Combating Climate Change:
Energy Saving and Carbon Emission Reduction in Buildings

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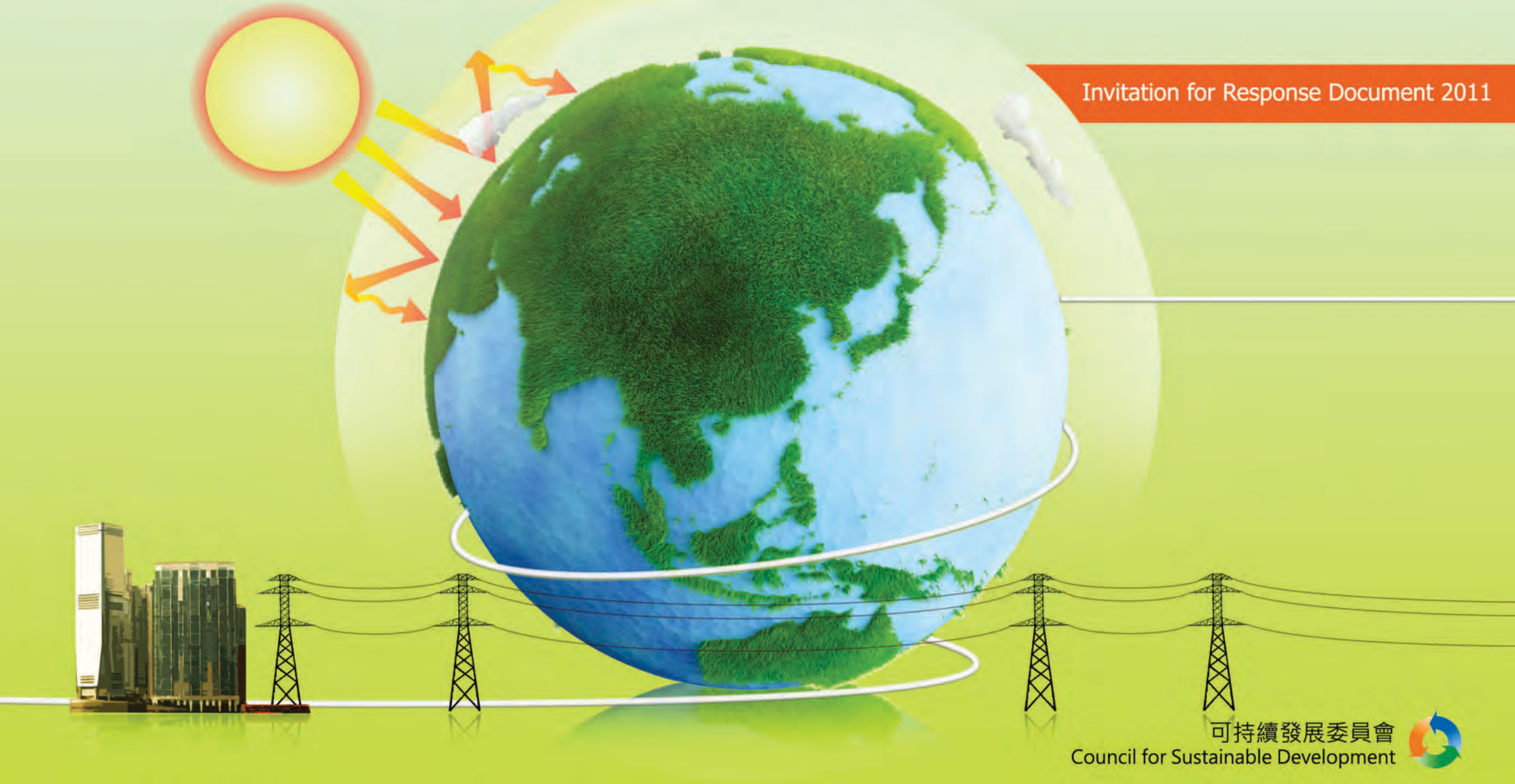
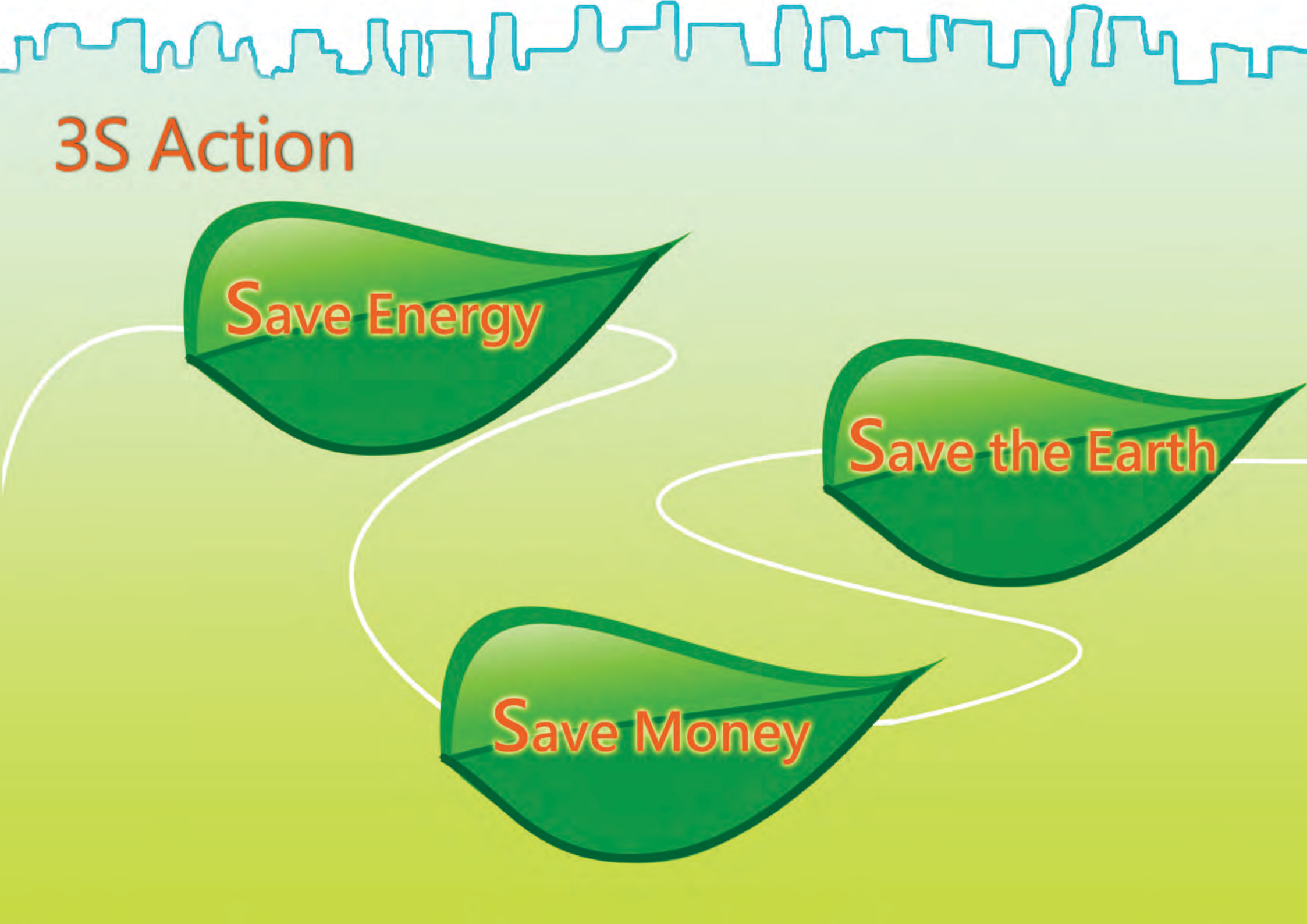


Invitation for Response Document 2011

可持續發展委員會
Council for Sustainable Development


3S Action
Save Energy
Save the Earth
Save Money

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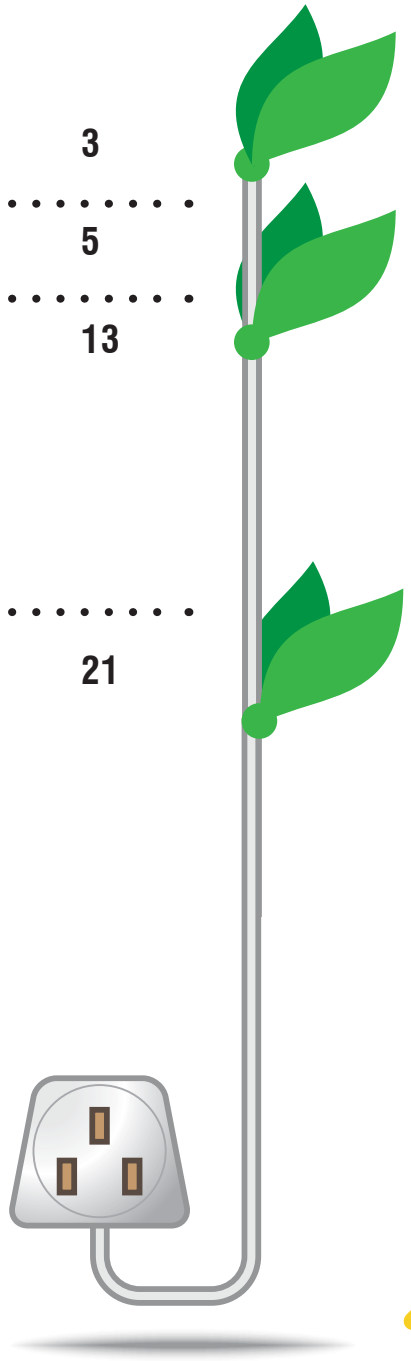


FOREWORD

Climate change is an issue we cannot ignore. It is already beginning to transform the way we live. Most of us have felt the impact but few are able to relate them to climate change.

It cannot be tackled by the efforts of one country alone nor can the challenges it presents be overcome by the well-intentioned actions of just a few in the community. In late May 2011, estimates from the International Energy Agency showed that in 2010, global carbon dioxide emissions from fossil fuels rose by a record amount despite the impact of the economic recession and existing policies aimed at controlling greenhouse gases (GHGs) emission. Climate change will affect us all and we must all respond to its challenges as responsible members of the local and global community.

In the last quarter of 2010, the Government conducted a public consultation to gauge the views of the community and various stakeholders on Hong Kong's climate change strategy and action agenda for the coming decade. The public consultation document not only proposed a target of reducing Hong Kong's carbon intensity in 2020 by 50%-60% compared to the 2005 figure but also set out a series of possible supply-side options and demand-side measures to help achieve this target.

The Fukushima nuclear plant incident triggered introspective thoughts in using and managing the demand-side of limited and increasingly expensive energy resources as effectively as possible. The Council for Sustainable Development has decided to conduct a new public engagement exercise to gauge the views of the community and stakeholders on concerns, incentives and potential action plans on demand-side management of electricity consumption.

Electricity consumption per capita in Hong Kong has risen steadily over the past 10 years. Some 90% of the electricity consumed in Hong Kong is used at buildings. Generating this electricity accounts for almost 60% of our GHGs emission. It is essential then that we use electricity efficiently and wisely, not just to help curb GHGs emission, but also because it makes sound financial sense. Saving just 1 kWh of electricity each day over a one year period can cut our electricity bills by an average of HK$365 and reduce carbon dioxide emissions by around 260 kg. The way that we use electricity in buildings is crucial to achieving these savings. Just how major building user groups - households, offices, retailers and caterers - see the opportunities, incentives and the concerns over saving electricity are things we need to know so that we can recommend action plans that are workable and achievable.

The public engagement process will take place from August to December 2011. This Invitation for Response Document provides a discussion framework containing background information on climate change and GHGs emission and electricity use in Hong Kong. It also explains how electricity is currently used by different building user groups and the measures that have already been taken by the Government and by various stakeholders to foster and encourage the more efficient use of electricity. It also identifies options for achieving further improvements in energy efficiency and energy saving in the future.

We all recognise that this is a complex issue. It raises many questions and problems but solutions may not be immediately obvious or workable. You may not be familiar with some of the concepts and terms used in this document. But please do not feel intimidated by them. After all, we all use electricity each and every day - without it our lives would be totally different. Please read this document or just focus on the sections that you feel are most relevant to your individual situation. Towards the end of the document, we explain how you can provide us with your ideas, opinions and viewpoints. There will also be opportunities to attend and participate in regional forums. The public engagement exercise will also have a dedicated website to provide you with up-to-date information on the subject and upcoming events. Your opinions and views are of tremendous importance to us. They will help us gain a better understanding of how electricity is used in Hong Kong buildings and assist us in recommending the way forward to the Government.

On behalf of the Council for Sustainable Development, I would like to thank you in advance for your participation in this engagement and for sharing your views with us. Your views will point us to the right direction for Hong Kong to make the transition to be a truly low-carbon city in the decades ahead.

Bernard Chan
Chairman
Council for Sustainable Development

EXECUTIVE SUMMARY

Background

This **Invitation for Response (IR) Document** seeks to invite interested individuals and organisations to give their views and comments on achieving energy saving and enhancing energy efficiency in buildings that will lead ways to combating climate change. The public engagement exercise aims to facilitate the exchange of ideas **on the concerns, incentives** and **possible action plans** for the **demand-side management in electricity consumption** and carbon intensity reduction.

Some 90% of Hong Kong's electricity is consumed in buildings and buildings alone account for about 60% of Hong Kong's greenhouse gases (GHGs) emission. The Council for Sustainable Development (SDC) recognised that buildings are an important area for climate change mitigation actions and proposed to focus strategically on **four core building user groups, i.e. household, office, retail and catering**, in order to maximise building energy efficiency and reduce carbon emissions.

Climate Change, Energy Consumption, Greenhouse Gases Emission and You

Climate change in its simplest term refers to changes of climate that are attributed directly or indirectly to human activities. Such changes are usually measured or noticed in the long term variations of the weather conditions, e.g. temperature, precipitation and wind patterns. In Hong Kong, meteorological observations in the past century reveal that there is a long term increasing trend in the city's average temperature and annual rainfall. The annual number of hot days/nights and annual rainfall are expected to increase over the coming decades. There will also be more occurrence of extreme weather.

Changes in climate will inevitably affect where and how people, plants and animals live, such as impacts on food production, accessibility and use of fresh water, and health risks. To alleviate climate change and its related impacts, both supply-side and demand-side management measures should be adopted. Innovations of renewable energy should be actively explored while every Earth citizen should revamp our conventional ways of living and pursue higher energy efficiency resulting in reduction in carbon emissions. Tackling climate change from the demand side will help achieve the higher goal of sustainability: saving energy means saving natural resources, reducing carbon emissions and saving costs.

Hong Kong Context

In 2008, Hong Kong's GHGs emission per capita were about six tonnes. In terms of sectoral contribution, electricity generation accounted for about 67% of our total emissions (2008 figure), whereas transport sector accounted for 18% and waste for about 5%. Electricity consumption per capita in Hong Kong has been continuously increasing and figures in 2008 showed that 89% of our city's electricity is consumed in buildings. In other words, buildings account for about 60% of Hong Kong's GHGs emission. These lay down a very strong case for targeting the four building user groups for territory-wide reductions in energy consumption and carbon emissions.

The Engagement Process

The SDC has identified household, office, retail and catering as the four core building user groups with the aim to allow for a more focused discussion on how each group can maximise energy efficiency and minimise carbon emissions in building uses. These four groups cover a wide spectrum of the general public as well as practitioners in the area of estate management and trades.

To effectively channel in views from the stakeholders and the public, the engagement programme involves different activities. A series of **informal meetings** were arranged to pick the brains of members of the SDC and its sub-committee in the early stage; **five focus group** meetings were arranged in April and May 2011 to solicit views and concerns from the target building user groups. These initial findings and **research on local and overseas experience** have formed the basis of this IR Document to facilitate informed and structured discussions among the stakeholders in the building user groups as well as in the wider community.

The public engagement process will take place from August to December 2011, **five regional forums** will be carried out to gauge public's ideas on **possible incentives, concerns and actions in energy saving and energy efficiency in building related activities**.

To help promote the engagement activities, more than 60 organisations would join the engagement programme as Supporting Organisations. These organisations, including tertiary institutions, research institutions, green groups, government and non-governmental organisations, as well as other business-related and professional organisations, are engaged to help disseminate invitation to the engagement exercise.

What have been in place already?

Existing measures for the promotion and implementation of energy efficiency in buildings can be discussed in four broad areas: regulation, financial assistance, incentive scheme and government leading by example.

Regulation currently mandated by the Government includes:

Buildings Energy Efficiency Ordinance (The Ordinance) which regulates compliance with the Building Energy Code to make building services installations more energy-efficient. The subjected building services installations include lighting, electrical, air conditioning and lifts and escalators installations. The Ordinance also mandates commercial buildings or commercial portion of composite buildings in Hong Kong to conduct energy audit once every ten years.

Energy Efficiency (Labelling of Products) Ordinance requires energy labels to be displayed on prescribed electrical products before being supplied in Hong Kong to facilitate consumers in choosing energy-efficient electrical appliances. The Voluntary Energy Labelling Scheme was also set up for 19 types of household appliances and office equipment to encourage manufacturers and suppliers to market more energy-efficient products.

Overall thermal transfer value (OTTV) is a measure of the energy consumption of a building envelope and applicable to commercial buildings and hotels as defined in the **Building (Energy Efficiency) Regulation.**

Financial assistance is another form of support offered by the Government with the aim to speed up the implementation of energy saving measures. **Buildings Energy Efficiency Funding Schemes** were launched in 2009 to provide financial support to building owners to conduct energy-cum-carbon audit as well as to conduct energy efficiency improvement projects that enhance buildings energy efficiency, and thus reduce carbon emissions from building related activities.

There are also programmes initiated by the Government and other related organisations with the aim to raise awareness of and facilitate actions in energy saving and carbon reduction. Some of these examples include **Hong Kong Awards for Environmental Excellence, "Green Hong Kong · Carbon Audit" campaign**, and various **online tools** such as carbon calculators and carbon audit toolkits to enable the public to get familiar with the concept of energy consumption and carbon reduction.

Ideas for More Action

Based on the findings from meetings with various stakeholders as well as reviewing local and overseas examples, the SDC puts forward an initial list of possible actions with a view to facilitating further discussion in the community. These possible actions are considered adoptable by one or more of the four building user groups in achieving higher energy efficiency and carbon reduction. These ideas can be categorised into systemic enhancement and facilitation of behaviour change.

Six possible actions are identified under **systemic enhancement**:

- **To consider tightening the Building Energy Code (BEC)** — other countries such as Australia have put in place national standards making minimum energy performance requirements for new buildings and major refurbishments statutory. In view of the current BEC covering four building services installations, i.e. lighting, electrical, air conditioning and lift and escalator installations, comments were received on the possible tightening of the current performance standards of these building services installations as well as extending the requirements to other installations.
- **To consider providing recognition for buildings achieving high energy efficiency** – it was a general consensus at the focus group meetings that good practice in making buildings more energy-efficient should be recognised. At present, BEAM Plus is a comprehensive assessment scheme available in Hong Kong. The scheme is recognised and accredited by the Hong Kong Green Building Council.
- **To explore extension of the application of the Mandatory Energy Efficiency Labelling Scheme (MEELS)** – the MEELS is well-received by many users in the community. Suggestions were received on extending the scheme to include other electrical appliances. The current lists of appliances under both the mandatory and voluntary schemes should be revisited to cover more commonly used electrical appliances to allow customers to make informed choices when buying electrical appliances.
- **To consider tightening up the energy efficiency grading levels for room air conditioners and refrigerators under the MEELS** – building on the potentials of the MEELS, members of the focus group meetings suggested to further tighten the energy efficiency grading levels for room air conditioners and refrigerators, the two appliances that are used most often and have contributed to a significant portion of electricity use within buildings.
- **To explore phasing out energy-inefficient incandescent light bulbs** – referring to international trend, there is wide spread movement to phase out incandescent light bulbs and target phase-out years were set. Australia, Canada, Korea and the United States are just some of the examples where the national target phase-out year has been mandated.
- **To explore phasing out energy-inefficient electrical installations/ appliances** – apart from the phasing out of incandescent light bulbs, other energy-inefficient electrical installations/appliances can be explored. In Japan's experience, 21 household and office appliances including air conditioners, TV sets, computers, microwaves, heaters and rice cookers, etc. are currently under a regulatory scheme designed to stimulate the continuous improvement of the energy efficiency of products by setting target values based on the current highest efficiency level of each type of product in the market instead of the current average efficiency level.

On the **facilitation of behaviour change**, **five** areas of action are proposed:

- **Energy/Carbon audit** – drawing experience from overseas cases and leading examples from local trades, energy/carbon audit is useful in providing an indication on operations' performance in electricity consumption and GHGs emission. These sets of information indicate possible areas for improvement and may eventually lead to potential cost savings. Possibility should be explored on introducing energy/carbon audit to priority groups of operations/building user groups, such as government departments and public housing estates, large corporations, listed companies, etc.
- **Better understanding of your energy consumption** – if building users have access to a year-on-year (by month) comparison of their own energy consumption, i.e. informative electricity bills, they may start to review their consumption pattern and undertake any possible behaviour change to save cost and energy use. Allowing building users to make reference to average energy consumption, such as in "per-capita" and "per-square meter" basis, will also enable them to benchmark their own level of consumption.
- **More use of energy efficiency management systems** – a number of information technology products and intelligent building environmental management systems are currently available to facilitate users to adopt energy-efficient practices. It was suggested to further promote the use of these management systems.
- **Promote adoption of energy-efficient electricity appliances among the trades** – the availability of energy-efficient electrical appliances is important to local trades who wish to invest in energy saving. Research & development and innovations on these electrical appliances should be actively promoted to encourage a wider choice for users. Publicity and dissemination of the latest information on highly energy-efficient electrical appliances should be made available to the trades and the public.
- **Electricity tariff structure review** – in the context of facilitating behaviour change, it was suggested to review the current electricity tariff structure on the basis that a fine-tuned tariff structure could change the operation of electricity cost-sensitive businesses/organisations.

Questions for Thoughts

Climate change and its related issues may be too broad and abstract to comprehend for most of us. Relating the topic with energy efficiency, energy saving and cost saving would help lay down the context for solid actions and implementation. We hope that the proposed actions may help trigger more thoughts from everyone in the society so that public discussion can be fruitful taking into account the considerations of people from all walks of life. A list of questions is proposed to stimulate further discussion with a view to building consensus on the way forward for alleviating climate change through improving the efficiency of energy use in buildings. The key questions are listed below:

Climate Change And You

(i) What does climate change mean to you?

(ii) Do you think you can contribute to the Government's proposed target of reducing Hong Kong's carbon intensity by 50%-60% in 2020 as compared with the 2005 level? If yes, what measures would you take? If no, why not?

Systemic Enhancement

(i) To consider tightening the Building Energy Code (BEC)

- *Do you agree that we should tighten the energy efficiency standards for the four building services installations (lighting, air conditioning, electrical and lift & escalator) covered by the BEC?*
- *Do you think that the BEC should cover other types of building services installations? If yes, what are they?*

(ii) To consider providing recognition for buildings achieving high energy efficiency

- *Do you think energy-efficient buildings should be recognised by the Government or other institutions through award/labelling scheme?*
- *What kind of elements (e.g. estimated/actual energy performance, housekeeping practices, innovative measures etc.) should be included in the assessment?*

(iii) To explore extension of the application of the Mandatory Energy Efficiency Labelling Scheme (MEELS)

- *Do you agree that we should introduce more electrical appliances under the MEELS?*
- *Will you consider installing energy-efficient electrical appliances even if their price may be higher than the energy-inefficient ones? If yes, why? If no, why not?*

(iv) To consider tightening up the energy efficiency grading levels for room air conditioners and refrigerators under the MEELS

- *Do you think there is a need to tighten up/revisit the grading levels under the MEELS, particularly for room air conditioners and refrigerators which consume a considerable amount of electricity?*

(v) To explore phasing out energy-inefficient incandescent light bulbs

- *Do you think we should restrict the supply of energy-inefficient incandescent light bulbs in Hong Kong as in some overseas jurisdictions?*
- *Are you using energy-efficient light bulbs at your home or workplace? If yes, what's the result? If no, why not?*

(vi) To explore phasing out energy-inefficient electrical installations/ appliances

- *Should we consider imposing minimum energy performance standards for electrical appliances? If yes, on what type of electrical appliances?*

Facilitation Of Behaviour Change

(i) Energy/Carbon audit

- *Has carbon audit been conducted in your own housing estate/ workplace?*
- *Have you ever considered conducting carbon audit in any premises/ building? If yes, what were your considerations? If no, why not and what are the obstacles?*
- *Do you want to understand more about the carbon emission level in your building and possible ways to reduce energy consumption?*
- *Is energy/carbon audit conducive to identification/implementation of appropriate energy saving measures?*
- *What kind of assistance or incentive should be available from the Government or other organisations to facilitate carbon audits?*
- *Which kind of organisation(s) should take the lead in conducting energy/carbon audit, e.g. government departments/large corporations/listed companies/small and medium enterprises etc.?*

(ii) Better understanding of your energy consumption

- *What kind of information should be provided in our electricity bills?*
- *What kind of presentation style do you prefer?*

(iii) More use of energy efficiency management systems (EMS)

- *How should we promote the adoption of EMS/tools/technologies in buildings?*
- *What kind of incentives should be provided for the developers/ property management companies etc. to adopt EMS in buildings?*

(iv) Promote adoption of energy-efficient electrical appliances among the trades

- *Do you think that there should be more investment on research & development (R&D) for energy-efficient electrical appliances for local trade use?*
- *What would be the best way to provide information on R&D and the marketing of such electrical appliances for you?*

(v) Electricity tariff structure review

- *Do you think the restructuring of electricity tariff can facilitate behaviour change and achieve energy saving?*

Welcoming Your Views

We sincerely welcome your views on the above possible actions and any other ideas you may have in implementing energy efficiency and energy saving. Please let us have your views by 4 December 2011 through the following channels:

E-mail: comments@susdev.org.hk

Website: www.susdev.org.hk

Mail: Sustainable Development Division, Environment Bureau, M/Floor, Murray Building, Garden Road, Central, Hong Kong.

Fax: 3150 8168

The public engagement process will take place from August to December 2011, and a series of regional forums will be organised. We welcome any members of the public to join. Information and registration details can be found at: www.susdev.org.hk.

For further information, you may call the Public Engagement Hotline: 2219 4763.

1. INTRODUCTION

Climate change is one of the greatest challenges of the 21st century. The consequences of **climate change** are global and long-term. Therefore, the Council for Sustainable Development (SDC) initiated this public engagement exercise to facilitate exchange of ideas on the possible incentives, concerns and action plans for maximising energy efficiency and minimising carbon emissions in building uses.

1.1 WHAT IS CLIMATE CHANGE?

The meaning of climate change

Climate change refers to a long-term shift in the Earth's global or regional climate, measured by long term changes in the weather conditions, such as temperature, precipitation and wind pattern.

World Meteorological Organisation (WMO)[1]

"a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use"

United Nations Framework Convention on Climate Change[2]

"a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods"

Growing concerns about impacts of climate change

According to the WMO, **2010 was one of the warmest years on record**, and the ten warmest years on record have all occurred since 1998. With increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level, the 2007 Intergovernmental Panel on Climate Change (IPCC) assessment report[3] concludes that global warming is unequivocal and accelerating.

As the natural balance of the climate system has been disturbed, it is not surprising that extreme weather events, such as **heat waves, flooding and drought**, have become more frequent, intense and widespread.

Although climate change is a natural phenomenon, the warming trend since the mid-20th century is very likely due to **human activities** such as the burning of fossil fuel and deforestation which increase concentrations of greenhouse gases (GHGs). As human-induced GHGs such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) act like a blanket which traps heat in the atmosphere, the surge of GHGs concentrations after the Industrial Revolution has resulted in an enhanced greenhouse effect, making the Earth hotter and hotter. The IPCC projected that there would be more frequent and intense extreme weather events due to global warming[4].

According to the United Nations' Human Development Report 2007/2008[5], we must not allow temperatures to rise more than **2°C** above pre-industrial levels if we wish to avoid catastrophic impacts of climate change.

The average temperature of the Earth's surface has risen by 0.74°C between 1906 and 2005.

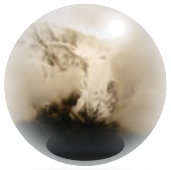
Global average sea level rose at an average rate of 1.8 mm per year over 1961 to 2003 and at an average rate of about 3.1 mm per year from 1993 to 2003.

Summer heat wave causing droughts and devastating forest fires?

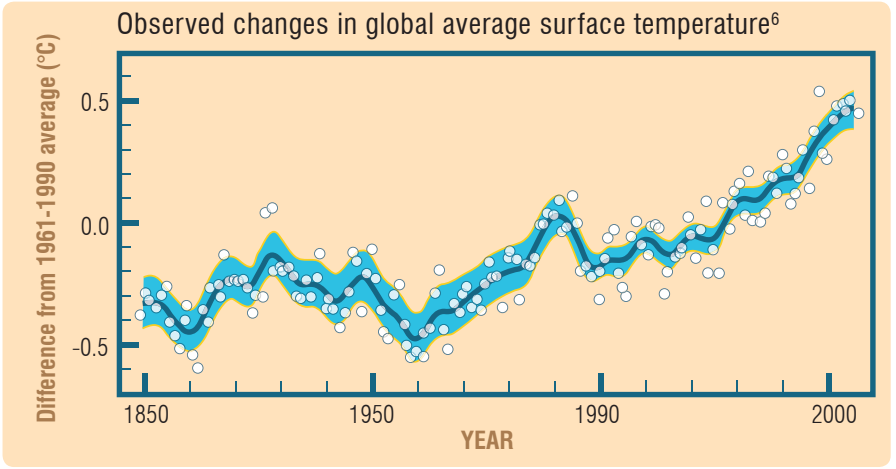
Long droughts affecting the crop yields and food prices?

More widespread flooding and mudslides?

Annual average Arctic sea ice extent has decreased by 2.7% per decade since 1978.

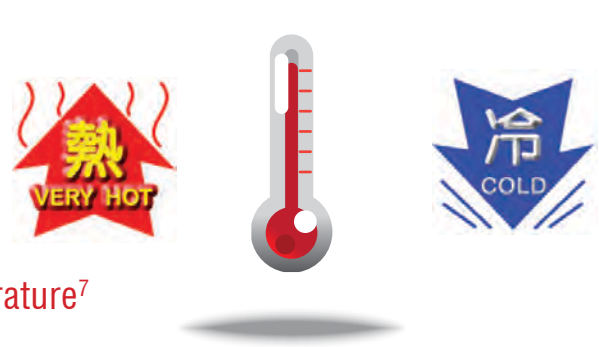


Mountain glacier and snow cover on average have declined in both hemispheres.



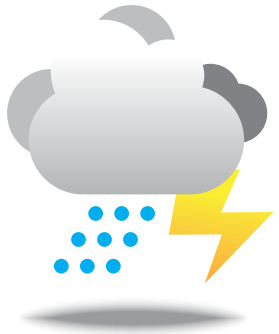
Climate change, electricity consumption and greenhouse gases reduction in Hong Kong

Climate change knows no borders and affects us all. Meteorological observations in the past century reveal that there is a long term increasing trend in Hong Kong's average temperature and annual rainfall.



Temperature[7]

The average annual mean temperature in Hong Kong was 23.1°C in 1980-1999. The figure is expected to rise by 4.8°C in 2090-2099. The number of hot nights and very hot days would increase in summer while the number of cold days would decrease in winter.



Rainfall[8]

The average annual rainfall in Hong Kong was 2,324mm in 1980-1999. The figure is expected to increase by 11% and would reach to 2,572mm in 2090-2099. The year-to-year rainfall variability would increase with more extremely wet and extremely dry years.

Past and Projected Number of Hot Nights, Very Hot Days and Cold Days

Parameter	Average 1980-1999 (Observation)	Projections 2090-2099
Annual number of hot nights (days with a minimum temperature ≥ 28°C)	16	137
Annual number of very hot days (days with a maximum temperature ≥ 33°C)	9	89
Annual number of cold days (days with a minimum temperature ≤ 12°C)	17	1

Past and Projected Number of Extremely Wet Years and Dry Years[9]

Parameter	1885-2000	21st century
Number of extremely wet years (annual rainfall > 3,187mm)	2	10
Number of extremely dry years (annual rainfall < 1,282mm)	2	4

Climate change's potential impacts on Hong Kong entail environmental, social and economic issues:

Food Supply

As the food supply in Hong Kong heavily depends on imports, food crisis in the Mainland and overseas will definitely push up Hong Kong's food price and may threaten our food security.

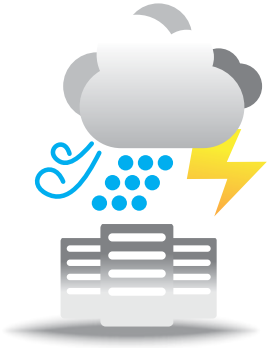
According to a report released jointly by the Chinese Academy of Agricultural Sciences and some other organisations, by 2050, food production in the Mainland would drop by 14%-23% under the effect of climate change, resulting in a shortage of food supply[10].

Water Supply

The annual imported water from Dongjiang accounts for almost 70% to 80% of Hong Kong's total water supply. However, the densely populated Guangdong has long been classified by the United Nations as "water-stressed"[11]. Climate change is likely to bring more drought years to Guangdong and may lead to insecure freshwater provision.

Human Health

Study shows that a 3°C rise in temperatures in Hong Kong would increase the likelihood of the epidemic potential of malaria by 18.7%[12]. Mortality would increase during cold surges and heat waves.

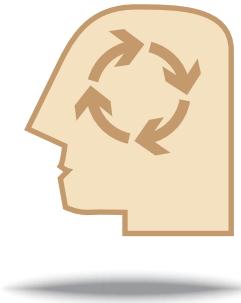


Built Environment

The increased risk of flooding, landslides and lightning strike as a result of heavy rain, thunderstorm or other extreme weather may lead to the damaging of buildings and other utilities cabling and pipes.

Ecosystem

Climate change may lead to damages to woodlands and coral communities because of more extreme weather. The rise in surface temperatures will also change the species distribution patterns.



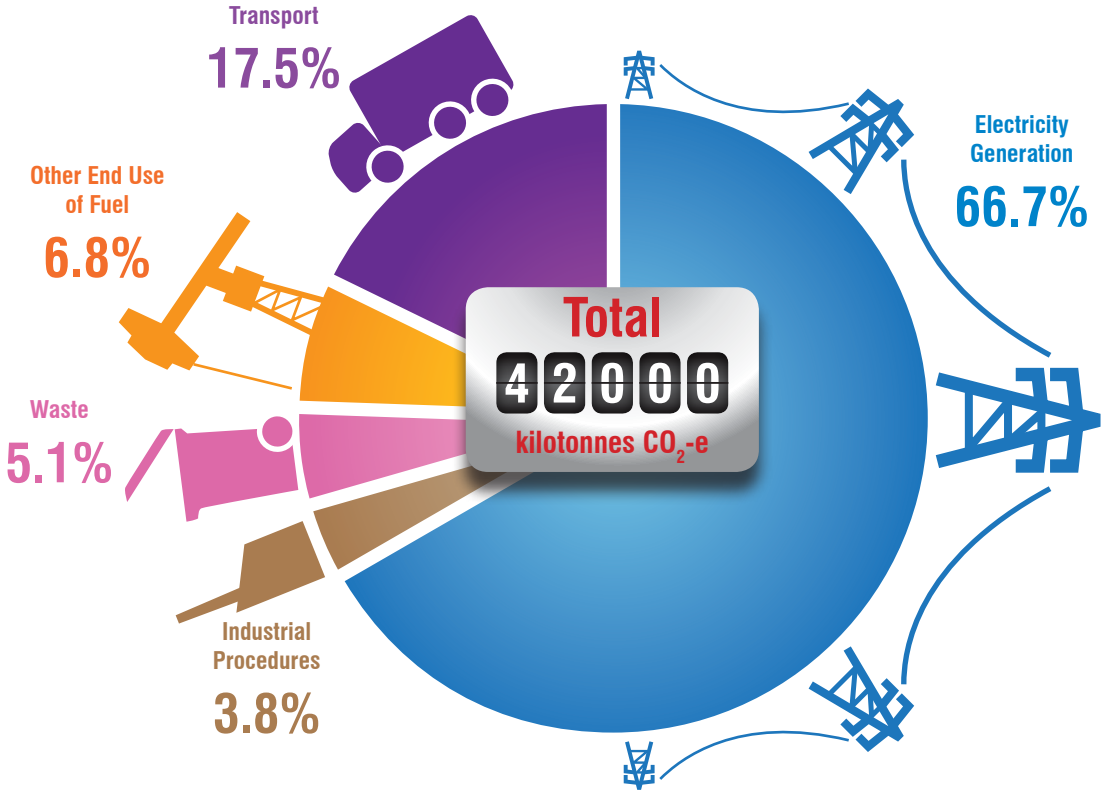
Other Socio-economic Issues

Increased demand for electricity from air conditioning and refrigeration due to increase in surface temperatures may lead to power spikes, interruptions and outages. The total energy cost for Hong Kong might therefore increase[13]. Households with lower income may suffer from a higher electricity bill.

Hong Kong's greenhouse gases emission and electricity consumption

Hong Kong's GHGs emission amounted to 42 million tonnes CO_2 equivalent (CO_2-e)* in 2008. Per capita GHGs emission was around 6 tonnes in 2008[14]. In terms of sectoral contribution to Hong Kong's GHGs emission, electricity generation accounted for about 67% of our total emissions in 2008. Electricity consumption per capita in Hong Kong has been continuously increasing from nearly 5,000 kWh in 1997 to 5,900 kWh in 2007 (i.e. 18.7%)[15]. According to the latest figures collected in 2008, around 90% of our city's electricity is consumed in buildings. In other words, buildings account for some 60% of Hong Kong's GHGs emission. Therefore, with an aim of reducing overall GHGs emission, this engagement exercise focuses on exploring ways to **reduce electricity consumption and enhance energy efficiency for building operations.**

Hong Kong's greenhouse gases emission by sectors in 2008[16]

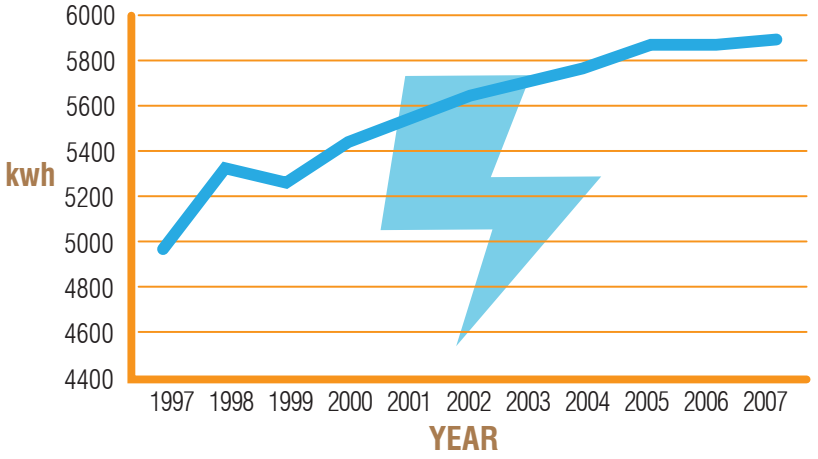


Note: Other end use of fuel: Including use of fuel for combustion in commercial, industrial and domestic premises

* *CO_2-e refers to the amount of CO_2, by weight, emitted into the atmosphere that would produce the same global warming potential as that of a given weight of other GHGs being emitted.*

Of the total electricity consumption as of 2008, residential premises took up about 25% and commercial buildings about 65%. The other 10% or so was accounted for by the industrial and transport uses. It follows that targeting residential and commercial building users would represent a major step in demand-side management of carbon emissions. The four building user groups **(i.e. household, office, retail and catering) are strategically targeted in this public engagement.**

Hong Kong's electricity consumption per capita pattern over the period 1997 - 2007[17]



Hong Kong's electricity consumption by sectors in 2008[18]

1.2 WHAT CAN WE DO: DEMAND-SIDE MANAGEMENT AS A SUSTAINABLE WAY FORWARD

The SDC conducted a public engagement exercise on **Building Design to Foster a Quality and Sustainable Built Environment** in 2009, focusing on three areas of **sustainable building design**:

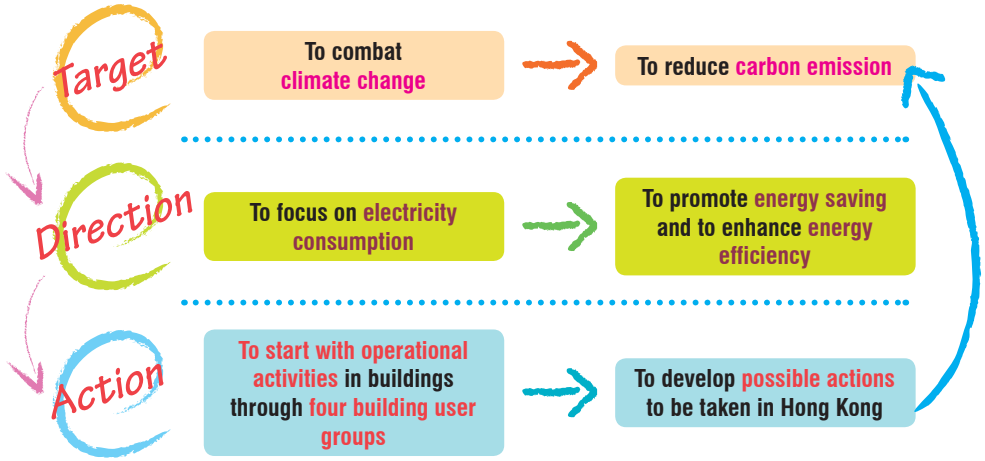
- building separation, setback from narrow streets, and greenery;
- balancing provision of certain building features against the resultant increase in building height and bulk; and
- energy efficient building design.

The SDC has made over **50 recommendations** on the core issues set out for the public engagement. For recommendations related to building energy efficiency, they include:

- enhancing the mandatory Building Energy Code;
- stepping up assistance to building owners for retrofitting buildings with energy-efficient installations;
- promoting the use of benchmarking and accreditation system;
- extending the coverage of the district cooling system;
- providing additional building design guidelines; and
- setting a target in implementing energy efficiency initiatives in public buildings.

Realising the urgent need to combat climate change, the Environment Bureau of the **HKSAR Government** launched a public consultation in September 2010 to gauge the public and stakeholders' views on **Hong Kong's Climate Change Strategy and Action Agenda** for the coming decade. The public consultation document proposed an overall target to **reduce Hong Kong's carbon intensity* by 50%-60% in 2020 as compared with the 2005 level**. It also proposed broad policy strategies on how Hong Kong can mitigate and adapt to the impact of climate change, with emphasis on both supply-side strategy (such as fuel mix), and demand-side measures including maximising energy efficiency, greening road transport, promoting use of clean fuels for motor vehicles and turning waste into energy etc.

As energy consumption in buildings is responsible for at about 60% of our GHGs emission (see Section 1.1 above), and it is suggested in the above climate change public consultation document that reduction in GHGs emission can be realised in buildings and electrical appliances in the next decade through various measures, the SDC decided to conduct, as an independent effort, **a new round of public engagement exercise** to facilitate exchange of ideas on **concerns, incentives, and possible action plans** for the **demand-side management on carbon intensity reduction**, which seeks to promote low carbon lifestyle, energy efficiency in buildings and green economy to tackle at root most of the problems pertaining to climate change.



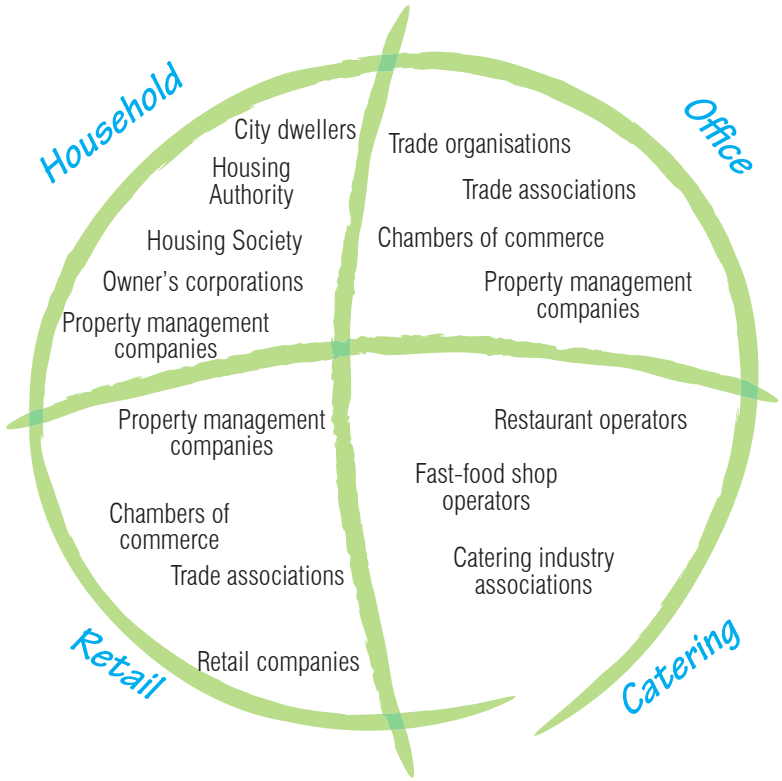
* Carbon intensity is defined as the amount of GHGs or carbon emission per unit of gross domestic product (GDP). It seeks to measure the effectiveness of efforts taken to reduce emissions which are highly associated with economic activities.

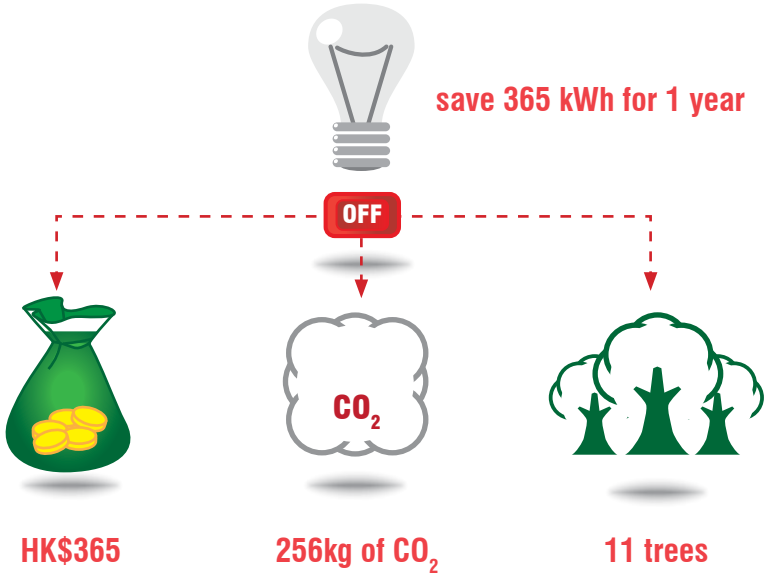
1.3 WE WILL ALL BENEFIT IF EVERYONE CONTRIBUTES

The SDC identified household, office, retail and catering as the four core building user groups. This allows more focused discussions on how each group can maximise energy efficiency and minimise carbon emissions in building uses. These four groups cover a wide spectrum of the general public. We will all benefit if everyone contributes to carbon reduction.

Saving energy means saving costs[19]. Assuming an average electricity tariff of HK$1.0 per kWh, saving 1 kWh each day means saving HK$365 of electricity cost each year and reducing 256 kg of carbon emissions. It would take 11 trees to absorb this amount of CO_2.

Lamps, air conditioners and refrigerators take up a substantial portion of our electricity consumption. Choosing energy efficient models can help save electricity cost and cut carbon emissions. Replacing incandescent lamps with compact fluorescent lamps, a household of four people can save up to HK$440 of electricity cost each year. By using air conditioners with the Grade 1 Energy Label, HK$480 of electricity cost can be saved each year when compared to a Grade 5 model. By choosing refrigerators with the Grade 1 Energy Label, electricity cost saving can be up to HK$380 each year when compared to a Grade 5 model[20]. Assuming an average electricity tariff of HK$1.0 per kWh, the above electricity cost saving of HK$1,300 implies a reduction of 910 kg of carbon emissions which would take 40 trees to absorb.





Note: 1. The average electricity tariff is HK$1.0 per kWh
2. The average emission factor of CO_2 is 0.7kg CO_2e per kWh
3. Each tree is assumed to absorb 23kg of CO_2 throughout its life

In fact, in face of the threat of climate change, we need to review our incumbent social values and lifestyles. After all, consumers' tastes and demand drive business development. In recent years, the advocacy of **green and low carbon living** has been growing and is seen as the necessary transition for sustainable communities. For example, think before purchase, support local products etc. Your action will make a difference!

As an Earth citizen, we should and we can contribute more to combating climate change. We hope you can contribute your ideas by participating in our engagement process. Your benefits and Hong Kong's success start with you.

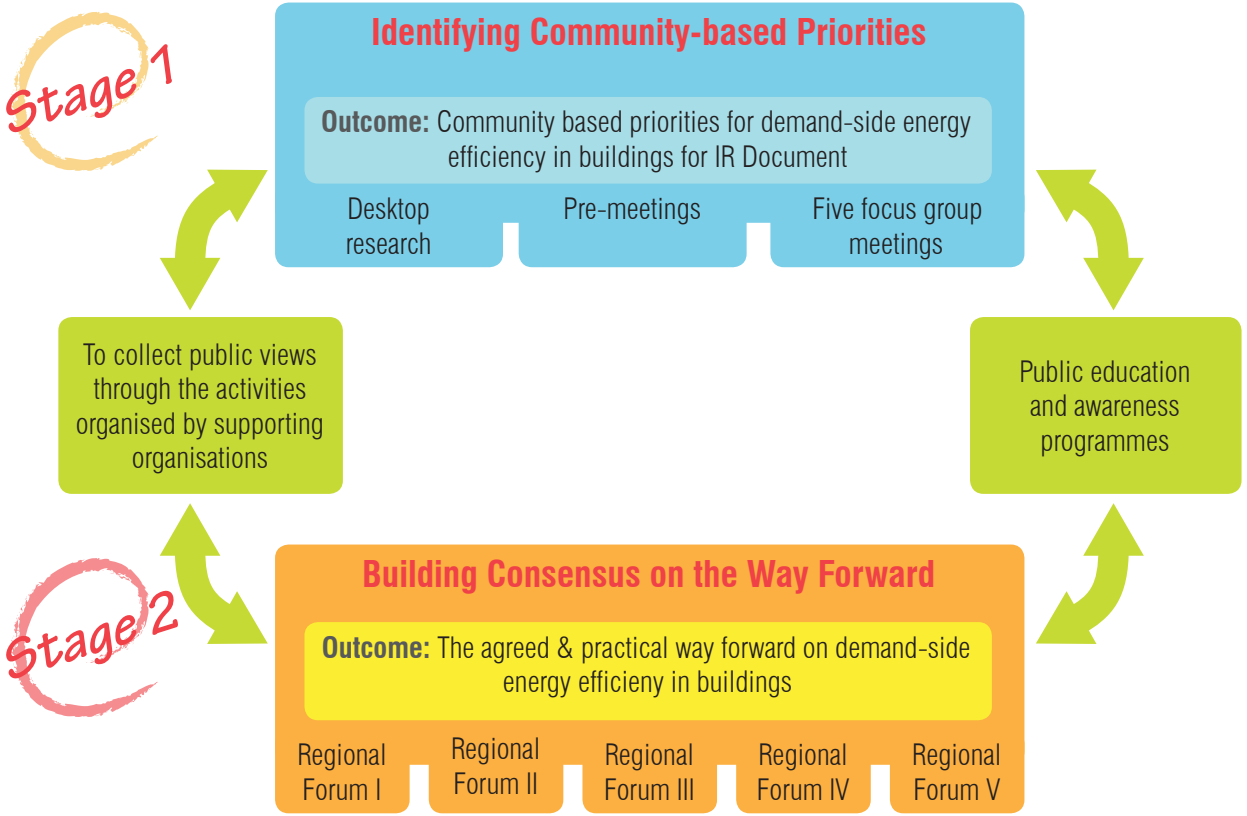
1.4 HOW DOES THIS PUBLIC ENGAGEMENT PROCESS WORK?

The process of this public engagement exercise adopts a structured and bottom-up approach that adheres to four principles:

In April and May 2011, **five focus group meetings (FGMs)** have been held with the four building user groups, as well as green groups and professional organisations. The FGMs were targeted to solicit their specific views and concerns over energy saving and enhancing energy efficiency in buildings. Based on the findings from the FGMs, the issues and questions in this Invitation for Response (IR) Document are formulated for engaging the core building user groups and the wider public.

Having this IR Document as a discussion framework for the public engagement process, **five regional forums** will be organised to engage the community and key stakeholders as a whole, which allow citizens from **different walks of life** to come and share their views and comments. Apart from the FGMs and forums, supporting organisations (including tertiary institutions, public authorities, research institutions/think tanks, green groups/non-governmental organisations, business-related organisations and professional organisations) are also engaged to help disseminate information about this public engagement exercise and organise activities to spread energy saving and carbon reduction messages.

To widen and deepen the general awareness of the public about the importance of combating climate change, public education and awareness programmes are conducted in parallel by collaborating with schools and non-governmental organisations.



We strongly encourage you to participate and express your views!

2. AN OVERVIEW OF GOVERNMENT EFFORTS

The Government has taken a number of initiatives to promote energy efficiency in buildings. They can be divided into four main categories:

- Regulation
- Financial assistance
- Incentive scheme
- Government leading by example

2.1 REGULATION

Buildings Energy Efficiency Ordinance (BEE Ordinance)[21]

- To mandate compliance with the Building Energy Code (BEC)[22] to prescribe the minimum energy efficiency standard for key building services installations.
- Require commercial buildings and commercial portion of composite buildings to comply with the Energy Audit Code (EAC).

The BEE Ordinance was passed in 2010. It mainly (1) requires the four major building services installations including **lighting, electrical, air conditioning and lift & escalator installations** of 13 categories of prescribed buildings* to comply with the BEC; and (2) requires commercial buildings or commercial portion of composite buildings to conduct energy audit in accordance with the EAC.

The Government estimated that the full implementation of this Ordinance will result in energy savings in new buildings of approximately **2.8 billion kWh** in the first decade, which contributes to a reduction in **carbon emissions of 1.96 million tonnes**.

s.22 and 23 of the Buildings Energy Efficiency Ordinance, Cap.610 stipulates that:

- Owners of commercial buildings or commercial portions of a composite building are required to arrange energy audits for the central building services installations at least once every ten years.
- An energy audit must be carried out by a registered energy assessor who is to issue an Energy Audit Form and send a copy of such Form and an energy audit report to the Electrical and Mechanical Services Department within 30 days after issuing the Energy Audit Form.
- The owner of a building in respect of which an Energy Audit Form is in force must exhibit a copy of the Form in a conspicuous position at the main entrance of the building.

Building (Energy Efficiency) Regulation

- The Government is reviewing the overall thermal transfer value (OTTV) standard of buildings.

Overall Thermal Transfer Value (OTTV)[23]

The OTTV is a measure of the energy consumption of a building envelope. Its formulation allows authorised persons, registered structural engineers and other persons responsible for the design and construction of buildings freedom to innovate and vary important envelope components such as type of glazing, window size, external standing to windows, wall colour and wall type to meet the maximum OTTV criteria.

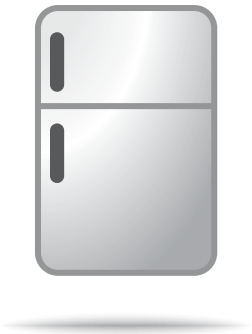
From the previous studies on "Building Design to Foster a Quality and Sustainable Built Environment" and public consultation on "Hong Kong's Climate Change Strategy and Action Agenda", both the Council for Sustainable Development (SDC) and Environment Bureau have proposed to tighten the OTTV standards and further promote green roofing design. In addressing the first issue, the Buildings Department has revised the Practice Notes for Authorised Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-67 in January 2011 and tightened the OTTV standards for building tower and podium by 20%. It is anticipated that such revision can save 2.4%-4.4% of energy subject to floor layout and types of air conditioning system.

* Buildings covered by the BEE Ordinance: commercial building; common area of a residential building; common area of an industrial building; a portion of a composite building that is not for residential or industrial use; common area of a portion of a composite building that is for residential or industrial use; hotel and guesthouse; educational, community, municipal services, medical and health care services building; Government building; passenger terminal building of an airport; and railway station.

Energy Efficiency (Labelling of Products) Ordinance

The Mandatory Energy Efficiency Labelling Scheme (MEELS) requires energy labels to be displayed on prescribed products before being supplied in Hong Kong to facilitate consumers in choosing energy-efficient electrical appliances.

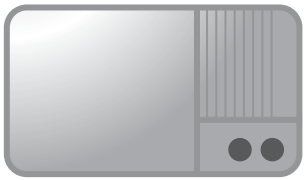
The Mandatory Energy Efficiency Labelling Scheme – covering five types of products



Refrigerating Appliances

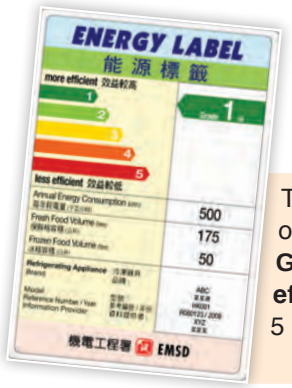
Dehumidifiers

Compact Fluorescent Lamps



Room Air Conditioners

Washing Machines



The energy label classifies the energy performance of a product type into five grades. A product with **Grade 1 energy label is among the most energy efficient** in the market while a product with Grade 5 is least efficient.

Voluntary Energy Efficiency Labelling Scheme (EELS)*

The EELS covers **19 types of household appliances and office equipment**, 11 types of which are electrical appliances including household refrigeration appliances (Voluntary Scheme), washing machines (Voluntary Scheme), non-integrated type compact fluorescent lamps, dehumidifiers (Voluntary Scheme), electric clothes dryers, room coolers (Voluntary Scheme), electric storage water heaters, television sets, electric rice-cookers, electronic ballasts and LED Lamp (effective from 14 June 2011).

The other seven types of office equipment include photocopiers, fax machines, multifunction devices, laser printers, LCD monitors, computers and hot/cold bottled water dispensers. There is one type of gas appliance for domestic gas instantaneous water heaters.

* The Voluntary Energy Efficiency Labelling Scheme for room coolers (Voluntary Scheme), household refrigeration appliances (Voluntary Scheme), washing machines (Voluntary Scheme) and dehumidifiers (Voluntary Scheme) covers only the type of products not regulated under the Energy Efficiency (Labelling of Products) Ordinance.

2.2 FINANCIAL ASSISTANCE

Buildings Energy Efficiency Funding Schemes (BEEFS)

Providing financial support to building owners to implement **energy-cum-carbon audit** and **energy improvement projects.**

The total electricity saving of the approved applications is estimated to be 131 million kWh per annum, which is equivalent to a reduction of CO_2 emissions by 92,000 tonnes.

725 funding applications have been approved and the grant amounts to over HK$279 million.

Up to end June 2011, more than 1,400 applications with over 9,000 buildings are involved.

BEEFS were formally launched in April 2009 with the allocation of HK$450 million from the Environment and Conservation Fund.

Hong Kong Example

A private housing estate in Tsuen Wan[24]

The Owners' Committee of this private housing estate has been granted by the BEEFS with an amount of **HK$2.5 million** for the **improvement of lift controlling system**. Starting from March 2011, the overall 51 lifts within the estate are being upgraded from the traditional AC2 Control System to Alternate Current Variable Voltage Variable Frequency (ACVVVF) System in phases.

The new ACVVVF System can master the electrical voltage, frequency and hence the climbing/descending speed of lift in a precise manner. This can reduce the electrical current output and achieve electricity saving. It is anticipated that the project can **reduce the annual expense on electricity by HK$400,000 with full return on investment in six years**.

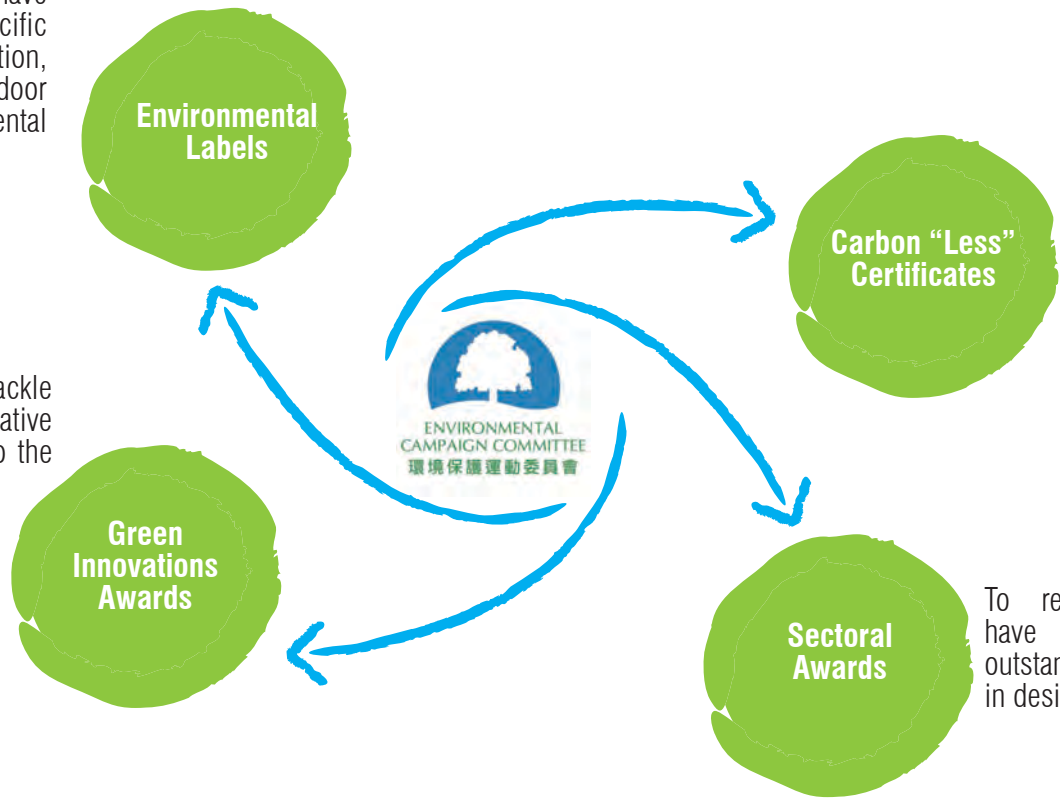
2.3 INCENTIVE SCHEME

Hong Kong Awards for Environmental Excellence[25]

First introduced in 2008, the Hong Kong Awards for Environmental Excellence (HKAEE) is led by the **Environmental Campaign Committee** alongside the **Environmental Protection Department (EPD)** and in conjunction with nine organisations. The HKAEE is a merger and extension of three former environmental award schemes, namely the Hong Kong Eco-Business Awards, the Wastewi$e Scheme and the Hong Kong Energy Efficiency Awards.

The main objective of HKAEE is to encourage organisations to adopt green management and recognise their commitment towards environmental protection. In 2011, a total of four award schemes are offered, namely, **Environmental Labels, Carbon "Less" Certificates, Green Innovations Awards** and **Sectoral Awards.**

To recognise organisations which have attained a prescribed number of specific environmental goals in waste reduction, energy conservation, improving indoor air quality and improving environmental attributes of their products.



To recognise buildings and organisations for reducing a verified amount of overall carbon emission.

To encourage organisations to tackle environmental issues with innovative ideas that have yielded benefits to the environment.

To recognise organisations which have demonstrated all-round and outstanding environmental performance in designated sectors.

Hong Kong Example

Hong Kong Convention and Exhibition Centre (HKCEC)

HKCEC (Management) Ltd (HML) has been presented the Award for Organisation with the Highest Amount of Carbon Footprint Reduction and the **Carbon "Less" 14% Certificate** of the HKAEE in recognition of its efforts in carbon reduction during the year of 2009.

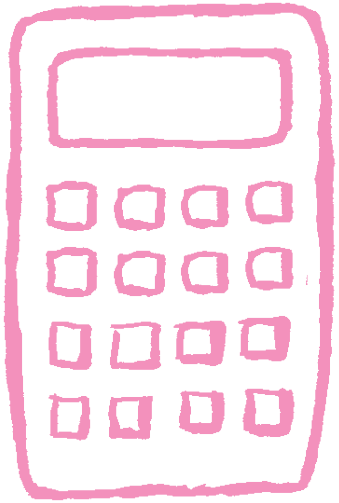
HML has reduced its carbon footprint by implementing various energy and water saving initiatives, while energy-saving measures include: **phased replacement of T8 fluorescent tubes by T5 fluorescent tubes, installation of LED lights in advertising lightboxes, installation of variable-frequency drives on escalators, replacement of insulation of chilled water pipes and stringent control on lights on/off policy** etc. The total energy consumption was reduced by a significant 16% over a two-year period.

"Green Hong Kong · Carbon Audit" campaign[26]

The Environment Bureau launched the "Green Hong Kong · Carbon Audit" Campaign in July 2008. Organisations from different sectors are invited to join the campaign by signing the **Carbon Reduction Charter** and undertaking to conduct carbon audits and carry out activities in support of **carbon reduction in their buildings**. So far, more than **250 organisations** (as of end May 2011) have taken the lead and signed up to the Charter to become "Carbon Audit · Green Partners".

A set of **"Guidelines to Account for and Report on Greenhouse Gas Emissions and Removals for Buildings (Commercial, Residential or Institutional Purpose) in Hong Kong"** has been developed by the EPD and the Electrical and Mechanical Services Department (EMSD) to facilitate building owners and managers to calculate the amount of GHGs emitted as a result of the operations of their buildings, and conduct voluntary programmes to reduce and/or offset emission.

Carbon Audit碳審計
綠色夥伴 Green Partner

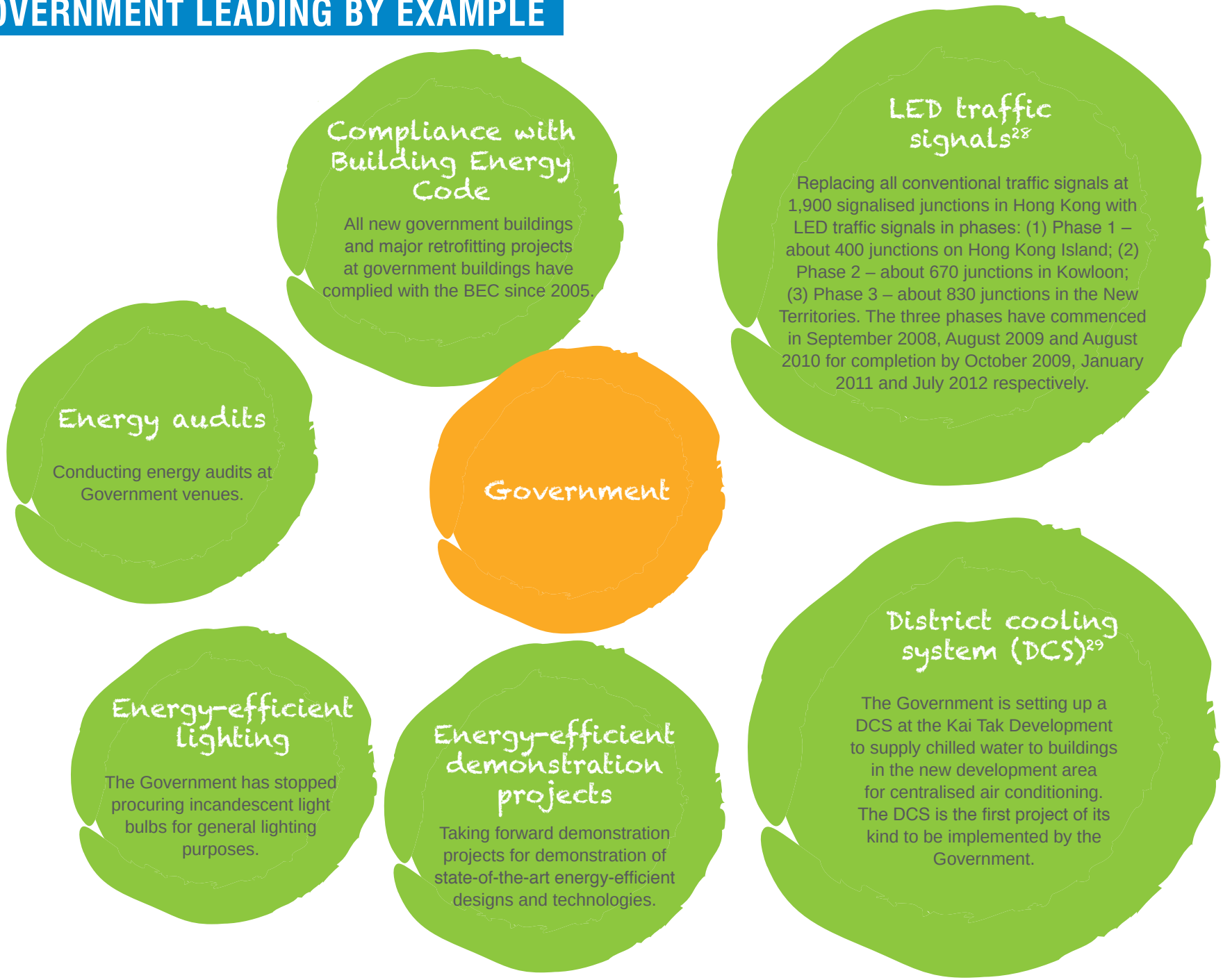


Carbon Calculator[27]

Available tools to estimate your carbon footprint (a measure of the impact of your activities on the environment in terms of the amount of GHGs produced) and advise appropriate actions for reducing your GHGs emission:

- **Carbon Calculator 2.0 - WWF's Climateer website**
  (http://www.climateers.org/eng/contents/carbon_calculator.php)
- **Carbon Calculator - CLP Power Hong Kong Ltd**
  (https://www.clponline.com.hk/ourEnvironment/MeasureOurImpact/Pages/Default.aspx)
- **Carbon Calculator - The Hongkong Electric Co. Ltd**
  (http://hongkongelectric.com.hk/hehWeb/CommunityAndEducation/EnergyEfficiencyAndConservation/SmartTipsforEnergyEfficiency/Index_en.htm)
- **Carbon Footprint Calculator - Hong Kong And China Gas Company Limited**
  (http://www.towngas.com/lowcarbonliving/eng/html/index.aspx)
- **CGCC-Carbon Management Tool - The Chinese General Chamber of Commerce and Hong Kong Productivity Council**
  (http://cmt.cgcc.org.hk/eng/home.html)
- **SME Carbon Audit Toolkit - The University of Hong Kong** *(http://www.hktscl.com.hk/carbon/index.asp)*
- **One Tonne Challenge Calculator – Kadoorie Farm and Botanic Garden**
  (http://www.climatechange.hk/eng/index.aspx)

2.4 GOVERNMENT LEADING BY EXAMPLE



District Cooling System[30]

District Cooling System (DCS) is a type of **water-cooled air conditioning system that can be used at regional level**. The system consists of central chiller plant and seawater pumphouse which supply chilled water to user buildings via underground piping network. Such technology is **more efficient than the conventional air-cooled air conditioning system by 35%**. Also, the system is environmentally friendly and brings merits to architectural and facilities design. The Government is implementing the DCS at Kai Tak Development with the first phase coming into operation in 2012-2013. Following the earlier public engagement on "Building Design to Foster a Quality and Sustainable Built Environment" conducted by the SDC in 2009, the SDC recommended that DCS should be extensively implemented across Hong Kong where appropriate.

Water-cooled air-conditioning[31]

Water-cooled central air conditioning system works are based on the refrigeration technology. The system uses refrigerant to lower the indoor air temperature. Depending on the design, the heat absorbed by refrigerant is then released either by water in the cooling tower or seawater by pump house. A previous related study led by the EMSD in 2003 shows that the **Cooling Tower Scheme and Central Seawater Scheme can save energy by 14%-20% and 22%-28% respectively** while comparing to the air-cooled air conditioning system.

3. READY FOR MORE ACTION

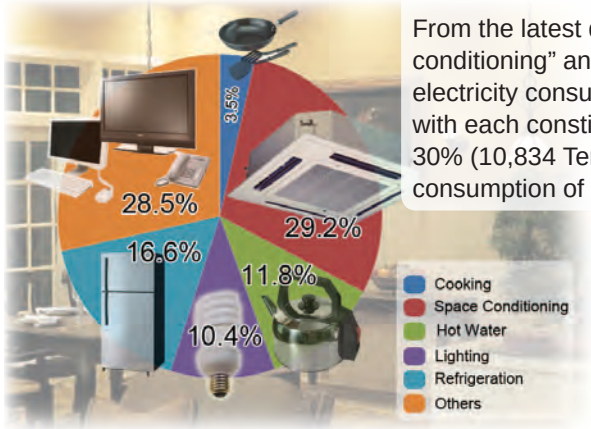
Following an overview of what have been achieved to date, this chapter will move on the discussion to look at what can be done in the future. Basing on the discussions at the focus group meetings and desktop research, we have identified a number of “actions” that can be further examined. They are divided into two categories, i.e. (1) systemic enhancement and (2) facilitation of behaviour change.

The four icons as shown below represent the four target building user groups of this public engagement. You will see them again in the following sections to indicate how the respective user groups can contribute to the “actions”. Prior to the discussion of the advantages and concerns over each “action”, we will also provide some background data (presented in pie charts) on the electricity consumption in households, offices, as well as retail and catering sectors in Hong Kong.

Household Office Retail Catering

Electricity consumption*

Household

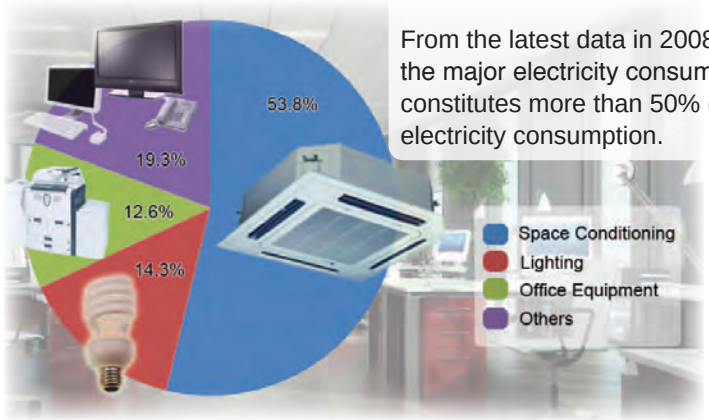


From the latest data in 2008, "space conditioning" and "others" are the major electricity consumption items in household, with each constitutes approximately 30% (10,834 Terajoule) of total electricity consumption of the residential sector.

Total 37099 Terajoule

Note: Examples under "Others" include laundry, audiovisual and miscellaneous equipment.

Office

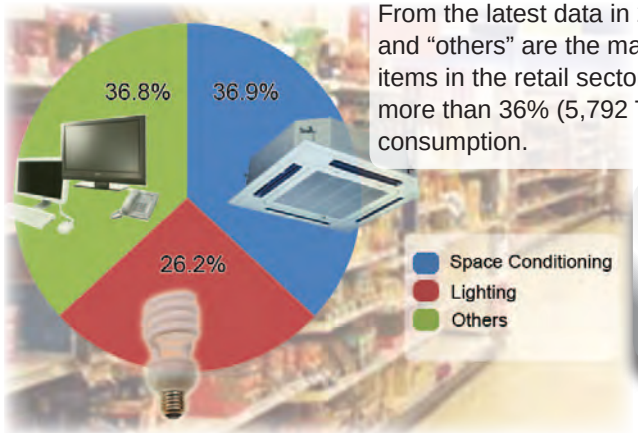


From the latest data in 2008, "space conditioning" is the major electricity consumption item in offices, which constitutes more than 50% (6,394 Terajoule) of total electricity consumption.

Total 11894 Terajoule

Note: Examples under "Others" include audiovisual and miscellaneous equipment.

Retail

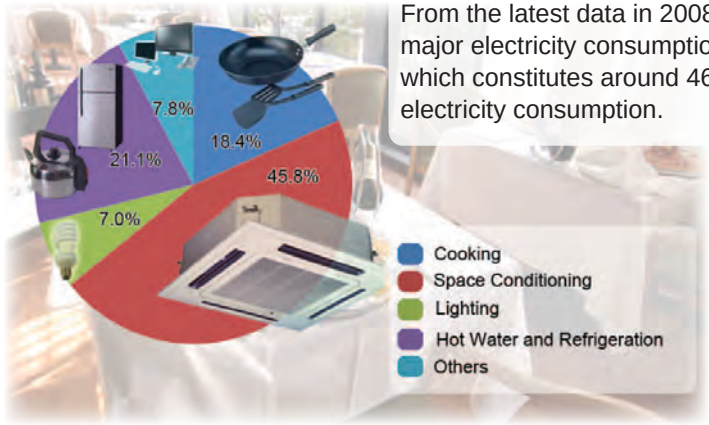


From the latest data in 2008, "space conditioning" and "others" are the major electricity consumption items in the retail sector, with each constitutes more than 36% (5,792 Terajoule) of total electricity consumption.

Total 15686 Terajoule

Note: Examples under "Others" include audiovisual, office equipment and miscellaneous equipment.

Catering



From the latest data in 2008, "space conditioning" is the major electricity consumption item in the catering sector, which constitutes around 46% (6,071 Terajoule) of total electricity consumption.

Total 13257 Terajoule

Note: Examples under "Others" include office equipment and miscellaneous equipment.

* Data provided by the Electrical and Mechanical Services Department.

3.1 SYSTEMIC ENHANCEMENT

(I) TO CONSIDER TIGHTENING THE BUILDING ENERGY CODE

The Building Energy Code (BEC) helps ensure the energy efficiency standards of key power consuming devices in buildings. Expanding the scope and tightening the requirements of the energy codes would help identify new opportunities to increase the energy performance of buildings.

Advantages

- To improve energy efficiency and conservation in buildings.
- To reduce energy use and result in a financial cost saving.
- To achieve overall reduction in greenhouse gases (GHGs) emission.

Concerns

- The need for regular review and upgrade to ensure that recent technological and design improvements are captured.
- Tightening the BEC may imply greater compliance costs for property developers/building designers.

Overseas Example

The Building Code of Australia (BCA)[32] is produced and maintained by the Australian Building Codes Board on behalf of the Australian Government and State and Territory Governments. The BCA is a uniform set of minimum standards for the design and construction of buildings and other structures throughout Australia whilst allowing for variations in climate and geological or geographic conditions.

All new buildings and major refurbishments in existing buildings have to comply with the **minimum performance requirements** set out in the BCA prior to the issuance of relevant **occupation permit**. The BCA covers such matters as structure, fire resistance, access and egress, services and equipment, and energy efficiency as well as certain aspects of health and amenity.

The BCA is published in two volumes: Volume 1 (commercial buildings) and Volume 2 (domestic buildings). It is **produced annually** with the new edition of the BCA having come into effect on 1 May 2011. The inclusion of energy efficiency measures in the BCA is part of a comprehensive strategy being undertaken by the Australian, State and Territory Governments to reduce GHGs emission. Energy efficiency measures were first introduced for housing in 2003, and the BCA has now been amended to include energy efficiency measures for all building classifications including commercial buildings. These requirements will ensure more efficient:

- construction, walls, floors, glazing and sealing;
- air conditioning, ventilation and heating systems;
- lighting types and power controls;
- hot water systems, swimming pools and spas; and
- monitoring, maintenance and ongoing improvements.

(II) TO CONSIDER PROVIDING RECOGNITION FOR BUILDINGS ACHIEVING HIGH ENERGY EFFICIENCY

The BEAM Plus[33] certification is a system to rate the environmental performance of **both new and existing building types** in Hong Kong. It is a comprehensive assessment scheme recognised since 2010 by the Hong Kong Green Building Council which provides a single performance label that embraces a range of good practices in planning, design, construction, and management, operation and maintenance of buildings. The BEAM Plus certification covers various assessment criteria in respect of the environmental sustainability of buildings. A total of five key areas are assessed namely **(1) Site Aspects; (2) Materials Aspects; (3) Energy Use; (4) Water Use; and (5) Indoor Environmental Quality**. In order to facilitate the promotion of sustainable buildings, bonus credits will be awarded for innovative techniques and performance enhancement. Subject to the overall assessment grade, the certification will fall into one of four categories. These include **platinum, gold, silver as well as bronze**. Each certification period has a validity of up to five years.

With effect from 1 April 2011, the BEAM Plus certification has become one of the pre-requisites for the granting of gross floor area concessions in a development. Despite this, green building certification and relevant rating standards are not yet widely applied in Hong Kong.

Advantages

- To serve as a sign of excellence and can have positive effect on the leasing and resale value for buildings.
- To help potential tenants identify green/energy-efficient buildings in order to save more on recurrent costs in the long-term.
- To provide a market incentive for more energy-efficient building performance.

Concerns

- Requires rigorous study and analysis to develop clear and objective benchmarks for comparing the energy performance of buildings (e.g. against the industry norms).
- Too complex and expensive for small-scale/old buildings to participate in such recognition system as it involves a high initial green premium cost.

Overseas Example

Singapore's Building and Construction Authority (BCA) Green Mark[34]

The BCA Green Mark, launched in 2005, is a green building rating system which evaluates a building for its environmental impact and performance. It is endorsed and supported by the National Environment Agency .

Under the assessment framework for new buildings, developers and design teams are encouraged to design and construct green and sustainable buildings. For existing buildings, the building owners and operators are encouraged to meet their sustainable operations goals and reduce adverse impacts of their buildings on the environment and occupant health over the entire building life cycle. The assessment criteria cover the following key areas: (1) Energy Efficiency; (2) Water Efficiency; (3) Environmental Protection; (4) Indoor Environmental Quality; and (5) Other Green Features and Innovation**.** Depending on the overall assessment and point scoring, the building will be certified to have met the BCA Green Mark Platinum (the highest), Gold^{Plus}, Gold or Certified rating (the lowest). Certified Green Mark buildings are required to be re-assessed every three years to maintain the Green Mark status.

The Singaporean government aims to have at least 80% of all buildings rated a BCA Green Mark Certified by 2030. It also requires that all existing buildings owned by government agencies meet the Green Mark Gold plus by 2020. Moreover, it was announced in BCA's second Green Building Masterplan in 2009 that projects developed on land sold under the Government Land Sales Programme sites in the elected strategic areas will be subject to higher Green Marks Standards.

BCA GREEN MARK

Australia's National Australian Built Environment Rating System, NABERS[35]

NABERS is a performance-based rating system for existing buildings. It is managed nationally by the New South Wales Office of Environment and Heritage on behalf of Federal, state and territory governments. NABERS rates a commercial office, hotel, shopping centre or residential building from zero to five stars, on the basis of its environmental impacts during operation in categories such as energy, water use, waste and indoor environment. It provides building owners, managers or occupants a simple indication of how well they manage and reduce the environmental impact of their buildings in comparison with their peers and neighbours.

For example, NABERS Energy ratings for offices take into account consumption of electricity, gas and other energy sources that relate to GHGs emission. Under a recently introduced Commercial Building Disclosure Program, most sellers or lessors of office space of 2,000 m^2 or more are required to disclose an up-to-date Building Energy Efficiency Certificate online which includes a NABERS Energy star rating for the building if they wish to sell, lease or sublease that office space.

(III) TO EXPLORE EXTENSION OF THE APPLICATION OF THE MANDATORY ENERGY EFFICIENCY LABELLING SCHEME (MEELS)

Using energy-efficient electrical appliances brings significant reduction in energy usage. the Electrical and Mechanical Services Department (EMSD) has implemented the MEELS since 2009 which facilitates consumers to compare electrical appliances in the market and choose appliances that are energy-efficient. There may be scope to broaden the coverage of the scheme to cover a wider range of electrical appliances.

Advantages

- To incentivize the supply of energy-efficient electrical appliances.
- To promote awareness and facilitate consumers in choosing energy-efficient electrical appliances.
- To promote energy saving and cost saving.

Concerns

- Energy-efficient electrical appliances may be of a higher upfront cost, resulting in a higher product price.

Overseas Example

The European Union (EU)

The EU Energy Label [36], introduced in 1992, is mandatory. Household appliances offered for sale, hire or hire-purchase in the EU market must be accompanied by a fiche and label providing information relating to: ranking of products according to their energy efficiency consumption ("A" - the best existing class to "G"); annual energy consumption or energy consumption per cycle; other related energy consumption information, e.g. water consumption, volume of appliances etc. The coverage of household appliances now includes: refrigerators-freezers, dishwashers, washing machines, oven, air conditioners etc.

What's New?

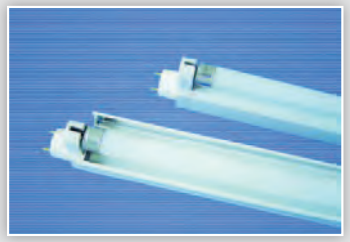
Extension of the EU Energy Label

The European Commission proposed energy labels for TV sets for the first time in 2010. Televisions represent almost **10%** of the **average household's electricity bill**. TV manufacturers now need to declare the energy efficiency of their products using an A to G scale. The label must be clearly shown on the TV set and in advertisements if the price of TV set is mentioned. The effective date for TV's energy label is 30 November 2011.

Energy-efficient products save your money in the long run and help protect the environment!

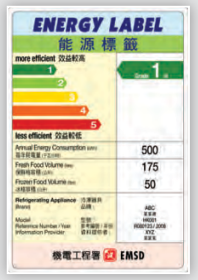
T5 fluorescent lamps[37] have higher luminous efficacy than that of T12 and T8 ones. If taking into account the high frequency operation and reduced power loss due to the use of electronic ballast, **20%-30% of energy reduction** can be achieved.

Replacing fat tubes (T10 or T8 fluorescent lamps) with thin tubes **(T5 fluorescent lamps) can save an electricity cost to HK$10,000 for a 1,000 m² office each year.**



Refrigerating appliances with "Grade 1" energy label[38]

You could save up to **HK$380** in electricity cost each year by **using refrigerating appliances with "Grade 1" energy label** when compared to a Grade 5 model.



(IV) TO CONSIDER TIGHTENING UP THE ENERGY EFFICIENCY GRADING LEVELS FOR ROOM AIR CONDITIONERS AND REFRIGERATORS UNDER THE MEELS

Apart from exploring the extension of coverage of the MEELS, we may also explore tightening up the standard of the scheme taking advantage of technological advancement.

Advantages

- To incentivize the supply of higher energy-efficient products.
- To promote awareness and facilitate consumers in choosing energy-efficient eletrical appliances.
- To encourage research & development of energy-efficient electrical appliances.

Concerns

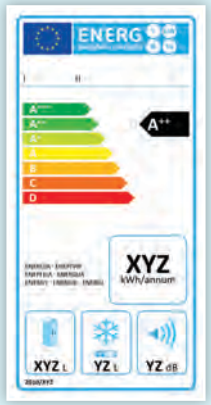
- Energy-efficient electrical appliances may be of a higher upfront cost, resulting in a higher product price.

Overseas Example

The European Union (EU)'s Energy Label[39]

The Premium label

The EU energy labelling of refrigerators-freezers, dishwashers and washing machines has been a huge success, and 90% of eletrical appliances sold in the EU now are in class "A" – the best existing class. But new technological advancement would allow existing A-class products to further reduce by half the energy consumption. The EU has decided to extend the scale upwards with three new classes: **"A+", "A++", and "A+++" for products with a better than A-performance.**



Validity Period

The EU Energy Label system has been amended to include validity period on the label. The new implementation measures take into consideration innovation of products and the date of next review. The product must also specify the fixed duration of the label classification(s), which shall be a time period of at least three years, but not exceeding five years.

(V) TO EXPLORE PHASING OUT ENERGY-INEFFICIENT INCANDESCENT LIGHT BULBS

Incandescent light bulb is the oldest and cheapest type of bulbs available on the market, but it is regarded as one of the energy-inefficient lighting products given that only 10% of the input energy is used to generate light. Compact fluorescent lamps (CFLs) have longer rated life of around 8,000 hours while the rated life of incandescent light bulbs is typically only 500 to 2,000 hours. As compared to incandescent light bulbs, CFLs use only 20% of the electricity to produce the same amount of light - a 22 watt CFL produces the same amount of light as a 100 watt incandescent light bulb. It is estimated that a **household of four people** could save up to **HK$440** of electricity cost each year by **replacing incandescent lamps with energy-efficient CFLs**[40].

Advantages

- To enhance energy efficiency and achieve energy saving.
- To save electricity cost in the long run.
- The longer life span of energy-efficient lighting products could help reduce waste.

Concerns

- The initial cost of energy-efficient lighting products, such as CFLs, is relatively higher than incandescent light bulbs.
- The technology of some lighting products, such as LEDs, may take more time to further develop.
- Comprehensive disposal plan may be needed.

Overseas Example

Australia[41]

Lighting constitutes around 12% of electricity usage from households, and around 25% of the electricity used by the commercial sector in Australia. The Australian government targeted to phase out less energy-efficient incandescent light bulbs by phases. The traditional, least efficient and pear-shaped incandescent bulbs were phased out first with an applied from 1 February 2009 and followed by a from November 2009. Different dates of sales restriction apply to different lamp types. Besides, lighting products have to meet specific requirements as set in the minimum energy performance standards and be registered with the relevant state regulatory authority. The phase-out is expected to save around and reduce between 2008 and 2020.

(VI) TO EXPLORE PHASING OUT ENERGY-INEFFICIENT ELECTRICAL INSTALLATIONS/APPLIANCES

Electrical installations/appliances have become a necessity in the modern world. It is noted that some countries have implemented programmes to phase out energy-inefficient electrical installations or appliances.

Advantages

- To improve average efficiency of products available on the market and achieve energy saving.
- To save electricity cost in the long run.

Concerns

- There is a need to set up energy efficiency standards for electrical installations/appliances.
- Consumers may have concerns if energy-efficient eletrical installations/appliances involve a higher upfront cost.

Overseas Example

Australia

The Federal Government of Australia has mandated **Minimum Energy Performance Standards (MEPS) Regulations**[42] on **17 types of products**, including tubular fluorescent lamps, refrigerators and freezers (and their combinations), air conditioners and televisions etc. Only those which meet the requirements are allowed to be **manufactured in** or **imported to** Australia, otherwise penalties shall be applied. MEPS are regularly reviewed with the industry to ensure the standard is aligned with advances in technology.

Japan's Top Runner Program: The Race for the Top[43]

In 1998, the Top Runner Program was adopted in Japan to improve energy efficiency of end-use products. The program sets the mandatory energy efficiency standards, based on **the value of the most energy-efficient products on the market** within their assigned categories at the time of the target value setting process. All other appliances are required to reach that standard within an agreed time scale. If the required standard is achieved or even surpassed before the deadline, the process will start again and the cycle continues. On the contrary, if manufacturers do not meet the agreed targets, the government will make recommendations to the company in question or the advice provided will be made public and penalties imposed for further non-compliance. Currently, 21 products including air conditioners, televisions, fluorescent lights, computers, electric freezers, microwaves, heaters and rice cookers etc. are under the system.

3.2 FACILITATION OF BEHAVIOUR CHANGE

(I) ENERGY/CARBON AUDIT

What is energy audit [44] ?

Energy audit is a framework that combines both qualitative and quantitative techniques for energy management. No matter a walk-through or detailed audit is adopted, the energy consumption data is in general collected and compared against a predetermined benchmark value to calculate the individual and overall variance. The variances are then used for determining and formulating the necessary energy saving measures for implementation and further evaluation.

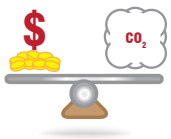
- Defining scope of energy audit
- Forming energy audit team
- Collecting building information
- Conducting site inspection and measurement
  - Strategic measuring points
  - Instrumentation
- Analysing data collected
  - Identification of energy management opportunities
  - Costing
  - Normalisation of date
  - Maintain thermal and lighting comfort
  - Already scheduled maintenance and refurbishment works

What are the drivers?

Key forces driving the need for reporting and independent auditing of GHGs emission[45]:

Regulatory/ Legislated forces

Demonstrate compliance with government regulations (national/ regional/ local) or company law public disclosure requirements.



Business drivers

Facilitate establishing a carbon emission baseline from which targets can be set and progress monitored; deliver cost savings and competitive advantage; promote carbon-conscious corporate culture and enhance brand image; demonstrate environmental leadership and commitment to corporate social responsibility.

Other market considerations

As a prerequisite for participation in carbon emission trading programmes to take advantage of the potential revenue streams in cap-and-trade, or emission-trading markets as developed in different regions.

What is carbon audit [46] ?

Carbon audit is a systematic procedure for measuring, evaluating, reporting and verifying the GHGs* directly and indirectly emitted by an entity, such as a person, household, building, facility, organisation and corporation; or by a geographical body such as a country, state or region.

Carbon audit provides the reported entity with a baseline to derive a pragmatic approach to reduce GHGs emission and allows evaluation of the effectiveness of the carbon reduction measures and policies introduced, which can lead to potential cost savings. It is a holistic measurement that looks at GHGs emission down the supply chain and tracks all emissions producing activities using a set of standard reporting protocols.

Standard procedures for a company/enterprise to quantify all GHGs emission producing activities in addition to deriving a carbon reduction action plan[47] :

- Set the physical and operational boundaries of a company/enterprise
- Identify the scope of emissions and removals (direct and indirect)
- Determine the reporting period; collect data and information and quantify the GHGs performance
- Apply conversion factors to quantify the total GHGs emission in CO_2 equivalent; prepare the audit report

* In accordance with the Kyoto Protocol, six types of gases which cause greenhouse effect include: carbon dioxide (CO_2); methane (CH_4); hydrofluorocarbons (HFC); perfluorocarbon (PFC); nitrous oxide (N_2O) and; sulphur hexafluoride (SF_6).

To establish more action-oriented schemes to further promote carbon emission reduction among (large) organisations as facilitated by conducting carbon audit

Advantages

- To provide a better understanding of the energy consumption behaviour and tracks the carbon producing activities.
- To identify improvement opportunities to save energy and reduce GHGs emission that may lead to cost reductions.
- To nurture an energy and carbon conscious culture.

Concerns

- Although carbon audit helps understand energy use and carbon emission implications, many corporations prefer directly investing on simple energy-saving installations/devices. The perceived scale and complexity, as well as time commitment required to carry out carbon audit are the major concerns.
- There may be resource and time implications for small and medium enterprises.

Hong Kong Example[48]

A private property developer in Hong Kong has started conducting carbon audit in all its housing estates. Carbon audit enabled one of its **residential estates** to save 1 million kWh a year, which equals to a reduction of **660 tonnes CO_2 emission**. The electricity is saved by adopting: (1) energy-efficient installations including energy-efficient lighting, and motion sensor in public areas and; (2) energy management practices including turning off extra elevators and air conditioning (at the podium level) during mid-nights.

Overseas Example

The United Kingdom (UK)[49]

The UK Government has recently published **"Measuring and reporting of greenhouse gas emissions by UK companies: a consultation on options"** for seeking views on whether or not to introduce mandatory reporting rules for some UK companies to report on their GHGs emission within the directors' report to meet the UK's climate change objectives. The consultation ran for eight weeks until 5 July 2011. The consultation document considers four options:

1. **Enhanced Voluntary Reporting** (e.g. enhanced linkage to Carbon Disclosure Project);
2. **Mandate under Companies Act for all Quoted Companies;**
3. **Mandate under Companies Act for all Large Companies** (according to company size in terms of employment, gross assets and turnover);
4. **Mandate under Companies Act for all companies whose UK energy consumption exceeds a threshold** (threshold of 6,000 MWh of electricity consumption each year).

The United States of America[50]

The Energy Savings Performance Contracts (ESPCs) support Federal agencies in identifying, obtaining and implementing funding for energy projects under the Federal Energy Management Program. The ESPCs invite Federal agency and Energy Service Company (ESCO) to work in partnership. Upon the consultation with the Federal agency, ESCO is responsible to conduct energy audit, identify areas of improvement and provide design and implementation services. The energy cost saved throughout the whole course will be used to pay for the project over the term of the contract.

As at May 2011, over 570 projects amounted to US$ 3.9 billion have been launched through ESPCs. It is estimated that these projects can reduce 32.8 trillion British thermal unit (Btu) of **energy consumption annually and save US$13.1 billion of energy cost, which is equivalent to about HK$105 billion.**

Australia[51]

The **Australia's National Greenhouse and Energy Reporting (NGER)** Act 2007 establishes a national framework for corporations to report GHGs emission and energy consumption and production from July 2008. It makes registration and reporting mandatory, requiring companies with emissions above certain levels to report to regulators, where there is non-compliance Directors of companies are liable for a fine of up to A$220,000.

All businesses must apply for registration with the Greenhouse and Energy Data Officer within the Department of Climate Change and Energy Efficiency (i.e. the head regulator) to report their GHGs emission and energy production and consumption for each year in which they meet certain specified thresholds - **'facility' thresholds and 'corporate' thresholds**.

Normally, businesses emitting more than 25,000 tonnes of CO_2 equivalent, or consuming more than 25,000 megawatts of electricity or 2.5 million litres of fuel in a year, can expect to be required to report.

Government departments to be a role model in adopting energy-efficient features, low-carbon practices and encouraging green behaviour, and to conduct regular energy/carbon audits

The Government runs many buildings in Hong Kong and, being a role model, will set an example for other sectors to follow suit. Some of the government departments have voluntarily conducted carbon audit for their buildings, such as the Housing Authority (e.g. Kwai Chung Shopping Centre; Hong Kong Housing Authority Customer Service Centre), Government Property Agency (e.g. North Point Government Offices; Trade and Industry Department Tower).

Hong Kong Example

Electrical and Mechanical Services Department Headquarters Building[52]

Located at the former cargo terminal building in Kowloon Bay, the seven-storey building housing 2,100 staff has been put into operation in 2005 and has incorporated a number of energy-efficient features and renewable energy technologies, including **water-cooled ammonia chillers, motion and daylight sensors, energy-efficient lighting, solar control window films, solar photovoltaic system, wind turbine, and sun pipes etc.**

(II) BETTER UNDERSTANDING OF YOUR ENERGY CONSUMPTION

- **To facilitate building users to gain a better understanding of their energy consumption, say, by referencing to the "per-capita" and "per-square meter" electricity consumption of building users in residential and commercial buildings respectively**
- **To enable building users to have a year-on-year (by month) comparison of their own energy consumption to facilitate their behaviour change**

One useful way to achieve energy efficiency is to understand your energy consumption behaviour and profile, e.g. through informative electricity bills. Besides keeping in-house record of details about your consumption patterns, this can also be done by comparison with peer group. In facilitating the above, many government agencies have developed and launched various sets of energy consumption indicators and benchmarking tools for compliance and reference that suit their local contexts.

Advantages

- To provide an accessible reference to the public for self-evaluation and identification of areas for continuous improvement.
- To facilitate peer comparison and competitions in energy performance.

Concerns

- There are divergent views on the methodology for deriving a meaningful reference/benchmark tool. It is a very complicated and time-consuming process. Users may not easily understand the jargons, definitions and assumptions involved.
- Indicators and benchmarking tools are applicable to limited context due to different factors, such as climatic conditions, operation scale, building layout/size etc. Updates are necessary from time to time.

Hong Kong Example[53]

The Energy Efficiency Office of the Electrical and Mechanical Services Department has made energy consumption indicators and benchmarking tools available on their websites. Eleven selected groups of indicators and benchmarking tools have so far been developed.

The energy consumption indicators[54] for offices and commercial outlets are extracted and displayed in the following tables*:

Energy Consumption Indicators for Offices

Principal Group	Subgroups	Energy consumed per unit floor area per annum (MJ/m²/annum)
Private Offices	Central services for buildings (multiple tenants) with central air-conditioning supply for tenants	943.5
	Tenant lighting and power in buildings (multiple tenants) with central air-conditioning supply for tenants	354.4
	Central services for buildings (multiple tenants) without central air-conditioning supply for tenants	196.0
	Tenant services in buildings (multiple tenants) without central air-conditioning supply for tenants	507.2
	Whole building (single tenant)	1270.6
Government Offices	Whole building (multiple users)	1043

Energy Consumption Indicators for Commercial Outlets

	Principal Group	Subgroups	Energy consumed per unit floor area per annum (MJ/m²/annum)
Commercial Outlets	Shopping Centres	Common services (with A/C in common area)	1301
		Common services (without A/C in common area)	585.6
		Tenant units - Chinese Restaurants	7179
		Tenant units - non-Chinese Restaurants	5737
		Tenant units - fast food shops, bars and other eating and drinking places	7881
		Tenant units - supermarkets	5077
		Tenant units - general retail (food)	4929
		Tenant units - general retail (non-food)	1663
	Standalone Restaurants and shops > 75m²	Chinese restaurants	12022
		Non-chinese restaurants	9839
		Fast-food shops, bars and other eating and drinking places	6598
		Supermarkets	5853
		General retail (food)	4710
		General retail (non-food)	2373

How well are you performing within your corresponding subgroup?

* The energy consumption indicators are derived from studies on a limited size of samples within the population of respective energy-consuming groups. These indicators should not be construed as representative energy consumption levels of the population, nor as territory-wide standards which businesses in the respective energy-consuming groups should comply with.

(III) MORE USE OF ENERGY EFFICIENCY MANAGEMENT SYSTEMS

- **To promote the use of information technology products and intelligent building environmental management systems to facilitate adoption of energy-efficient practices**

Hong Kong Example

Hong Kong Applied Science and Technology Research Institute (ASTRI)

The ASTRI was founded by the Government in 2000 with a mission of enhancing Hong Kong's competitiveness in technology-based industries through applied research. The ASTRI has developed a **building energy management system (BEMS)** which enables **real-time monitoring** and **trend analysis** on energy consumption taking into account the environmental factors and building conditions. It also supports **local and remote control** on energy consumption of end devices. It is expected to **save 20% or more of the energy consumption** of the plant being controlled.

International Organization for Standardization

ISO 50001 - Energy Management Systems[55]

Besides legislative measures, the promotion of energy management also relies on the provision of **standard guidelines and documentation**. The International Organization for Standardization rolled out *ISO 50001:2011, Energy management systems – Requirements with guidance* for use in June 2011. ISO 50001 provides public and private organisations in manufacturing and services with management strategies to increase energy efficiency, improve energy performance and save costs. It sets out a framework of requirements for organisations to:

- Develop a policy for better energy efficiency
- Fix targets and objectives to meet the policy
- Use data to facilitate energy decision-making
- Measure results
- Review policy effectiveness
- Improve energy management continually

(IV) PROMOTE ADOPTION OF ENERGY-EFFICIENT ELECTRICAL APPLIANCES AMONG THE TRADES

To promote green innovations on electrical appliances for local trade use

While various energy-efficient electrical appliances are available on the market, the collections remain small and offer little choices for users, in particular for some trades. Some industries, such as catering, have difficulty in procuring suitable electrical appliances at a reasonable price. There were also concerns over the performance and durability of these electrical appliances. Research and development (R&D) in green innovations should therefore be further promoted to facilitate wide spread application in the local trade.

Advantages

- Make available more choices of energy-efficient electrical appliances for local trade use.
- Create competitive market for energy-efficient electrical appliances at reasonable price.
- Awareness building on application of green innovations.

Concerns

- Availability of R&D experts and professionals in green innovations.
- Uncertainties on the time and investment needed.

Overseas Example

The United Kingdom (UK)[56]

The UK Government launched the **UK Innovation Investment Fund** in January 2010 to support the development of cutting-edge environmental technologies (e.g. low carbon technologies and advanced manufacturing are two of the focus areas).

The first closing of the Fund aims to invest £125 million (£50 million of government funding and £75 million from private investors), which is equivalent to HK$1,625 million, in small growing businesses, startups and spinouts, including pre-profit and pre-revenue stages of development that focused on improving resource efficiency.

To step up publicity and dissemination of latest information on energy-efficient electrical appliances to enhance awareness of the trade

Although the Government has launched the Energy Efficiency Labelling Schemes and promoted awareness of energy-saving information through different channels, there is still room for further promotion. Some may find existing measures too technical to understand. For example, some consider that information on energy labels may not be easily comprehensible. It is therefore necessary to convey energy saving information in an easily understandable manner through channels which can effectively reach the most relevant audience.

Advantages

- To make energy-saving information more readily accessible and easily understandable to the general public.
- To facilitate consumers to make informed choices.

Concerns

- Difficult to assess the effectiveness of the publicity and education programmes.

Overseas Example

Singapore[57]

"Grant for Energy Efficient Technologies" is administered by a multi-agency committee, Energy Efficiency Programme Office, to encourage owners and operators of industrial facilities to invest in energy-efficient equipment or technologies.

The Grant provides funding of up to 50% (capped at S$2 million per project, which is equivalent to HK$13 million) covering the manpower cost, equipment and materials, and professional services in relation to capital investment on equipment/technologies that help achieve energy efficiency.

To further promote installing water-cooled air conditioning system in lieu of air-cooled ones

In recent years, an increasing number of new commercial buildings have installed water-cooled air conditioning system. For buildings already installed with air-cooled air conditioning system, there may be little incentive for the replacement. Tenants in non-domestic buildings usually pay a fixed amount of management fee covering electricity fee, and net savings in electricity bills, after discounting higher capital cost, operation and maintenance cost of the retrofitted system, may not benefit them.

Advantages

- To achieve energy saving and cost saving.

Concerns

- Relatively high upfront capital investment and retrofitting costs.
- Replacement of air conditioning system will inevitably result in disruption in air conditioning services.

Hong Kong Example[58]

Followed by a review in 2010, **"Fresh Water Cooling Towers Scheme for Air Conditioning Systems"** was updated and launched by the EMSD. One of its most important aims is to promote the wider use of energy-efficient water-cooled air conditioning systems (such as fresh water cooling towers) in Hong Kong.

The Scheme applies to all non-domestic types of new and existing buildings within the designated areas and applications outside the designated areas would also be considered on a case-by-case basis.

(V) ELECTRICITY TARIFF STRUCTURE REVIEW

The issue of electricity tariff structure is a complex one but is linked with electricity demand and consumption. In Hong Kong, electricity is the main source of energy. It has been suggested that the two power companies should explore the possibility of further encouraging energy saving and reducing the peak demand through tariff innovation. The following are two possible tariff-related demand-side measures to reduce or shift the electricity use:

To consider revising the existing electricity tariff structure with a view to driving reduction in electricity consumption

Overseas Example

Progressive Tariff Structure

With a simple progressive tariff structure, the tariff rate of electricity will increase if the consumption exceeds a certain limit. In multiple block progressive structure, tariff rates increase with the level of consumption in several steps. Examples of such tariff structure can be found in Taiwan and US.

Area	Sector	Details		
Inclining Block rates: Taiwan (Taipower)	Non-residential[59]	Total Energy Rates (TW$/kWh) :-	June to Sept	Other Months
		0 to 330 kWh	$3.76	$3.02
		331 to 500 kWh	$4.05	$3.27
		501 to 700 kWh	$4.51	$3.55
		701 kWh and above	$5.10	$3.97
San Francisco, US (Pacific Gas and Electric Company)[60]	Residential*	Total Energy Rates (US$/kWh):-		
		Baseline Usage		$0.12233
		101% - 130% of Baseline		$0.13907
		131% - 200% of Baseline		$0.30180
		201% - 300% of Baseline		$0.34180
		Over 300% of Baseline		$0.34180

To consider revising the existing electricity tariff structure with a view to driving reduction in demand for electricity at peak/critical time

Time-of-Use Tariff Programmes

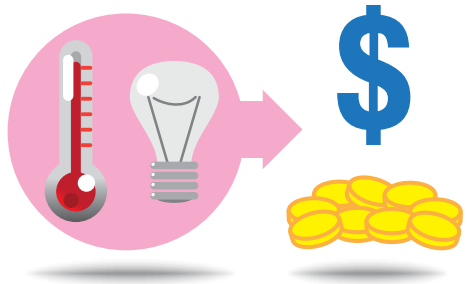
The main objective is to reduce peak loads and/or shift load from peak to off-peak periods. They typically include seasonal tariff and daily time-of-use tariff. By using the price discrimination strategy, it can relieve the electricity demand during the critical period. Time-of-use tariff is widely adopted in Queensland, Australia[61]. For example, two different rates are found in “Tariff 22 – General Supply” which are listed as follows:

Time	Sector	Electricity Rate (A$ cent/kWh)
7am - 9pm (Monday – Friday)	Retail	26.43
Other times		9.31

* The tariff schedule has just been revised and the tariff rates took effect from June 2011.

EXAMPLES OF ENERGY-SAVING PRACTICES

The following are other possible measures to save energy. Some involve good housekeeping, some require additional information being made available while others involve using different types of electrical appliances or technologies. Some automatic control devices are useful for energy saving. For example, occupancy sensors and timer switches can help switch off lights and air conditioning at unoccupied areas.



To switch off lights (e.g. signboard) during a specific period

Lighting accounts for a large proportion of electricity consumption for some sectors, such as retail and catering. Lighting gives a better image of the shops and makes the products look more attractive. Many companies also use signboard as their advertisement and attract customers' attention.

Advantages

- To achieve energy saving.
- To save electricity cost in the long run.

Concerns

- Lights-out may affect visitors' impression towards Hong Kong as the Pearl of the Orient.
- Less attractive to the customers and affect the business.

To dress down

Energy-saving can start in the very daily practices; dressing smart can also save the environment. Statistics show that about 30% of all electricity consumed in Hong Kong is used for air conditioning. The Government has been encouraging the public to set air-conditioned room temperature at 25.5°C. If room temperature is raised from 22.5°C to 25.5°C, i.e. a rise of 3°C, it will save 9% of energy use in air-conditioning. Dressing down will result in a lesser demand for an excessively cooled indoor environment.

Advantages

- To promote energy saving and cost saving.

Concerns

- Corporations might have concerns about corporate images.
- Retail and catering industries need sufficient air conditioning to attract customers in summer.

Overseas Example

South Korea[62]

Facing skyrocketing oil prices, South Korea has tightened the energy policy and launched a **lights-out policy** that targets **neon signs** and **outdoor lights** in Seoul's **major business and entertainment districts**. Establishments that sell alcoholic beverages, night clubs and bars are required to turn off their outdoor lighting at 2:00 a.m. Local media estimated that about 92,000 establishments in Seoul have been targeted by the government lighting restrictions. Those which fail to abide by the regulations will be fined up to 3 million Korean won, which is equivalent to about HK$21,600.

Japan[63]

Casual Dress Campaign - "Super Cool Biz"

The Ministry of the Environment is pushing the Super Cool Biz in the summer of 2011, calling for lighter and more casual outfits appropriate for the office yet cool enough to endure the sweltering heat. The casual dress campaign known as "Cool Biz" started in 2005 where ministry workers are allowed to **forego neckties and suit jackets** under hot weather. Under the newly launched campaign, **polo shirts and trainers** are allowed, while **jeans and sandals** are also acceptable under certain circumstances. The campaign is a response to the energy shortage after the nuclear plant crisis, the government is **asking companies and government offices to cut electricity usage by 15%** and to limit air conditioning use and **set air-conditioned temperatures at 28°C**.

Hong Kong Example[64]

Dress Down in Summer

The Government has been promoting "dressing down in summer" to encourage government officials, legislators, civil servants as well as the private sector to wear smart casual outfits in summer months.

OTHER ENERGY-SAVING PRACTICES IN HONG KONG

To provide sectoral guidelines and communication platform for the industry to make reference, e.g. "Cool Kitchen" (清涼廚房作業手冊)

The Hong Kong Productivity Council and the Hong Kong Environmental Resource and Safety Institute have launched a handbook on the best practices in "Cool Kitchen"[65], which provides guidelines on **kitchen layout** and **ventilation design, green equipment and facilities** as well as **business management systems** that can save energy and resources, enhance work safety and staff morale in order to raise the efficiency and competitive edge of the catering industry.

To promote induction cooking to lower indoor temperature and reduce wastage of energy

Using energy-efficient induction cooking tools is one of the important keys in creating a "cool kitchen". Induction cooking uses less energy than conventional cooktops and offers **precise heat control**. It also requires less air conditioning to lower the temperature of a kitchen.

To promote the use of environmentally-friendly steamer / steam oven to strengthen energy efficiency

For the environmentally-friendly steamer, more than 80% of heat energy is used for cooking while the traditional ones wasted most of the heat energy. As a result, environmentally-friendly steamer needs **less cooking time and uses less electricity** as a whole.

Hong Kong Example

The temperature of the kitchen of a hotel has been **lowered by 5°C** after using energy-efficient induction cooktops. Energy-efficient induction cooktops also enabled a non-governmental organisation to **save 30% of the energy expenses**.

Waste Heat Recovery Technology

A local restaurant has adopted some energy-saving measures, including recycling waste heat from the steamer cabinet in the kitchen to generate hot water for washing dishes and re-directing exhaust cool air from the dining area to the kitchen. These helped the restaurant to save up **to 30% energy cost** and lead to a **reduction of 100 tonnes of CO_2 emission per year.** The pay-back period of the HK$20,000 upfront investment in the heat recovery steamer was less than one year.

OTHER PROMOTION MEASURES REGARDING ENERGY EFFICIENCY AND CONSERVATION, SUCH AS THROUGH GOVERNMENT'S DEMONSTRATION PROJECT TO SHOWCASE ENERGY-EFFICIENT BUILDINGS

Hong Kong Example

Tamar Development Project

The Tamar Development Project (the Project), which houses the new headquarters of the Government, demonstrates the Administration's commitment to protecting the environment through a variety of environmentally friendly features, e.g. **high energy efficient sea-water cooled chiller plants, green roof, photovoltaic panels, daylight sensors and computerised lighting controls** etc. When completed, the Project is expected to achieve the highest rating, i.e. Platinum, under the Building Environment Assessment Method (BEAM).

Sing Yin Secondary School

Since the 2008-09 Policy Address, the Government has started to promote energy efficiency by introducing state-of-the-art design and technologies in some demonstration projects, e.g. the new campus of Sing Yin Secondary School to be operated in the academic year of 2011-2012.

Locating at the junction of New Clear Water Bay Road and Choi Hing Lane in Jordan Valley, the new campus comprises a total site area of 8,630 m^2. The school buildings have incorporated various energy-efficient features, including **building energy management system** (e.g. scheduled control on lighting system, automatic control on air-conditioning system, regular energy audits and review etc.); **renewable energy installations** such as photovoltaic panels, solar water heaters, small scaled wind turbine and daylight sun tubes; **water-cooled Variable Refrigerant Volume** air conditioning system as well as **LED lighting system**. The total expense for these measures costs approximately HK$5.8 million.

Upon implementation, it is anticipated that a **27.3% of total energy consumption** would be saved annually.

AN OVERVIEW OF THE PUBLIC EDUCATION AND AWARENESS PROGRAMME OF THE COUNCIL FOR SUSTAINABLE DEVELOPMENT

The public education and awareness programmes planned by the Council for Sustainable Development (SDC) in collaboration with schools, non-governmental organisations and other organisations would take on the perspective of sustainable development in relation to climate change, by according equal importance to economic, environmental and social aspects. Interested parties may surf the SDC's dedicated website for the public engagement at www.susdev.org.hk for detailed information on the public education and awareness programme.

Schools and students

- Collaborating with WWF - Hong Kong to organise a low carbon leader training programme - **"Low Carbon Guru Programme" (Go Fun 低碳達人)** for engaging the senior secondary school sector.
- To encourage participating schools of the Education and Publicity Sub-committee (EPSC) of SDC's existing **Sustainable Development School Award Programme** to attend events/organise projects, such as field trips/visits, on the theme of low carbon living, sustainable consumption and building energy efficiency.
- To leverage on EPSC's existing **School Outreach Programme** whereby stakeholder partners will deliver talks/workshops on the issue of climate change, low carbon living, sustainable consumption and building energy efficiency.

General public

- Collaborating with the **Hong Kong Arts Centre** to commission Hong Kong Independent Short Film & Video Awards winners to produce **two promotional shorts** on the relevance and urgency of climate change and/or the promotion of building energy efficiency.
- Collaborating with the **Hong Kong Productivity Council** to **develop a web-based carbon management tool and launch a pilot carbon audit programme.**

Other publicity

- A **Television Announcement in Public Interests (API)** and a **Radio API** will be produced and broadcast to promote the overall message of the SDC's public engagement and to arouse the public's interest.
- A **dedicated website** will be launched as a base for publicising information, and to provide interactive "infotainment" to bring home messages about climate change from a sustainable development perspective.
- Collaborating with **Radio Television Hong Kong** to highlight building energy efficiency as a key theme of its Solar Project this summer.
- Three series of **air promotion segments** will be designed in the form of a series of short stories on the topic of building energy efficiency, and scheduled for broadcast on **Commercial Radio**.
- **Roadside banners, posters** and/or other publicity items will be displayed at a wide range of venues across the territory.

4. PUT THOUGHTS INTO ACTION: SOME QUESTIONS FOR YOU…

CLIMATE CHANGE AND YOU

(i) What does climate change mean to you?

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(ii) Do you think you can contribute to the Government's proposed target of reducing Hong Kong's carbon intensity by 50%-60% in 2020 as compared with the 2005 level? If yes, what measures would you take? If no, why not?

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SYSTEMIC ENHANCEMENT

(i) To consider tightening the Building Energy Code (BEC)

- *Do you agree that we should tighten the energy efficiency standards for the four building services installations (lighting, air conditioning, electrical and lift & escalator) covered by the BEC?*

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- *Do you think that the BEC should cover other types of building services installations? If yes, what are they?*

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(ii) To consider providing recognition for buildings achieving high energy efficiency

- *Do you think energy-efficient buildings should be recognised by the government or other institutions through award/labelling scheme?*

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- *What kind of elements (e.g. estimated/ actual energy performance, housekeeping practices, innovative measures etc.) should be included in the assessment?*

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(iii) To explore extension of the application of the Mandatory Energy Efficiency Labelling Scheme (MEELS)

- *Do you agree that we should introduce more electrical appliances under the MEELS?*

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- *Will you consider installing energy-efficient electrical appliances even if their price may be higher than the energy-inefficient ones? If yes, why? If no, why not?*

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(iv) To consider tightening up the energy efficiency grading levels for room air conditioners and refrigerators under the MEELS

- *Do you think there is a need to tighten up/revisit the grading levels under the MEELS, particularly for room air conditioners and refrigerators which consume a considerable amount of electricity?*

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(v) To explore phasing out energy-inefficient incandescent light bulbs

- *Do you think we should restrict the supply of energy-inefficient incandescent light bulbs in Hong Kong as in some overseas jurisdictions?*

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- *Are you using energy-efficient light bulbs at your home or workplace? If yes, what's the result? If no, why not?*

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(vi) To explore phasing out energy-inefficient electrical installations/ appliances

- *Should we consider imposing minimum energy performance standards for electrical appliances? If yes, on what type of electrical appliances?*

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FACILITATION OF BEHAVIOUR CHANGE

(i) Energy/Carbon audit

- *Has carbon audit been conducted in your own housing estate/ workplace?*

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- *Have you ever considered conducting carbon audit in any premises/ building? If yes, what were your considerations? If no, why not and what are the obstacles?*

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- *Do you want to understand more about the carbon emission level in your building and possible ways to reduce energy consumption?*

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- *Is energy/carbon audit conducive to identification/implementation of appropriate energy saving measures?*

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- *What kind of assistance or incentive should be available from the Government or other organisations to facilitate carbon audits?*

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- *Which kind of organisation(s) should take the lead in conducting energy/carbon audit, e.g. government departments/large corporations/listed companies/small and medium enterprises etc.?*

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(ii) Better understanding of your energy consumption

- *What kind of information should be provided in our electricity bills?*

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- *What kind of presentation style do you prefer?*

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(iii) More use of energy efficiency management systems (EMS)

- *How should we promote the adoption of EMS/tools/technologies in buildings?*

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- *What kind of incentives should be provided for the developers/ property management companies etc. to adopt EMS in buildings?*

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(iv) Promote adoption of energy-efficient electrical appliances among the trades

- *Do you think that there should be more investment on research & development (R&D) for energy-efficient electrical appliances for local trade use?*

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- *What would be the best way to provide information on R&D and the marketing of such electrical appliances for you?*

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(v) Electricity tariff structure review

- *Do you think the restructuring of electricity tariff can facilitate behaviour change and achieve energy saving?*

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Please tear off this page along the dotted line and send it to us on or before 4 December 2011 by mail, e-mail or fax to:

Mail: Sustainable Development Division
Environment Bureau
M/Floor, Murray Building
Garden Road, Central, Hong Kong

E-mail: comments@susdev.org.hk

Fax: 3150 8168

5. WHAT'S NEXT? WE NEED YOUR INPUT!

Continuous Dialogue

Collective wisdom is an essential element in public engagement. We earnestly request you to let us have your views and comments. Copies of the Invitation for Response (IR) Document are available at public libraries and all District Offices. It can also be downloaded from the Council for Sustainable Development's (SDC) dedicated website: www.susdev.org.hk.

The proposed actions on maximising energy efficiency and reducing carbon emission in buildings will have profound impact on our environment, economy as well as our social lifestyle. Please make reference to the key discussion points appended at the end of this IR Document and send your comments to us on or before 4 December 2011 by mail, e-mail or fax to the following –

Mail: Sustainable Development Division
Environment Bureau
M/Floor, Murray Building
Garden Road, Central, Hong Kong

E-mail: comments@susdev.org.hk

Fax: 3150 8168

Upcoming Events

You are not limited to providing a written response based on this document. We sincerely encourage you to participate in the ongoing public engagement activities and other related events. You may wish to visit the SDC's dedicated website at **www.susdev.org.hk** for the relevant and updated information on the public engagement activites and events.

Quoting Your Views

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

Enquiry hotline

If you have any enquiries about the public engagement process, or how to submit your views, please contact our **Public Engagement Hotline at 2219 4763**. Please note that this Hotline is for general enquiry only, and will not be used as a channel to collect views.

ANNEX I

TERMS OF REFERENCE AND MEMBERSHIP OF THE COUNCIL FOR SUSTAINABLE DEVELOPMENT, STRATEGY SUB-COMMITTEE AND SUPPORT GROUP

THE COUNCIL FOR SUSTAINABLE DEVELOPMENT

Terms of Reference –

(a) To advise the Government on the priority areas it should address in promoting sustainable development;

(b) To advise on the preparation of a sustainable development strategy for Hong Kong that will integrate economic, social and environmental perspectives;

(c) To facilitate community participation in the promotion of sustainable development in Hong Kong through various means, including the award of grants from the Sustainable Development Fund; and

(d) To promote public awareness and understanding of the principles of sustainable development.

Membership –

Chairman:

Mr Bernard Charnwut CHAN, GBS, JP

Members:

Mr CHAN Siu-hung; Professor HO Kin-chung, BBS; Mr Benjamin HUNG Pi-cheng, JP; Mrs Stella LAU KUN Lai-kuen, JP; Ms Lilian LAW Suk-kwan, JP; Mrs Miranda LEUNG CHAN Che-ming; Mr Victor LI Tzar-kuoi; Dr LO Wai-kwok, BBS, MH, JP; Professor POON Chi-sun; Mr SIN Chung-kai, SBS, JP; Professor Joseph SUNG Jao-yiu, SBS; Professor Nora TAM Fung-yee, JP; Ms Iris TAM Siu-ying, JP; Dr Andrew Lee THOMSON; Miss Sherry TSAI Hiu-wai; Professor Stephen WONG Siu-lun, SBS, JP; Secretary for the Environment*; Secretary for Development*; Secretary for Home Affairs*; and Secretary for Transport and Housing*

* or Permanent Secretary

STRATEGY SUB-COMMITTEE OF THE COUNCIL FOR SUSTAINABLE DEVELOPMENT

Terms of Reference –

(a) To assist the Council for Sustainable Development (SDC) with the formulation of a sustainable development strategy for Hong Kong;

(b) To engage stakeholders and the community and implement a consultation programme as agreed by the SDC with a view to ensuring that the sustainable development strategy is inclusive and widely accepted by the community; and

(c) To report regularly to the SDC on progress with the formulation of the sustainable development strategy.

Membership –

Chairman:

Mr Bernard Charnwut CHAN, GBS, JP

Members:

Mr CHAN Siu-hung; Mr Henry HO Kin-chung*; Mr Benjamin HUNG Pi-cheng, JP; Mrs Miranda LEUNG CHAN Che-ming; Mr Victor LI Tzar-kuoi; Mr LO Sze-ping*; Professor Bernard LIM Wan-fung*, JP ; Professor POON Chi-sun; Mr SIN Chung-kai, SBS, JP; Professor Joseph SUNG Jao-yiu, SBS; Ms Iris TAM Siu-ying, JP; Dr Andrew Lee THOMSON; and Dr Ray YEP Kin-man*

* Co-opted Members

SUPPORT GROUP ON COMBATING CLIMATE CHANGE: ENERGY SAVING AND CARBON EMISSION REDUCTION IN BUILDINGS

Terms of Reference –

(a) To assist the Council for Sustainable Development (SDC) and its Strategy Sub-committee (SSC) in compiling an Invitation for Response (IR) Document, with reference to relevant local and international information on climate change and operations of target user groups;

(b) To make proposals to the SDC and SSC on the design and implementation of the public involvement phase of the public engagement for public discussion of the IR Document and related issues;

(c) To present the IR Document to the public and facilitate interactive discussion by stakeholders with a view to bringing about mindset changes and prompting for appropriate actions; and

(d) To receive and collate responses from stakeholders, with a view to making proposals to the SDC and SSC on the SDC's recommendations to the Government.

Membership –

Convenor:

Mr WONG Kam-sing

Members:

Ms Teresa AU Pui-yee; Mr Felix CHAN Kwok-wai, MH, JP; Mr CHAN Siu-hung; Mr Cary CHAN Wing-hong; Ms Christine FANG Meng-sang, BBS, JP; Professor HO Kin-chung, BBS; Mr Michael LAI Kam-cheung, MH, JP; Mr LAM Chiu-ying, SBS; Dr LAM Pun-lee; Mrs Miranda LEUNG CHAN Che-ming; Mr Kendrew LEUNG Chun-yuen; Dr Michael LEUNG Kwok-hi; Professor Bernard LIM Wan-fung, JP; Dr LO Wai-kwok, BBS, MH, JP; Mr LOOK Guy; Professor POON Chi-sun; Ir Otto POON Lok-to, BBS; Mr Simon WONG Ka-wo, JP; Dr William YU Yuen-ping; Representative from the Environment Bureau; Representative from Environmental Protection Department; Representative from the Electrical and Mechanical Services Department; Representative from the Buildings Department; Representative from the Housing Department

ANNEX II

SUPPORTING ORGANISATIONS

Universities and Tertiary Institutions

Chu Hai College of Higher Education

City University of Hong Kong

Hang Seng Management College

Hong Kong Baptist University

Hong Kong Shue Yan University

Lingnan University

The Chinese University of Hong Kong

The Hong Kong Academy for Performing Arts

The Hong Kong Institute of Education

The Hong Kong Polytechnic University

The Hong Kong University of Science and Technology

The Open University of Hong Kong

The University of Hong Kong

Vocational Training Council

Public Authorities and Related Organisations

Airport Authority Hong Kong

Hong Kong Housing Authority

Hong Kong Housing Society

Hong Kong Productivity Council

Urban Renewal Authority

Research Institutions/Think Tanks

Centre of Architectural Research for Education, Elderly, Environment and Excellence Limited

Hong Kong Policy Research Institute Limited

Research Centre for Building Environmental Engineering

Roundtable Institute and its Network

Sino-Forest Applied Research Centre for Pearl River Delta Environment

30SGroup

Green Groups

Friends of the Earth (HK)

Greeners Action

Greenpeace

Green Power

Kadoorie Farm and Botanic Garden

The Conservancy Association

WWF – Hong Kong

Non-governmental Organisations

Breakthrough Limited

Green Council

Scout Association of Hong Kong

St James' Settlement

The Boys' & Girls' Clubs Association of Hong Kong

The Hong Kong Award for Young People

The Hong Kong Council of Social Service

The Hong Kong Federation of Youth Groups

The Hong Kong Girl Guides Association

Business-related Organisations

Association of Restaurant Managers

Business Environment Council (Climate Change Business Forum)

Federation of International SME Limited

Hong Kong Federation of Restaurants & Related Trades

Hong Kong General Chamber of Commerce

Hong Kong Small and Medium Enterprises Association

The Chinese General Chamber of Commerce

The Hong Kong General Chamber of Small and Medium Business

The Real Estate Developers Association of Hong Kong

Professional Organisations

American Society of Heating, Refrigerating and Air-Conditioning Engineers (Hong Kong Chapter)

BEAM Society

Building Services Operation and Maintenance Executives Society

Energy Institute (Hong Kong Branch)

Environmental Management Association of Hong Kong

Hong Kong Association of Energy Engineers

Hong Kong Climate Change Forum

Hong Kong Green Building Council

Professional Green Building Council

The Chartered Institution of Building Services Engineers – Hong Kong Branch

The Hong Kong Institute of Architects

The Hong Kong Institution of Engineers

The Hong Kong Institute of Facility Management

The Hong Kong Institute of Landscape Architects

The Hong Kong Institute of Planners

The Hong Kong Institute of Surveyors

(By alphabetical order under each category)

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