Buildings Energy Efficiency Bill

The Administration's response to Action Items at the Bills Committee meeting on 28 January 2010

Environmental benefits of the proposed mandatory implementation of the Building Energy Codes (the proposed mandatory scheme)

It is estimated that implementation of the proposed mandatory scheme will result in energy saving of approximately 2.8 billion kWh in the first decade of implementation. The estimation is based on the information from Hong Kong Property Review 2007 issued by the Rating and Valuation Department on the projected additional floor areas for commercial, residential and industrial buildings and the average energy saving achieved by complying with the Building Energy Codes.

2. In terms of reduction in carbon dioxide emissions, it will be in the region of 1.96 million tonnes in the first decade, based on the emission of 0.0007 tonnes per kWh of electricity generated in Hong Kong.

3. The figure only covers the estimated energy saving achieved by implementing the proposed mandatory scheme in new buildings. Additional energy saving could be achieved by requiring compliance with the Building Energy Codes when existing buildings undergo major retrofitting works.

4. Electricity consumption by different categories of existing buildings and the potential energy saving of new buildings in those categories in the first decade of implementation of the proposed mandatory scheme is at **Annex A**. Electricity consumption of different building services installations in a building is at **Annex B**.

The proposed energy efficiency standards and overseas practices

5. Since 1998, the Electrical and Mechanical Services Department (EMSD) has been operating the Hong Kong Energy Efficiency Registration Scheme for Buildings (HKEERSB) to promote voluntary compliance with the Building Energy Codes. A comparison of the control regimes between HKEERSB and the proposed mandatory scheme

is at **Annex C**.

6. The voluntary Building Energy Codes 2007 edition will be used as the blueprint for the mandatory energy efficiency standards. The standards on air-conditioning installations and electrical installations are broadly comparable to the standards adopted by other jurisdictions, whereas the standards on lighting installations are relatively less stringent to meet the general local preference for better-illuminated interior spaces. Moreover, EMSD has put in place standards on lift and escalator installations, unique to the built environment of Hong Kong which is dominated by high-rise buildings. The draft codes of practices to be issued under clause 40 of the Buildings Energy Efficiency Bill (the Bill), which will set out in detail the technical standards of the proposed mandatory scheme, are available at EMSD's website.

7. An overview of the legislative practices of minimum building energy efficiency requirements in the Mainland and some overseas jurisdictions and a comparison of the respective energy efficiency standards are at **Annexes D and E**.

Scope of application

8. Under clause 4 of the Bill, a building that is constructed in accordance with the Buildings Ordinance (Application to the New Territories) Ordinance (Cap. 121) is not covered under the Bill. Those buildings are constructed in accordance with the height and dimension limits as set out in the concerned Ordinance. Their common areas usually contain lighting installations only, and do not have air-conditioning installations or lifts. Having considered the compliance implication and the amount of potential energy saving, it is proposed that those buildings would be excluded from the application of the Bill.

9. On similar consideration, buildings with approved loading of main electrical switch not exceeding 100A, 1-phase or 3-phase are also proposed to be excluded from the application of the Bill.

Threshold of 500 m^2

10. We propose to adopt a 500 m^2 threshold as one of the parameters in defining the scope of major retrofitting works. The

proposed threshold has taken account of extensive consultation with relevant trades and aimed to achieve a balance between the promotion of energy saving and the compliance implication in particular on business environment.

11. For post-enactment buildings[1], their central building services installations, as well as other building services installations in individual units and common areas where applicable, will be required to comply with the Building Energy Codes at all times. Any change to the 500 m^2 threshold would only affect the number of major retrofitting works projects that require a Form of Compliance.

12. For pre-enactment buildings[2], any change in the 500 m^2 threshold would affect the number of major retrofitting works that will be required to comply with the proposed mandatory scheme. However, as the extent of change in saving in electricity and carbon dioxide emissions by changing the threshold would depend on the frequency, scale and nature of major retrofitting works to be conducted, such extent of change can hardly be estimated.

Liabilities between individual owners and owners' corporation

13. Owners of a building, in general, would be jointly responsible for duties relating to the common areas of the building under the proposed mandatory scheme. If an owners' corporation is being set up to manage the common parts of the building, then the owners' corporation will be responsible for the duties relating to the common areas of the building under the Bill.

Implementation of recommendations from energy audits

14. Since the recommendations from energy audits would vary depending on the operation pattern and situation of individual buildings, we consider it inappropriate to mandate the implementation of the recommendations identified in energy audits. The potential savings in

[1] Post-enactment buildings mean buildings that obtain consents to the commencement of building works for superstructure construction from the Building Authority after the new legislation comes into operation.

[2] Pre-enactment buildings mean buildings that obtain consents to the commencement of building works for superstructure construction from the Building Authority on or before the new legislation comes into operation.

electricity bills would provide owners with incentives to implement such energy saving measures. The requirement to exhibit energy audit results would also encourage owners to improve the energy performance of their buildings. A copy of the draft energy audit form is at **Annex F** for reference.

External lighting

15. The issue of external lighting involves not only the energy efficiency standards of the lighting installations, but also the use and operation of those installations. In view of the energy wastage arising from the excessive use of external lighting, the Government has been conducting a consultancy study on relevant issues, with a view to assessing the feasibility of regulating external lighting by legislation. We will take account of findings of the relevant consultancy study and stakeholders' views in mapping out the way forward.

Promoting energy efficiency in residential buildings

16. The Government has been promoting energy efficiency through various means. We propose to include common areas of residential buildings in the scope of the Bill. For individual households in residential buildings, we have implemented voluntary and mandatory Energy Efficiency Labelling Schemes (EELS) to promote energy saving by informing customers of the energy performance of electrical appliances. EELS will also encourage product suppliers to make available more energy-efficient products to meet customers' demand.

17. The initial phase of the mandatory EELS has been in full implementation since 9 November 2009, covering room air conditioners, refrigerating appliances and compact fluorescent lamps. These products account for about 60% of the total electricity consumption in the residential sector. The second phase of the mandatory EELS, which will commence on 19 March 2010, covers washing machines and dehumidifiers. These two products account for about 7% of the total electricity consumption in the residential sector. As such, the mandatory EELS has already covered products that account for some 70% of the total electricity consumption in the residential sector.

Buildings Energy Efficiency Funding Schemes

18. Owners of private residential, commercial and industrial buildings are eligible to apply for subsidy under the HK$450 million Buildings Energy Efficiency Funding Schemes to carry out alteration, addition or improvement works to upgrade the energy efficiency performance of building services installations for communal use of the buildings.

19. As at end January 2010, over 1,000 funding applications have been received among which, 300 applications have been approved. We will closely review the need to provide additional financial assistance to building owners for enhancing building energy efficiency.

Grading system and award scheme for buildings

20. The Bill aims at setting minimum energy efficiency standards for key building services installations. The proposed mandatory energy audit requirement would enable the Administration to collect the necessary information for building up relevant database of energy consumption of buildings, which is requisite for the setting up of such grading scheme or relevant award scheme in the long run.

Previous public consultation

21. The Administration reported the results of the public consultation concluded in March 2008 to the Legislative Council Panel on Environmental Affairs in May 2008 (LC Paper No. CB(1) 1595/07-08(04). Written submissions received during the public consultation period have been uploaded to the website of the Environment Bureau.

First Sustainable Development Strategy for Hong Kong

22. In the First Sustainable Development Strategy for Hong Kong promulgated by the Government in May 2005, we, after considering the local social, economic and environmental conditions, have set the target of having 1-2% of Hong Kong's total electricity supply met by renewable energy by 2012. The Government will also build on plans to promote energy efficiency and conservation as part of an overall sustainable

energy policy. The proposed mandatory implementation of the Building Energy Codes is one of the measures to increase and sustain conservation of energy. The Government is also taking various measures to promote the use of renewable energy.

Other factors affecting building energy efficiency

23. Apart from the use of energy-efficient building services installations, building design and use of materials would also affect building energy efficiency. Such issues have been covered in the public engagement process launched by the Council for Sustainable Development on "Building Design to Foster a Quality and Sustainable Built Environment" from June to October 2009.

24. Views received are being analyzed and the Council for Sustainable Development plans to submit its report and recommendations to the Government before mid 2010. The Government will consider the promotion of energy efficient building design and building materials in this context, taking into consideration views collected.

25. Concerning the thermal transmission property of building envelopes, the Building (Energy Efficiency) Regulation (Cap. 123M) already provides control on the amount of heat transferred through the external walls and roofs of certain types of buildings (known as the Overall Thermal Transfer Value) to reduce the energy needed for air-conditioning. The Buildings Department is currently conducting a review on the control and standards to be adopted under the Building (Energy Efficiency) Regulation.

Environment Bureau
Electrical and Mechanical Services Department
February 2010

Annex A

Electricity consumption by different categories of existing buildings

Building Categories	Electricity Consumption (billion kWh) #	Percentage of Total Electricity Consumption of Existing Buildings
Commercial	23.5	66%
Industrial	3.2	9%
Residential	9	25%
Total	**35.7**	**100%**

Hong Kong Energy End-use Data 2009, the Electrical and Mechanical Services Department

Estimated potential energy saving in new buildings in the first decade of implementation of the proposed mandatory scheme

Building Categories	Estimated Energy Saving (billion kWh)	Estimated CO_2 Reduction (million tonnes)
Commercial	2.6	1.82
Industrial – common area only	0.1	0.07
Residential – common area only	0.1	0.07
Total	**2.8**	**1.96**

Annex B

Estimated percentage of electricity consumption by typical installations/equipment in a typical office building

Installations / Equipment	**Percentage of Electricity Consumption**	**Covered under the proposed mandatory scheme**
Air-conditioning	48%	Yes
Lighting	19%	Yes
Office equipment	22%	No #
Others (e.g. lift & escalator, motors for water pumps etc.)	11%	Yes (majority)
# Majority of office equipment such as computer and photocopier are covered under the voluntary Energy Efficiency Labelling Scheme operated by the Electrical and Mechanical Services Department		

Annex C

Comparison of control regimes between the Hong Kong Energy Efficiency Registration Scheme for Buildings (HKEERSB) and the proposed mandatory scheme

Major Control Regimes	**Mandatory Scheme**	**Voluntary Scheme**
Lighting Installation		
Maximum allowable lighting power density in a space (Watt/m^2)	Applicable	Applicable
Minimum allowable number of control points in office space	Applicable	Applicable
Minimum allowable lamp luminous efficacy (Lumen/Watt)	Not applicable #	Applicable
Maximum allowable lamp controlgear loss (Watt)		Applicable
Air-conditioning Installation		
Ductwork: leakage limit (Litre/second per m^2 of duct surface), and maximum allowable system fan power (Watt per Litre/second)	Applicable	Applicable
Pipework: maximum allowable water flow frictional loss (Pascal/m)	Applicable	Applicable
System control requirements	Applicable	Applicable

Major Control Regimes	**Mandatory Scheme**	**Voluntary Scheme**
Thermal insulation requirements	Applicable	Applicable
Air conditioning equipment: minimum allowable coefficient of performance	Applicable	Applicable
Metering facilities to monitor energy consumption of chiller / plant	Applicable	Not applicable
Electrical Installation		
Power distribution loss (%)	Applicable	Applicable
Minimum allowable motor efficiency (%)	Applicable	Applicable
Power quality requirements: minimum allowable power factor, maximum allowable harmonic distortion, balancing of single-phase loads	Applicable	Applicable
Metering facilities to monitor electricity consumption	Applicable	Applicable
Lift & Escalator Installation		
Maximum allowable electrical power (Watt)	Applicable	Applicable
Utilization of power: power quality	Applicable	Applicable

Major Control Regimes	**Mandatory Scheme**	**Voluntary Scheme**
requirements, maximum allowable lift decoration load, lift parking mode requirement		
Metering facilities to monitor electricity consumption	Applicable	Applicable
Energy audit	Applicable to common area of commercial building and common area of commercial portion of composite building only	Existing buildings can join the voluntary scheme after conducting energy audits
# after consultation with Technical Taskforce and aligning with international experience		

Legislative practices of minimum energy efficiency requirements for buildings in the Mainland and some overseas jurisdictions

Australia

The Building Code of Australia (BCA) is a national standard stipulating the minimum energy efficiency requirements together with other health and safety requirements for buildings. Other than the minimum energy efficiency requirements, the BCA also requires that all residential buildings should achieve a specified energy benchmark. The BCA is adopted by the State and Territory building legislation as the technical standard for the construction of buildings. Subject to the actual legislative requirements in each State and Territory such as the Australian Capital Territory's Building Regulations, all new building works in new and existing building development have to comply with the BCA prior to the issuance of relevant occupation permit by the authority. The BCA does not have retrospective effect and is generally not applicable to existing buildings unless those building undergo alterations, additions or changes of use to an extent that the authority may require them to be upgraded to meet the above-mentioned standards.

2. Other than the BCA, Australia also implements a voluntary Australian Building Greenhouse Rating (ABGR) Scheme, which is developed in 2005 to provide market recognition and a competitive advantage for low greenhouse emitters and energy efficient performers, and to encourage best practice to minimize greenhouse emissions in commercial buildings. The scheme is renamed as NABERS Energy in May 2008. The Scheme is administered nationally by the New South Wales Department of Environment, Climate Change and Water, and locally by leading state greenhouse agencies. The Scheme rates buildings from one to five stars and helps building owners and tenants across Australia benchmark the greenhouse performance of their buildings.

Singapore

3. Singapore Standard SS 530 – Code of Practice for Energy Efficiency Standard for Building Services and Equipment is the national standard stipulating the minimum energy efficiency performance requirements for building services installations in Singapore. Under the Building Control Regulations of its Building Control Act, all new buildings in Singapore have to satisfy the minimum energy efficiency

performance as stated in the Approved Document – Acceptable Solutions issued by the Building and Construction Authority, which requires that the requirements in SS 530 have to be satisfied. The energy efficiency requirements have to be complied with prior to the issuance of relevant occupation permit by the authority. The requirements in SS 530 do not have retrospective effect and are generally not applicable to existing buildings unless these buildings undergo alterations, additions or changes of use to an extent that the relevant authority may require them to be upgraded to meet the above-mentioned requirements.

4. On the other hand, the Building and Construction Authority has launched in 2005 a voluntary Green Mark Scheme, which is a green building rating system to evaluate factors affecting the environmental impact and performance of a building. The Scheme aims to encourage the incorporation of environmentally friendly and energy saving features in buildings and to raise environmental awareness among developers, designers, and building professionals. Buildings will be awarded a Certified, Gold, Gold Plus or Platinum rating depending on the points scored on the key criteria including energy efficiency. Starting from 2008 onwards, the new Building Control (Environmental Sustainability) Regulations 2008 shall apply to all new buildings and existing buildings undergoing major retrofitting works with gross floor area above 2000 m^2. The minimum Green Mark score for any building works to which the regulations apply shall meet the Certified rating or above.

<u>England and Wales, The United Kingdom</u>

5. The minimum energy efficiency requirements for buildings are included in the Approved Document L1 – Conservation of fuel and power in dwellings and Approved Document L2 – Conservation of fuel and power in buildings other than dwellings issued by the Secretary of State. All buildings have to comply with the mandatory functional requirements set out in the Building Regulations under the Building Act, which are also supported by the practical guidance in the Approved Documents to cover the common building design, with compliance of the relevant British Standards as an alternative approach to cover the more complex situations. The energy efficiency requirements have to be complied with prior to the issuance of relevant occupation permit by the authority. The requirements do not have retrospective effects and are generally not applicable to existing buildings. The Approved Documents give practical guidance for new buildings as well as existing buildings involving alterations, additions or change of use, etc. for compliance of the Building Regulations.

6. Apart from the above-mentioned legislative requirements, the United Kingdom introduced the Energy Performance of Buildings (Certificates and Inspections) (England and Wales) Regulations of the Building Act in 2007. The new Regulations require that an Energy Performance Certificate, which gives the building a grading ranging from A to G for its energy efficiency performance, shall be produced whenever the building is constructed, sold or rented. The Certificate shall be displayed in large buildings occupied by public authorities and certain public institutions.

The United States of America

7. Each State in the United States has acts and regulations on their own to govern the energy efficiency performance of buildings. The regulations normally refer to codes and standards developed by non-government bodies such as the American Society of Heating, Refrigeration & Air-conditioning Engineers (ASHRAE). The ASHRAE Standard 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings has been recognized as the American National Standard governing energy efficiency performance for buildings. In the Energy Policy Act, States are requested to adopt ASHRAE Standard 90.1 or equivalent as the state-wide energy code for commercial buildings. For example, the California Building Standard Code administered by the California Building Standards Commission is developed based on ASHRAE Standard 90.1. Other than new buildings, the California Code is applicable to existing buildings whenever the buildings change tenancy or ownership.

The Mainland

8. The minimum energy efficiency requirements for buildings are stipulated in the national standard GB 50189 – 《公共建築節能設計標準》, with which the design of buildings has to comply. The《民用建築節能管理規定》of the 《中華人民共和國建築法》, which came into force on 1 January 2006, requires that the planning, design, construction and operation of both residential and public buildings have to comply with the requirements covering various energy efficiency and conservation measures as stipulated in the Regulation. The requirements are applicable to new buildings as well as alterations and additions to existing buildings.

Annex E

Comparison of the proposed mandatory Building Energy Codes (BEC) with standards in the Mainland and some overseas jurisdictions

Space Types	**Lighting - Maximum Allowable Lighting Power Density (W/m^2)**					
	Hong Kong mandatory BEC	**Australia BCA**	**Singapore SS 530**	**US ASHRAE 90.1**	**Europe (e.g. UK Approved Document L2)**	**Mainland GB 50034**
Open Plan Office / Cellular Office	17	7 (< 200 Lux [#]) or 10 (200 Lux or more)	15	11.8 (general), 16.1 (banking)	not less than 40 luminaire-lumen per circuit Watt	11 (general), 18 (high class)
Retail	20	25	25	18.3	No specific requirement	12 - 20
Restaurant	23	20	15	15		13
Atrium / Foyer	20	10	10	5.4 - 14		15
# The unit of the illumination level in a space, the higher the brighter. In Hong Kong, an illumination level of 500 Lux is commonly adopted in lighting design.						

Type/Rating of air- conditioning Chillers	**Air-conditioning - Minimum Allowable Coefficient of Performance of Chiller #**					
	Hong Kong mandatory BEC	**Australia BCA**	**Singapore SS 530**	**US ASHRAE 90.1**	**Europe (e.g. UK Approved Document L2)**	**Mainland GB 50189**
Air cooled, scroll / screw	2.7 – 2.9	2.2 – 2.5	2.8	2.8	Requirement is set on overall air-conditioning system performance instead of on coefficient of performance	2.4 – 2.6
Water cooled, screw, 500 – 1000kW	4.6	4.5	4.45 – 4.9	4.9		4.3
Water cooled, screw, >1000kW	5.5	5.5	4.9 – 5.5	5.5		4.6
Water cooled, centrifugal, 500 – 1000kW	4.5	4.5	5 – 5.55	5.55		4.7
Water cooled, centrifugal, >1000kW	5.7	5.5	5.55 - 6.1	6.1		5.1
# Coefficient of performance means the ratio of the rate of heat removal to the rate of energy input.						

Motor (4-pole) Rating, P (kW)	**Electrical Installation - Minimum Allowable Motor Efficiency (%)**					
	Hong Kong Mandatory BEC	**Australia**	**Singapore SS 530**	**US ASHRAE 90.1**	**Europe (e.g. CEMEP)**	**Mainland**
$1.1 \leq P < 5.5$	76.2 – 84.2	No specific requirement	83.8 – 88.3	84 – 87.5	76.2 – 84.2	No specific requirement
$5.5 \leq P < 22$	85.7 – 90		89.2 – 92.2	89.5 – 92.4	85.7 – 90	
$22 \leq P < 55$	90.5 – 92.5		92.6 – 93.9	92.4 – 93.6	90.5 – 92.5	
$55 \leq P < 90$	93 – 93.6		94.2 – 94.7	94.1 – 94.5	93 – 93.6	
$P \geq 90$	93.9		95	94.5	93.9	

Remarks:

(a) BCA - "Building Code of Australia, 2006" is the national standard for buildings in Australia;
(b) SS 530 – "Energy Efficiency Standard for Building Services and Equipment" is the standard adopted in Singapore;
(c) ASHRAE 90.1 – "Energy Standards for Buildings Except Low-Rise Residential Building, 2004" issued by the American Society of Heating, Refrigeration and Air-conditioning Engineers is the standard adopted in the United States;
(d) Approved Document L2 – "Conservation of fuel and power in buildings other than dwellings" is the standard document adopted in England, the United Kingdom;
(e) CEMEP – European Committee of Manufacturers of Electrical Machines and Power Electronics represents the European manufacturers on electrical machines and provides classification of electrical motors according to their efficiencies; the motor efficiency figures represent the major market share of electrical motors in European countries; and
(f) GB 50034 - 《建築照明設計標準》is the standard for lighting design in the Mainland; and GB 50189 –《公共建築節能設計標準》is the standard for energy efficiency of buildings in the Mainland.

機電工程署 EMSD

Form EE-5 表格 EE-5

The Government of the Hong Kong Special Administrative Region Buildings Energy Efficiency Ordinance (Chapter XXX, Section 21, 22, 23 and 25) Energy Audit Form

香港特別行政區政府 建築物能源效益條例（第 XXX 章第 21, 22, 23 及 25 條）能源審核表格

Section A 甲 部：General Information 一般資料

Name of Building： 建築物名稱：	English 英文	
	Chinese 中文	
Address of Building： 建築物地址：	English 英文	
	Chinese 中文	

Section B 乙 部：Declaration 聲明

To 致： Building owner 建築物擁有人

Cc 副本抄送： The Director of Electrical & Mechanical Services 機電工程署署長

In accordance with the provisions of Section 21, 22, 23 and 25 of the Buildings Energy Efficiency Ordinance (Chapter XXX), I, (full name) _____, Registered Energy Assessor (Registration No._____), certify that I have completed an Energy Audit in the above building on (DD/MM/YY) _____/_____/_____.

根據建築物能源效益條例（第 XXX 章第 21, 22, 23 及 25 條）條文，本人(姓名)_____，
註冊能效評核人（註冊號碼._____），現證明上述建築物已於
_____/_____/_____(日/月/年) 完成能源審核。

The energy utilisation index (EUI) was：

能源使用指數爲：

_____ MJ/m^2/annum (兆焦耳/平方米/年)

Signature of Registered Energy Assessor
註冊能效評核人簽名 _____

Date
日期 _____

The Government of the Hong Kong Special Administrative Region
Buildings Energy Efficiency Ordinance
(Chapter XXX, Section 21, 22, 23 and 25)
Energy Audit Form

香港特別行政區政府
建築物能源效益條例
(第 XXX 章
第 21, 22, 23 及 25 條)
能源審核表格

Official use only
此欄不用填寫

Receiving date 收件日期：
_____

Section C 丙 部：Other Information 其他資料

Full name of Building Owner： 建築物的擁有人姓名：	English 英文	
	Chinese 中文	
Address of Building Owner： 建築物的擁有人地址：	English 英文	
	Chinese 中文	

Particulars of Contact Person 聯絡人資料：

Name of Contact person ：
聯絡人姓名 ：

English 英文 Mr./Ms.* _____

Chinese 中文 * _____ 先生/女士

Contact Telephone No.
聯絡電話 ：
_____

Fax No.
傳真號碼 ：_____

E-mail Address 電郵地址 ：
_____

Installation(s) exempted from energy audit by Director of Electrical & Mechanical Services (if any) ：
已獲機電工程署署長批准豁免的裝置(若有)：
_____

Please provide reference no. and date of the Director's letter exempting the installation(s) as described on above (if any):
就以上列出已獲豁免的裝置，請提供署長信件的參考編號和日期 (若有)：
Reference No.
參考編號 _____
Date
日期 _____

Total Internal floor area of the above building
公用地方的總內部樓面面積：
(Defined in Section 2 of the Code of Practice for Energy Audit in Buildings 按建築物能源審核實務守則第 2 條的釋義)
_____ m^2 平方米

Date of energy audit conducted 進行審核的日期：
_____

Please provide reference no. and date of the energy audit report:
請提供能源審核報告的參考編號和日期：
Reference No.
參考編號 _____
Date
日期 _____

Note 注意：

1. Page 1 of this form shall be exhibited in a conspicuous position at the main entrance of the building.
   本表格的第一頁須被展示在建築物的主要入口的顯眼位置