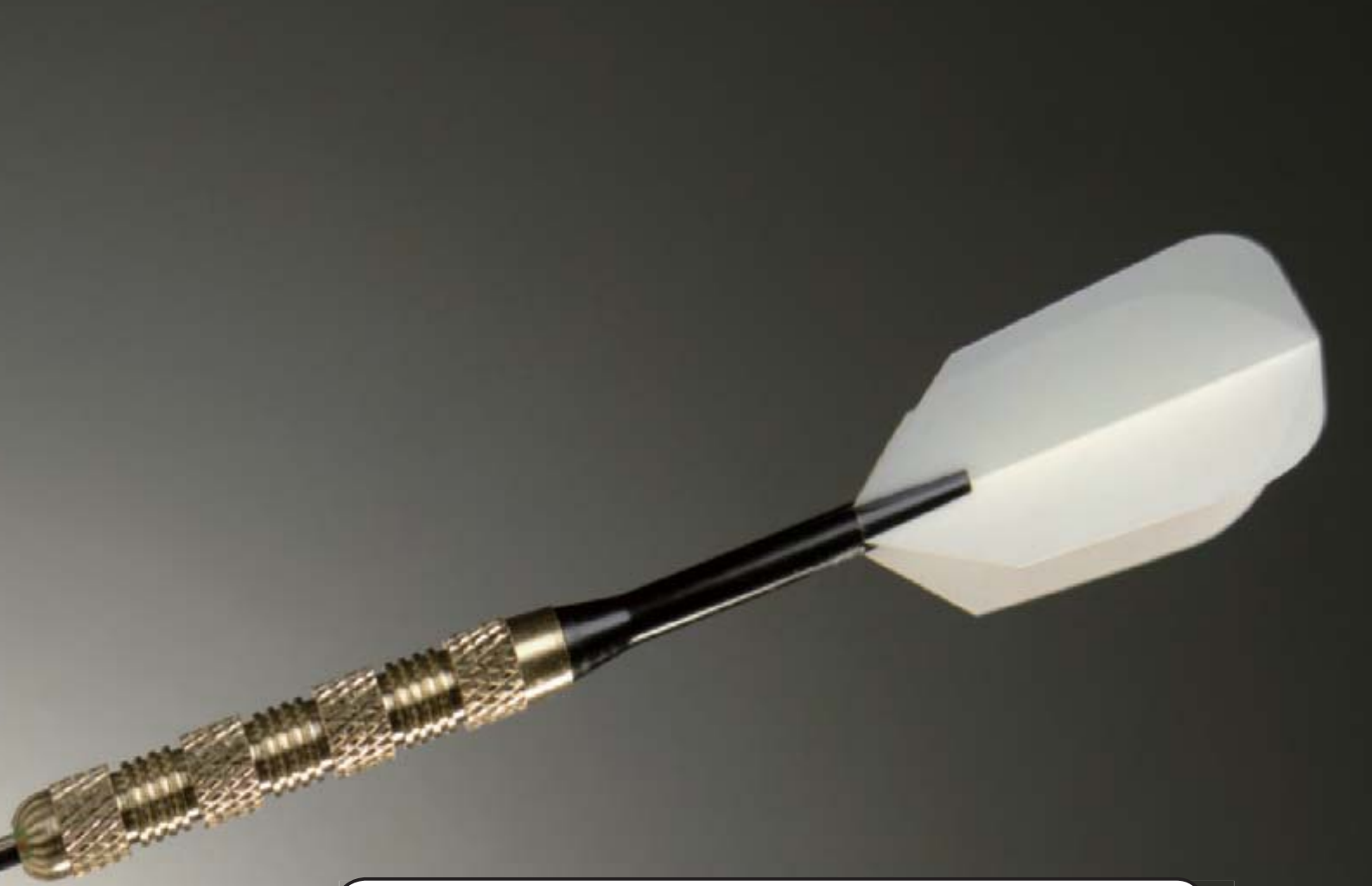
 # The range of reduction level represents the range of pledges made by different economies based on different reporting approach.
Source: World Resources Institute

Additional potential benefits

5.50 We consider the Proposed Target would befit Hong Kong's position as an international city and a highly advanced economy. It would also adequately reflect the performance of our GHG emissions reduction efforts now and in the future.

5.51 Furthermore, investment in enhancing energy efficiency will help reduce recurrent operating costs at enterprises, as well as save on household expenses. In the long run, it will sharpen Hong Kong's competitive edge. Utilising waste-to-energy technologies, cleaner fuel and green transportation will also help bring about a cleaner environment for all of us.

5.52 We believe that going low-carbon will also generate opportunities in green and energy efficient technologies and applications, which could be a promising new economic growth area in the coming decade.



Question 5

To build Hong Kong as a green city, do you agree to the proposed target to reduce the carbon intensity of Hong Kong by 50 - 60 % by 2020 ?

Question 6

Do you support the Government's proposed direction and action agenda in achieving the proposed carbon intensity reduction target?

Question 7

Do you agree that we should strengthen regional co-operation in the Pearl River Delta Region in moving along the low carbon pathway, and aspire to become one of the greenest cities in China?

Closer cooperation with the Mainland

5.53 The Government has been working alongside with the Government of Guangdong to further enhance our co-operation and take forward the Outline of the Plan for the Reform and Development of the Pearl River Delta (PRD). This includes signing of the Framework Agreement in April 2010, which has included the co-operation initiatives being undertaken or actively considered by the Hong Kong and Guangdong sides. One of the objectives is to improve the regional environmental quality and to transform the PRD region into a Green Quality Living Area. For this purpose, a Regional Co-operation Plan on Building a Quality Living Area (the Plan) is being formulated. Amongst others, facilitating low carbon development will be a key element for future regional co-operation. Co-operation in the areas of developing and promoting use of renewable and low-carbon energy, green transportation, cleaner production etc. in both places will be pursued to achieve synergy. In addition, the Framework Agreement supports the increase of use in clean energy with a view to gradually phasing out coal-fired power generators in Hong Kong, and both sides will support increase in the supply of nuclear and other clean energy to Hong Kong. We would also explore the interconnection of electricity grids, increase in the natural gas supply, and further guarantee of electricity supply to Hong Kong.

Call for community-wide participation

5.54 More importantly, we believe that the Proposed Target would be instrumental in building consensus and driving community-wide actions to meet the challenge of climate change.

5.55 The Proposed Target is technically viable but challenging for achievement by 2020. The proposed measures in the action agenda for mitigating the impact of climate change are consistent with the Government's existing policies of promoting energy efficiency improvement, environment-friendly vehicles, energy efficient buildings, and setting up of waste-to-energy facilities, etc.; and represent stepped up actions in achieving present policy objectives.

5.56 We appreciate that some proposed measures would require the availability of technology and products that would come about in the coming decade, market acceptance and extensive community support. Implementation of some of the measures will also require new legislation. We are committed to promoting energy efficiency and a low carbon economy, and engaging the public in driving for changes. The wide coverage of challenging demand-side measures is considered necessary to indicate a comprehensive and community-wide participation in tackling climate change, and for setting a community-wide action agenda.

5.57 Subject to public acceptance of these proposals in principle, we would map out the implementation details of each measure with the stakeholders, including the power companies and other energy enterprises, professional bodies as well as the community at large as appropriate and necessary.

Part 2 : Adaptation to Climate Change

5.58 Scientists over the world point out that the effects of climate change are inevitable, although they will not be uniform across the globe. Climate change will occur at different rates and magnitudes at different locations. Hong Kong would not be unaffected. It is therefore important for us to identify in good time the key vulnerable areas in Hong Kong and the options for adapting to climate change and enhance our resilience towards its possible impacts.

Key Vulnerable Areas in Hong Kong

5.59 Vulnerability to climate change is the degree to which systems are susceptible to, and unable to cope with, its adverse impacts. The Consultants have carried out the first assessment of Hong Kong's vulnerability to climate change based on the current state of knowledge, the information available from IPCC and other expert views. With regard to the likelihood of impacts and vulnerabilities, importance of the vulnerable systems, and potential for adaptation, the Consultants have identified eight sectors or areas in Hong Kong which are more vulnerable to climate change impacts, as follows -

(a) biodiversity and nature conservation;
(b) built environment and infrastructure;
(c) business and industry;
(d) energy supply;
(e) financial services;
(f) food resources;
(g) human health; and
(h) water resources.

Major Impacts on the Vulnerable Areas

5.60 Each of the above areas may be subject to different risks brought about by climate change. Some potential impacts on the vulnerable areas have been assessed by our Consultants and generally agreed among the stakeholders in an earlier engagement event. They include substantial increase in demand for electricity from air-conditioning and refrigeration due to increase in surface temperatures; potential asset damage because of flooding, landslides, wind damage, storm surge, and lightning strike, etc.; and concerns about sustainability of water supply as a result of changing distribution pattern of rainfall and rising regional demand for freshwater.

Adaptation Options and Measures

5.61 Although the effects of climate change are inevitable, it is generally recognised that the risks can be cushioned or ameliorated by adaptive actions, e.g. by making adjustments that reduce the potential for adverse impacts of climate change, and enhance resilience in response to observed or projected changes in climate by making preparations to cope with the unavoidable consequences. The adaptation cornerstones identified by IPCC are reducing exposure, reducing sensitivity and building intrinsic adaptive capacity by raising public awareness and education.

5.62 Adaptation measures cannot entirely eradicate the adverse impacts of climate change and climatic variability. Some events cannot be prevented and for these instances, effective response and recovery plans are the only adequate form of adaptation. Effective adaptation is mainly to help minimise future damages and strengthen capacity to respond to adverse impacts.

5.63 In the context of Hong Kong, the Consultants have identified, and discussed among the stakeholders in an earlier engagement event, five categories of adaptation options for implementation, as follows -

(a) **Monitoring** : Hong Kong possesses significant adaptive capacity and has many systems, facilities and services in place which could be used to adapt to the physical impacts of climate change, e.g. planning suggestions and guidelines for developments in response to extreme temperatures, water management programme in response to drought, rainstorm warnings and flood prevention projects in response to floods, warnings and guidance on wind calculation in building design in response to high winds and gusts, strengthening of public health system to prevent and control communicable diseases and other public health hazards in response to health impacts. Nonetheless, continued vigilance is required in the light of the potentially new challenges;

(b) **Institutional Strengthening and Capacity Building** : Actions that facilitate adaptation to climate change may be embedded within broader sectoral initiatives by strengthening existing and future infrastructure and capacity building;

(c) **Disaster Management and Emergency Planning** : Advance planning to respond to climate related events is considered essential, including disaster management and emergency planning;

(d) **Research and Investigation** : At present, there is high uncertainty concerning the impact of climate change on Hong Kong such as sea level rise, changes in marine environment and extreme weather events.

There are also data gaps with respect to biodiversity and nature conservation, built environment and infrastructure, financial services, food resources, human health and water resources. A substantial amount of research would be required to address the local uncertainty with respect to the potential impacts of climate change, in particular, those associated with the changing physical processes/impact on habitats and species and ecosystem adaptation, at-risk infrastructure, climate risk management, and impact on food and water supply chain; and

(e) **Education and Public Awareness** : Raising public awareness on climate change and their potential impact on socio-economics, people's livelihood, and the ecosystem is an important component for the adaptation strategy. Enhanced awareness encourages public participation and taking climate change actions. The key sectors should also be more sensitised to the particular risks that they will be facing. The Environment and Conservation Fund (ECF) set up under the Environment Bureau provides funding support for public education programmes on, *inter alia*, enhancing public awareness on climate change as well as projects on raising energy efficiency. Communication of climate change, in particular, the causes and potential impacts on ecosystems, climate variability and concepts such as risk and uncertainty, along with the need for adaptation activities should be provided.

Summary of Vulnerabilities and the Proposed Framework of Adaptation Options

5.64 The table below summarises the possible impacts of climate change on the key vulnerable areas of Hong Kong and the general framework of major adaptation options, which the Consultants have examined and proposed for implementation.

Vulnerable areas	Possible major impacts	Adaptation options
Biodiversity and nature conservation	• Change in species distribution patterns due to increase in surface temperatures • Damage to woodlands, coral communities due to increase in frequency and/or severity of extreme weather	**Monitoring** • To review and revise monitoring programmes periodically **Research** • To develop a baseline of species, especially for those of conservation importance • To establish priorities for species/habitats/ ecosystems most at risk
Built environment and infrastructure	• Heavy rain, thunderstorm and extreme weather leading to damaging of building foundations, increased risk of rain penetration of building fabric, and damage to utilities cabling and pipes • Potential asset damage because of flooding, landslides, wind damage, storm surge, and lightning strike, etc.	**Capacity building** • To develop and use climate risk assessment tool for screening future development projects to minimise potential risks posed by climate change and variability • To regularly update and adjust, if necessary, construction-related codes, guidelines and design standards for buildings and infrastructure • To develop flood and landslip risk strategies for increasing adaptive capacity to extreme weather and sea level rise **Research** • To identify at risk infrastructure that are likely to be vulnerable to climate impacts • To update flood risk maps
Business and industry	• Heavy reliance on international trade, financial markets, imports of key products and services exposing Hong Kong to climate change impacts beyond its boundaries and increasing its vulnerability • Vulnerable to climate change impacts on other areas such as food and water resources, transportation and infrastructure, etc. • Higher insurance costs, etc.	**Contingency planning** • To request essential operations to prepare business continuity plan for possible threats arising from climate change
Energy supply	• Electricity generation, supply and overall energy supply vulnerable to climatic disruptions • Increased demand from air conditioning and refrigeration due to increase in surface temperatures leading to supply interruptions and power spikes • Risk of flooding, lightning strike, landslides, causing damage to power lines and other assets	**Monitoring** • To monitor for changes in energy demand and supply patterns to identify trends caused by climate change **Capacity building** • Power companies to consider the latest available climate change scenarios and associated impacts during regular review and forecasts of energy demand and supply • To diversify fuel sources and fuel suppliers • To assess and act on the climate risks and challenges along the energy supply chain, including those at fuel sources and associated logistics and at the generation and distribution assets themselves **Contingency planning** • To incorporate climate change-related risks and challenges in contingency planning

Vulnerable areas	Possible major impacts	Adaptation options
Financial services	• Direct risk relating to vulnerability of telecommunications and computer systems to storms, power failure and spikes • Indirect exposure in terms of changes to the risk profile of individual business and their investments • Some segments of financial services likely to be more exposed, e.g. insurance	**Research** • To examine the insurance coverage on climate risks for infrastructure and assets located in hazard-prone areas and vulnerable assets, and the legal implications of the insurance industry in dealing with climate risks
Food resources	• Extreme weather reducing agricultural outputs at sources of food imported to Hong Kong and pushing up commodity prices • Rise in temperature and increased incidence of pests and diseases affecting poultry and livestock species and resulting in more expensive and lower availability of imports	**Monitoring** • To monitor prices of major food stuff and factors that could lead to fluctuations in prices, and climate change agricultural impact studies for Hong Kong's key food importers **Contingency planning** • To develop an emergency response management plan to deal with unforeseen food shortages **Research** • To examine the impacts on food supply chain and food hazards, and research effects on vulnerable groups
Human health	• Chronic health conditions such as cardio-vascular and respiratory diseases may be aggravated by climatic variables • Thermal stress, exacerbation of asthma and heat stroke may be caused directly by climatic variables • More accidents and emergency situations may result from increased frequency and/or intensity of extreme weather, such as storms, floods, droughts and tropical cyclones, etc. • Changes in some infectious disease transmission patterns are a likely consequence of climate change	**Monitoring** • To set up monitoring programmes to observe health and food safety implications of extreme temperatures on local population and associated impacts on different groups of population • To set up monitoring programmes on proliferation of pests with public health significance **Contingency planning** • To periodically review warning, alert and monitoring systems, as well as emergency services and contingency plans **Research** • To research health and nutrition effects on vulnerable groups
Water resources	• Changing distribution pattern of rainfall and rising regional demand for freshwater may impact on the sustainability of water supply • Increased consumer demand for water due to increase in surface temperatures • Possible salinization of freshwater aquifers due to sea level rise	**Capacity building** • To consider climate change and variability in the regional context and their impact on water resources • To periodically review HK's Total Water Management Strategy **Contingency planning** • To review drought contingency plans as desirable from time to time **Research** • To assess the impacts along the water supply chain

Follow-up action

5.65 The Consultants recognize that there are inherent uncertainties and limitations in the current assessment of climate change impacts on the vulnerable areas, mainly because of the rapid evolution in the climate change science and the lack of local scientific data for some sectors. Implementation of some proposed adaptation options requires careful planning and is likely to incur additional costs within the community. The Consultants recommend, therefore, that the Government should evaluate the implications, feasibility and costs and benefits of these measures before taking them forward.

5.66 Having considered the views and feedback from the public, the IWGCC will monitor and co-ordinate efforts of relevant Government bureaux and departments in implementing suitable options to facilitate adequate adaptation to climate change in Hong Kong, as well as carrying out necessary actions to promote public awareness and understanding of climate change and its likely impacts. Particular regard would be given to international developments and new information available as the scientific understanding on climate change evolves.

Question 8

Do you think that as an individual, you know enough about climate change? Are you prepared to make changes to your lifestyle to help combat climate change? If so, how do you think you can contribute?

Question 9

How do you think climate change will impact the vulnerable areas as identified in this consultation paper? What are your views on the proposed framework of adaptation options?

RESPOND TO THIS CONSULTATION

For ease of reference, a list of the key consultation points is set out at Annex 6. Please send your comments to us on or before 10 December 2010 by mail, e-mail or facsimile to the following addresses –

Address : Environmental Protection Department
Cross-boundary & International Division
Climate Change Policy Co-ordination Section
33/F., Revenue Tower
5 Gloucester Road
Wan Chai, Hong Kong

E-mail : cc_consultation @ epd.gov.hk

Facsimile : 2838 2155

When returning by mail, you can make use of the postage paid form at the centre pages of this consultation paper.

Please note that the Government would wish, either during private or public discussion or in any subsequent report, to be able to refer to and attribute views submitted in response to this consultation paper. 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.

The adoption of a carbon intensity reduction target for Hong Kong and the proposed strategy and action agenda for combating climate change will have profound impact on our economy as well as our environmental performance. We earnestly request you to let us have your views on our proposals as set out in this paper before public consultation closes on 10 December 2010. If you have any enquiries, please contact us on 2594 6302.

Inter-departmental Working Group on Climate Change

Terms of Reference

Having regard to the obligations of the Hong Kong Special Administrative Region (HKSAR) under the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol, the Terms of Reference of the Inter-departmental Working Group on Climate Change are –

(a) to co-ordinate, in close consultation with Government bureaux and departments and other bodies concerned, existing and planned activities to fulfill the HKSAR's obligations under UNFCCC;

(b) to monitor and co-ordinate efforts of relevant Government bureaux and departments in formulating and carrying out measures to control greenhouse gas emissions and facilitate adequate adaptation to climate change;

(c) to monitor closely the latest international developments on climate change and make recommendations for appropriate action taking account of these developments; and

(d) to formulate and co-ordinate action to promote public awareness and understanding of climate change and its likely effects.

Membership

Led by Environment Bureau, with representation of the following policy bureaux and government departments –

Development Bureau

Economic Analysis and Business Facilitation Unit, Financial Secretary's Office

Education Bureau

Food and Health Bureau

Transport and Housing Bureau

Agriculture, Fisheries and Conservation Department

Architectural Services Department

Buildings Department

Civil Engineering and Development Department

Drainage Services Department

Electrical and Mechanical Services Department

Environmental Protection Department

Food and Environmental Hygiene Department

Health Department

Home Affairs Department

Hong Kong Observatory

Housing Department

Leisure and Cultural Services Department

Planning Department

Transport Department

Water Supplies Department

GHG Emissions and Carbon Intensity in Hong Kong

Year	Total GHG emissions (kilotonnes CO_2-e)	Per capita emissions (tonnes CO_2-e)	Carbon Intensity (kg CO_2-e per HK Dollar GDP)
1990	35,300	6.2	0.044
1991	38,800	6.7	0.046
1992	43,000	7.4	0.048
1993	43,400	7.4	0.046
1994	35,900	5.9	0.036
1995	36,900	6.0	0.036
1996	35,600	5.5	0.033
1997	34,100	5.3	0.030
1998	35,500	5.4	0.033
1999	33,300	5.0	0.031
2000	34,600	5.2	0.029
2001	34,700	5.2	0.029
2002	36,200	5.4	0.030
2003	39,600	5.9	0.032
2004	39,800	5.9	0.030
2005	42,000	6.2	0.029
2006	42,300	6.2	0.027
2007*	43,300	6.3	0.026
2008*	42,000	6.0	0.025

* *Provisional figures subject to revision*

GHG Emissions in Hong Kong by Sector

Year	Greenhouse gas emissions (in kilotonnes CO_2-e)						
	Energy			Waste	Industrial Processes and Product Use	Agriculture, Forestry and Other Land Use	TOTAL
	Electricity Generation#	Transport	Other End Use of Fuel@				
1990	22,900	5,940	4,560	1,550	215	140	35,300
1991	25,600	6,470	4,330	1,600	638	123	38,800
1992	29,200	6,870	4,530	1,660	651	100	43,000
1993	29,700	6,970	4,230	1,760	724	87	43,400
1994	21,900	7,270	4,030	1,770	830	77	35,900
1995	23,000	7,180	3,720	1,940	935	85	36,900
1996	21,800	7,170	3,630	1,900	952	86	35,600
1997	20,000	7,340	3,660	2,010	1,060	75	34,100
1998	22,100	7,430	3,370	1,550	977	70	35,500
1999	20,100	7,570	3,430	1,120	1,020	85	33,300
2000	21,200	7,800	3,500	1,120	977	78	34,600
2001	21,600	7,640	3,160	1,260	862	85	34,700
2002	23,400	7,890	2,810	1,490	503	82	36,200
2003	26,500	7,810	2,890	1,800	538	74	39,600
2004	26,400	7,640	3,060	2,000	636	67	39,800
2005	28,600	7,480	2,720	2,220	867	73	42,000
2006	28,500	7,480	2,730	2,140	1,380	74	42,300
2007*	29,600	7,380	2,720	2,180	1,350	52	43,300
2008*	28,000 (67%)	7,350 (18%)	2,850 (7%)	2,160 (5%)	1,590 (4%)	29 (0%)	42,000 (100%)+

** Provisional figures subject to revision*
 # Including Towngas production which accounts for only about 1% of GHG emissions caused by energy production
@ Including use of fuel for combustion in commercial, industrial and domestic premises
+ Do not add up to 100 due to rounding

GHG Reduction Targets Announced by Other Economies

To date, major economies have announced economy-wide target on GHG emissions for 2020 (see table below). Industrialised economies express their GHG emissions reduction targets as a percentage reduction in total GHG emissions by 2020 as compared with a base year ranging from 1990 to 2005. Major developing economies (including China) usually express their targets as a percentage reduction in carbon intensity by 2020 as compared with a base year.

(a) Annex I (Industrialised) Economies	Total GHG Emissions Reduction Targets by 2020		
	Unconditional[1]	Conditional[2]	Base Year
Australia	5%	5-15 or 25%	2000
Canada	NA	17%	2005
European Union	20%	30%	1990
Japan	NA	25%	1990
New Zealand	NA	10-20%	1990
Norway	30%	40%	1990
Russian Federation	15-25%	NA	1990
Switzerland	20%	30%	1990
USA	NA	17%	2005

(b) Major Non-Annex I (Developing) Economies	Carbon Intensity Reduction Targets for 2020	
	Unconditional[1]	Base Year
China	40-45%	2005
India	20-25%	2005

1 Unconditional target is set by an economy without any string attached.

2 An economy pledges to achieve the conditional target only if specific conditions are fulfilled. These conditions may include the signature of an international legally binding agreement on emissions reduction by all or majority of economies, agreement on specific accounting rules, provision of adequate support from other economies, and passing of relevant national legislation.

Existing Measures Taken by the Government to Reduce GHG Emissions

(1) Enhancing Energy Efficiency

1.1 The Government has been taking forward a series of initiatives to promote building energy efficiency and conservation. They include –

(a) introducing in end 2009 new legislative proposals to mandate the Building Energy Codes covering lighting, air-conditioning, electrical and lift & escalator installations, with a view to enhancing the energy performance of existing and new buildings and reducing electricity consumption;

(b) implementing the "Buildings Energy Efficiency Funding Scheme" since April 2009 to provide financial subsidies on a matching basis to private building owners to conduct energy-cum-carbon audits and energy efficiency improvement projects in buildings. As at August 2010, about 1210 applications have been received. Over 550 funding applications have been approved, involving a total subsidy of $172.8 million and contributing to a reduction in carbon emissions by 65 100 tonnes per annum;

(c) launching the "Green Hong Kong • Carbon Audit" campaign in July 2008 following promulgation of carbon audit guidelines for buildings in Hong Kong. Thus far, more than 190 organisations from different sectors of the community have become the "Carbon Audit • Green Partners" to undertake to conduct carbon audits and to initiate carbon reduction programmes;

(d) launching a comprehensive target-based Green Performance Framework since April 2009 for new and existing Government buildings to promote environmental protection and energy conservation. The Government has been leading by example in implementing energy saving programmes within Government departments, including -

- all new Government buildings and major retrofitting projects at Government buildings have complied with the Building Energy Codes since 2005;
- taking forward energy efficiency demonstration projects for demonstration of state-of-the-art energy-efficient designs and technologies;
- conducting energy audits at Government venues;
- maintaining air-conditioned room temperature of government offices at 25.5°C in summer months; and
- replacing all conventional traffic signal at 1 900 signalised junctions in Hong Kong with LED traffic signals by phases, etc.;

(e) reviewing the Building (Energy Efficiency) Regulation and the overall thermal transfer value (OTTV) standard of buildings, with a view to improving energy performance of buildings;

(f) rolling out the Mandatory Energy Efficiency Labelling Scheme since 2009 to cover room air-conditioners, refrigerating appliances and compact fluorescent lamps and extending the scope to cover dehumidifiers and washing machines in 2011; and

(g) promoting the use of water-cooled air-conditioning systems by publishing a code of practice in July 2006, covering guidelines for cooling tower design, installation, testing, commissioning, operation and maintenance. The Government is also setting up a District Cooling System (DCS) to provide more energy-efficient air cooling services in the Kai Tak Development.

(2) Greening Road Transport

2.1 Hong Kong has been well served by its public transport system, and around 90% of the residents use public transport everyday. Forbes magazine ranked Hong Kong's commute the best among 84 worldwide cities. Rail is the backbone of the system, with a total route length of 218.2 km. In addition, projects are being taken forward to further enhance the infrastructure with a view to facilitating easier greener transport, e.g. the West Island Line, the Shatin to Central Link, and the South Island Line, etc.

2.2 The Government has also been encouraging the use of more environment-friendly vehicles with low emissions and high fuel efficiency through tax concession. To further promote their use in the commercial sector, starting from the 2010/11 financial year, enterprises could enjoy 100% profits tax deduction in the first year of their capital expenditure on such vehicles.

2.3 Car manufacturers all over the world have been gearing up in developing electric vehicles (EVs) and putting them to commercial production. The Government has also been actively promoting wider adoption of EVs in Hong Kong. The Financial Secretary has pledged in the 2010-11 Budget to set up a $300 million Pilot Green Transport Fund to encourage the local transport sector to use more environmentally friendly transportation technology, including EVs. The Government has also been taking the lead in introducing EVs and other cleaner vehicles (such as hybrid vehicles) into our vehicle fleet.

2.4 In addition to an adequate supply of EVs, it is also necessary that an ancillary charging network and relevant supporting services such as repair and maintenance are set up locally. On this front, some 60 EV charging points have been installed in different locations across the territory as at June 2010. It should be stressed that the number of charging facilities installed thus far is only the beginning of a continual growth trend as the number of EVs and the demand for such facilities increase over the time.

(3) Promoting the Use of Biodiesel

3.1 The Government has announced in 2007 a standing policy to make use of biodiesel as motor vehicle fuel duty-free. We have also recently established

the statutory product requirements for biodiesel used by motor vehicles under the Air Pollution Control (Motor Vehicle Fuel) (Amendment) Regulation 2009. This should help boost the confidence of vehicle owners in using biodiesel. Furthermore, the Government is actively considering the use of biodiesel in its motor vehicle fleet.

(4) Turning Waste to Energy

4.1 Amid the growing awareness in the community, waste recycling rate reached almost 50% in 2009. Still, about 9 000 tonnes of municipal solid wastes (MSW) are disposed of at Hong Kong's three strategic landfills every day. This is not a sustainable approach to waste management. The disposal of MSW at landfills not only takes up the precious land space of Hong Kong which could otherwise be used for other purposes, it also generates methane, a landfill gas which has 21 times higher global warming factor than carbon dioxide. Such an approach to waste also overlooks the fact that MSW could be a resource for turning into energy. The waste-to-resource potentials of MSW is commonly recognised by other economies, including many Asian cities.

4.2 Waste reduction and recovery has always played an important role in our waste management strategy. The Government has been advocating for the community to recycle more, discard less, and lead a green lifestyle.

4.3 To encourage waste reduction, recovery and recycling, the Government has since January 2005 been taking forward a territory-wide programme in respect of source separation of domestic waste.

4.4 Action is also being taken to reduce the amount of food waste requiring disposal at landfills. The Government commissioned a pilot composting plant in mid-2008 to gather experience and information on the collection and treatment of organic waste. The pilot plant has provided useful local information and experience in developing the first phase of Organic Waste Treatment Facilities. Biological treatment technology will be adopted for recycling food waste into compost product and biogas as renewable energy.

4.5 To reduce GHG generated from solid waste disposal, efforts have been made to use the methane content of landfill gas for towngas production and, where possible, for electricity generation and heat conversion for daily landfill operation.

(5) Cleaner Fuel for Power Generation

5.1 Starting from 1997, power companies in Hong Kong were not allowed, for environmental reasons, to build new coal-fired power plants and all new generation units are fueled by natural gas.

Annex 6

List of Key Consultation Points

1 Do you notice more extreme weather in Hong Kong, such as more hot days and heavier rainfall? Do you think climate change is affecting us?

2. In the light of international and national developments, do you agree that Hong Kong should adopt a carbon intensity target to guide our future actions to control GHG emissions?

3 Do you agree that the community should conserve energy and use greener transport to reduce local GHG emissions? What do you think you could do as an individual or as a business enterprise?

4 Will you agree to the proposed strategy of reducing use of coal and increasing use of natural gas and non-fossil fuels in meeting local electricity demand? Do you think the proposed fuel mix is appropriate for Hong Kong in 2020, with regard to such considerations as better environment, availability, reliability and cost?

5 To build Hong Kong as a green city, do you agree to the proposed target to reduce the carbon intensity of Hong Kong by 50 - 60 % by 2020?

6 Do you support the Government's proposed direction and action agenda in achieving the proposed carbon intensity reduction target?

7 Do you agree that we should strengthen regional co-operation in the Pearl River Delta Region in moving along the low carbon pathway, and aspire to become one of the greenest cities in China?

8 Do you think that as an individual, you know enough about climate change? Are you prepared to make changes to your lifestyle to help combat climate change? If so, how do you think you can contribute?

9 How do you think climate change will impact the vulnerable areas as identified in this consultation paper? What are your views on the proposed framework of adaptation options?

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