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Latest Development of Building Energy Code in Hong Kong

Ir K.K. LI

Electrical and Mechanical Services Department, Hong Kong SAR Government,
3 Kai Shing Street, Kowloon Bay, Kowloon, Hong Kong, China

ABSTRACT

The Chief Executive of the Government of Hong Kong Special Administrative Region (HKSAR) states in the Policy Address 2009-10 that the Government has been working toward the goal of improving air quality and reducing carbon emissions. Besides, the Government has committed to reducing the energy intensity of Hong Kong by at least 25% by 2030, compared to 2005 levels. One of the effective and proven means to achieve this goal is through energy efficiency enhancement. In connection with this objective, the Buildings Energy Efficiency Bill was introduced into the Legislative Council of HKSAR by the end of 2009. This paper will give a brief account of this initiative.

Keywords: BEC, Building Energy Code

1. INTRODUCTION

This paper outlines the HKSAR Government's philosophy and proposal on introducing legislation to require the prescribed buildings to comply with the Building Energy Code (BEC) and Energy Audit Code (EAC) issued by the Electrical and Mechanical Services Department (EMSD). This is a major government initiative for enhancement of energy efficiency to make Hong Kong moving towards a low carbon economy.

One of the issues that top the agenda of the international community is the Climate Change. Governments from around the world have been striving to formulate measures that strike an appropriate balance between economic development and the reduction of greenhouse gas emissions so as to achieve sustainable development including low carbon economy.

Figure 1 and Figure 2 below show the distribution of electricity consumption by sectors in Hong Kong at 2007 and the distribution of electricity consumption by types of services in a typical office at Hong Kong respectively. Hong Kong consumed a total energy of 294,107 Terajoule (TJ) at end-use level in 2007. The energy consumption was also increasing at an average annual rate of around 1.4% in the past years. About 50% of the energy consumed in 2007, i.e. 147,072 TJ, belonged to electricity consumption, of which around 90% were for buildings. As electricity generation is the single largest source of air pollution in Hong Kong, contributing to 89%, 46% and 28% of emissions of sulphur dioxide (SO₂), nitrogen oxides (NO_x)

and particulates (RSP) respectively in 2007, it follows that improving energy efficiency would also help improve local air quality.

As the Chief Executive has outlined in the Policy Address 2009-10, Hong Kong is committed to doing its part in improving the regional environment and fulfilling the applicable convention and consensus. HKSAR Government will honor its pledge and seek to achieve the reduction goal adopted in the Asia-Pacific Economic Co-operation Leaders' Declaration on Climate Change, Energy Security and Clean Development in September 2007, i.e. to reduce energy intensity by at least 25% by 2030 (with 2005 as the base year). To meet this target, we have to enhance our energy efficiency.

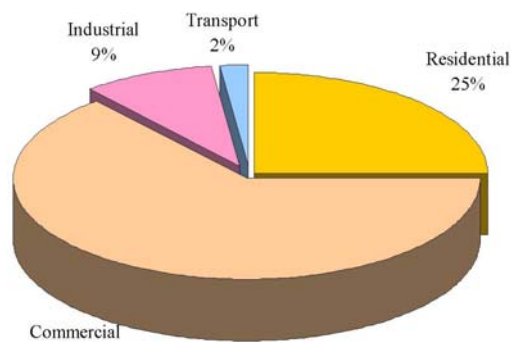


Figure 1 - Electricity Consumption by Sectors in 2007

It is evident from the foregoing energy consumption analysis that energy efficiency in buildings is an area where significant energy savings and greenhouse gas emission reduction can be made. Besides, we have also made reference with the international practice that most well-established overseas countries have been mandatory implementing their own BEC to require building to comply with minimum energy efficiency standards by means of legislation. The comparison of general BEC legislation in other overseas countries is shown in Table 1 below. There are thus very good reasons to make a strong push for its attainment to complement other Government's efforts on reducing energy intensity as well as alleviating global warming and combating air pollution. The mandatory implementation of the BEC will be an effective means to contribute to reducing energy intensity by enhancing the building energy efficiency.

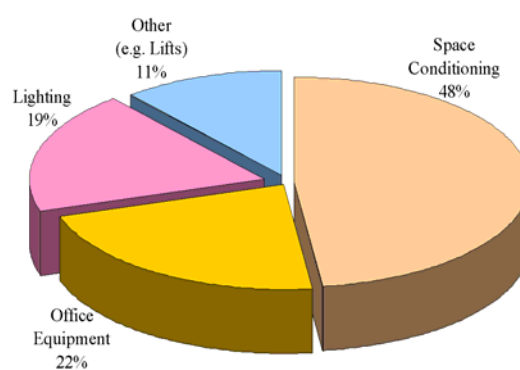


Figure 2 - Electricity Consumption in a Typical Office

Table 1: Comparison of general BEC legislation in various jurisdictions

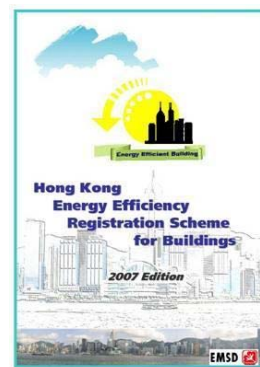
Country / State / Region	Mandatory / Voluntary BEC	BEC document on energy efficiency standards	Legislations concerned
Hong Kong	Voluntary (under proposal for mandatory implementation)	Codes of Practice for Energy Efficiency in Electrical, Lighting, Air-conditioning, Lift & Escalator Installations and Performance-based Building Energy Code	Building Energy Efficiency Bill (being vetted by Legislative Council of HKSAR)
Australia	Mandatory	Included in the Building Code of Australia	Implemented by States, e.g. Australian Capital Territory's Building Regulations
Singapore	Mandatory	SS 530 – Energy Efficiency Standard for Building Services and Equipment	Building Control Act 2003 – Building Control Regulations
California	Mandatory	Building Energy Standards, California Energy Commission	Energy Building Regulations
England	Mandatory	Approved Document L2 – Conservation of fuel and power in buildings other than dwellings	Building Act – Building Regulations

Country / State / Region	Mandatory / Voluntary BEC	BEC document on energy efficiency standards	Legislations concerned
China	Mandatory	GB 50189 – 《公共建築節能設計標準》 (Design standard for energy efficiency of public buildings)	中华人民共和国国务院令 第 530 号 Act 530 of State Council of the People's Republic of China – 《民用建筑节能条例》 (Ordinance of Energy Conservation in Civil Buildings)

3. THE VOLUNTARY SCHEME FOR BUILDING ENERGY CODES

Considering that commercial buildings and the communal parts of residential and industrial buildings account for a significant portion of the total energy consumption, the EMSD has since 1998 developed a set of five BEC¹ (latest edition: 2007) and at the meantime launched the voluntary Hong Kong Energy Efficiency Registration Scheme for Buildings (HKEERSB) to promote the adoption of the BEC. The BEC consist of 4 prescriptive codes stipulating energy efficiency requirements for four key types of fixed building services installations in buildings, namely, lighting, air conditioning, electrical and lift & escalator installations and a Performance Based Code detailing the total building energy approach. In principle, the BEC mainly control the design but not the daily operation of the concerned building services installations. The remaining BEC (PB) sets out an alternative performance-based means to evaluate and assess the energy efficiency performance of a building. The owners and developers may enjoy greater freedom in design as this approach allows trade-off among various components of building energy consumption. The aim of this approach is to encourage the use of energy efficient equipment, innovative installations and renewable energy.

Compliance with the BEC is now on a voluntary basis. The building developers/owners may apply for certification for either one or more of the four key types of fixed Building Services Installations in their buildings provided that the relevant installations have complied with the minimum energy efficiency requirements in the respective BECs. Since implementation of the voluntary HKEERSB, the EMSD has issued a total of 2,593 certificates, covering 2,752 building services installations in 1,106 building venues (as at February 2010). However, only around 28% of the 1,105 building venues are non-government premises over the past 11 years. The participation rate of private sector is disconcertingly low.



There is no disagreement that improving building energy efficiency is a cost-effective measure to address the growing concerns of global warming, local air quality and energy security. Some may however argue that as energy saving measures is cost-effective, we may and perhaps should rely on market-driven forces to achieve efficiency gain, which is in fact in line with the Government's regulatory philosophy generally. Yet, such forces appear not promising over the past 10 something years. There are impediments to the effective operation of the market force in Hong Kong's situation: the notable one being the split incentive between developers/landlords who make the capital investment and occupants who enjoy savings in the electricity bills later. With the pressing environmental aspiration and needs, the HKSAR Government thus proposed the mandatory compliance with the BEC.



¹ The BEC can be downloaded at http://www.emsd.gov.hk/emsd/eng/pee/eersb_pub_cp.shtml.

4. BUILD-UP OF THE LEGISLATIVE PROPOSAL

In the build-up of the legislative proposal, the following philosophies have been taken into account:

- a) Major building energy consumers (at least commercial buildings, common areas of residential & industrial buildings etc.) should comply with BEC. However, small buildings (say smaller than some certain area or power rating etc.) should be exempted from compliance since the cost effectiveness of regulation for these buildings will be very low.
- b) To avoid over-disturbing general public's daily life, residential units are not recommended to be included. In parallel, another mandatory scheme in energy efficiency imminently coming into effect, the Mandatory Energy Efficiency Labelling Scheme, will help improving energy savings in residential units, in which the energy performance of some major domestic appliances like room coolers, refrigerators and compact fluorescent lamp has been regulated.
- c) Industrial units are also not recommended to be included since industrial processes may require specific energy inputs and operators are normally compelled to remain in competitiveness through efficiency gains.
- d) Energy efficiency of new buildings may be raised through regular review/update of the BEC with consideration of the worldwide development trend and public aspirations.
- e) Energy efficiency of existing buildings should be improved when there are opportunities, i.e. when major retrofitting of the covered installations is carried out.
- f) Retrospectively mandatory compliance with the BECs in existing buildings, even after a transitional period, will not be appropriate if these buildings are not going to carry out major retrofitting work. As it will lead to large amount of environmental wastes if the installations are not near the end of their services life. Financial burdens to owners or responsible persons for the upgrading works are also of major concern.
- g) Commercial buildings are major energy consumers and should have more rooms for energy savings. Meanwhile, commercial operators should usually be the most capable group to fund energy audits.
- h) Exhibition of energy performance (energy audit results) of commercial buildings will drive owners or responsible persons to look for improvement for better business image.
- i) Implementation of Energy Management Opportunities (EMOs) identified from energy audit should be at owners' or responsible persons' initiatives, as the improvement should be self-driving through cost effectiveness of the EMOs and the energy savings in return.

Indeed, our proposals are broadly comparable to the practices adopted by other jurisdictions. A brief comparison of some of our legislative proposals with the practices adopted by some other jurisdictions is shown in Tables 2 to 3 below.

Table 2: Comparison of BEC legislation on existing buildings in various jurisdictions

Country / State / Region	Retro-spective power to existing buildings	Applicable to alteration / additional works in existing buildings	Criteria for application in existing buildings	Reference document for requirements to existing buildings
Hong Kong	No (under proposal)	Yes (under proposal)	Major retrofitting works such as addition/replacement of a building services installation in the retrofitting works covering a floor area aggregated $\geq 500\text{m}^2$ under the same series of works within 12 months in a unit/common area. (Under proposal)	Building Energy Efficiency Bill (being vetted by Legislative Council of HKSAR)
Australia	No	Yes	Substantial alteration of a building with the aggregate volume of the proposed alteration made to the building during the 3 years immediately before the day the application for building approval of the alteration made $> 50\%$ of the volume of the original building	Building Act 2004 – Building Regulation 2004 – Section 16
Singapore	No	Yes	Additions or extensions to existing buildings which involve increasing the gross floor area of the existing buildings $\geq 2,000\text{ m}^2$; Building works which involve major retrofitting to existing buildings with gross floor area $\geq 2,000\text{ m}^2$.	Building Control Act (Chapter 29) – Building Control (Environmental Sustainability) Regulations 2008 – Section 3
California	No	Yes	The envelope and lighting of the addition, any newly installed space-conditioning or water heating system serving the addition, any addition to an outdoor lighting system, and any new sign installed in conjunction with an indoor or outdoor addition shall meet the applicable requirements	California Energy Commission - Building Energy Standards – Subchapter 6
England	No	Yes	Existing buildings $> 1,000\text{ m}^2$ will be subject to energy performance improvements when they undergo major refurbishment or renovations. Their energy performance should be upgraded as much as is technically and economically feasible in accordance with national performance standards.	EU Directives 2002/91/EC (New Directives under consideration – removal of the $1,000\text{ m}^2$ threshold)
China	Subject to individual building proposal	Subject to individual building proposal	Clause 24 – Transformation of energy conservation for existing buildings shall be implemented in a sorted, planned & step-by-step manner according to the actual situations of the local economic & community development levels and geographical & climatic conditions etc. The transformation of energy conservation for existing buildings mentioned in this Ordinance means the implementation of transformation activities of energy conservation for the building envelopes, heat supply systems, heating & cooling systems, lighting installations and hot water supply facilities etc. of the existing buildings that do not comply with the mandatory standards of energy conservation for civil buildings. Clause 25 –	Act 530 of State Council of the People's Republic of China – Ordinance of Energy Conservation in Civil Buildings: Clause 24 & Clause 25

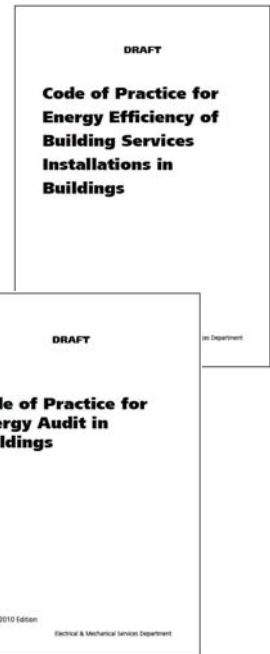
Country / State / Region	Retro-spective power to existing buildings	Applicable to alteration / additional works in existing buildings	Criteria for application in existing buildings	Reference document for requirements to existing buildings
			<p>The construction authorities of local people's governments at county level or above shall organize survey, statistic and analysis for the years of construction, forms of structure, energy consumption systems, energy consumption indicators and life cycle etc. of the existing buildings in the local administrative regions; establish transformation plan of energy conservation and define the target, scope & requirement of the transformation of energy conservation.</p> <p>The aforesaid plan, target, scope and requirement shall be submitted to the local people's government for approval before implementation. Regarding the transformation of energy conservation for existing buildings of the Central Government's organizations, the relevant management authorities shall establish, organize and implement the transformation plan of energy conservation.</p>	

Table 3: Comparison of energy audit legislation in various jurisdictions

Country / State / Region	Mandatory energy audit in buildings?	Brief scope of application	Reference document for mandatory energy audit requirements
Hong Kong	Yes (under proposal)	Only apply to common areas of commercial buildings and commercial portions of a composite buildings (under proposal)	Building Energy Efficiency Bill (being vetted by Legislative Council of HKSAR)
Australia	No		
Singapore	No		
USA	Not widely adopted but being emerging in various cities or states	<ul style="list-style-type: none"> ◆ Commercial building (excluding industrial buildings) ◆ Residential buildings ◆ Multi-family buildings 	For example, "An Ordinance adding A New Chapter 6-7 to The City Code relating to Energy Conservation Audit and Disclosure Requirements" approved on 6 November 2008 in Austin, Texas (http://www.ci.austin.tx.us/council_meetings/wams_item_attach.cfm?recordID=14388)
European Union	Widely adopted in EU member countries including England & Wales, Germany, Denmark, Italy, France, Netherlands, Portugal, Spain etc.	<ul style="list-style-type: none"> ◆ All buildings (excluding buildings to be demolished, buildings for worship, officially protected buildings, temporary buildings, industrial sites, workshops, & agricultural buildings with low energy demand, and stand-alone buildings < 50m²) ◆ Air conditioning systems of capacity > 12kW 	"Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings" (http://europa.eu/scadplus/leg/en/vb/l27042.htm)
Canada	Not widely adopted but being emerging in various cities or provinces	Homes sold or rent	For example, the proposed Green Energy Act in Toronto, Ontario (http://www.nationalpost.com/most_popular/story.html?id=1321615&p=1)

6. THE DRAFT MANDATORY BUILDING ENERGY CODE AND ENERGY AUDIT CODE

The latest version of BEC is 2007 Edition which has taken into account the development of energy efficiency technology, design practices, local needs and incorporated good engineering practices. A public consultation for the proposal of mandatory implementation of the BEC had been conducted from end December 2007 to March 2008. The result of the public consultation indicated that the public and stakeholders generally supported to adopt the BEC 2007 Edition for the voluntary scheme as the blueprint for the mandatory. The BEC sets out the minimum energy efficiency standards governing the prescribed building services installations. The prescribed building services Installations designed, installed and maintained in accordance with the BEC will be deemed to have satisfied the relevant statutory requirements of the proposal in the technical aspects.



We also take the Guidelines on Energy Audit 2007 Edition published by EMSD as the blueprint to draft the Energy Audit Code (EAC) for the legislative proposal. An energy audit is a systematic review of the energy consuming equipment/systems in a building to identify Energy Management Opportunities and provide useful information for the building owners to decide and implement energy saving measures for environmental consideration and economic benefits. Similar to BEC, compliance with the EAC will also be deemed to have satisfied the relevant statutory requirements in the technical aspects.

The key energy efficiency requirements of the mandatory BEC and the key technical requirements of the mandatory EAC are summarized in Table 4 and Table 5 respectively.

Table 4: Key Energy Efficiency Requirements of the Mandatory BEC

Mandatory BEC	
Four Key Building Services Installations	Key energy efficiency requirements
Lighting Installations	a) Lighting power densities of various indoor areas; and b) Number of lighting control points
Air Conditioning Installations	a) Efficiency of air conditioning equipment; b) Fan power per unit volume of air flow; c) Frictional loss per unit length of pipe run; d) Thickness of thermal insulation; and e) Air conditioning control system f) Energy metering in chiller plant

Table 5: Key Energy Audit Requirements of the Mandatory EAC

Mandatory EAC	
Steps	Key energy audit requirements
1	Collection of building information of various energy consuming equipment/systems a) collect building operation characteristics collect technical characteristics
2	Review of energy consuming equipment a) study the information collected b) conduct site inspections c) make record of the characteristics of the energy consuming equipment and systems d) identify or calculate the power and energy consumptions of the major energy consuming equipment/systems e) take measurements when the operation records not be sufficient

Mandatory BEC	
Four Key Building Services Installations	Key energy efficiency requirements
Electrical Installations	<ul style="list-style-type: none"> a) Efficiency of electric motors; b) Power loss in electrical distribution system; c) Harmonic distortion in electrical system; and d) Metering devices for main, feeder and sub-main circuits
Lift & Escalator Installations	<ul style="list-style-type: none"> a) Electric motor power of lifts/escalators; and b) Provision of metering for power quality measurement, c) Lift decoration load and Parking mode
Performance approach	<ul style="list-style-type: none"> a) Specification of the method to derive the Design Energy value from the actual design and operational characteristics of a building; and b) Specification of the method to derive the Energy Budget value, which is evaluated based on a hypothetical building of the same size and shape of the building fully in compliance with the minimum energy efficiency requirements of Lighting, Air Conditioning, Electrical and Lift & Escalator installations

Mandatory EAC	
Steps	Key energy audit requirements
3	Identification of EMO <ul style="list-style-type: none"> a) conduct an appraisal and evaluation on the energy consuming equipment and systems b) compare with original design and relevant benchmarks c) identify any deviations from efficient operation d) identify the potential EMO for improving energy efficiency
4	Cost benefit analysis of EMO <ul style="list-style-type: none"> a) made an estimate on the energy saving b) carry out a cost benefit analysis when capital cost is involved
5	Recommendations <ul style="list-style-type: none"> a) made recommendations of the EMO to be implemented b) highlight the known programmed operation & maintenance activities of the building c) list out suggestions for further studies of equipment or components
6	Compiling energy audit report <ul style="list-style-type: none"> a) outline the objectives and scope of audit, description of operating characteristics of equipment/systems audited, findings in the audit, potential EMO identified, cost benefit analysis etc. b) recommend any other follow-up actions

7. COMPARISON OF THE STANDARDS IN THE DRAFT MANDATORY BUILDING ENERGY CODE WITH OVERSEAS COUNTRIES

It is in fact a well-established international practice to require buildings to comply with minimum energy efficiency standards by means of legislation. We make reference to the BEC legislation and standard of the Mainland China and some overseas countries, such as Australia, Singapore, United States and United Kingdom etc in formulation of our legislation proposal and the standard of mandatory BEC. The tables 6 to 8 below summarized the comparison of the standards in our draft mandatory BEC with the BEC of overseas countries.

Our standards on air-conditioning installation and electrical Installation are broadly comparable to the standards adopted by other jurisdictions, whereas our standards on lighting installations are relatively less stringent to meet the general local preference for better-illuminated interior spaces. Besides, the EMSD has put in place the BEC standards for lift & escalator installation, unique to the built environment of Hong Kong which is dominated by high-rise buildings. We are not yet aware of other overseas practices that have introduced energy efficiency standards for lifts and escalators.

Table 6: Comparison of some standards of Coefficient of Performance of Typical Air-Conditioning Chillers in various jurisdictions

Type/Rating of air-conditioning Chiller	Coefficient of Performance					
	Hong Kong Mandatory BEC ³ (Draft)	Australia BCA	Singapore SS 530	US ASHRAE 90.1	Europe (e.g. UK Approved Document L2)	China GB 50189
Air cooled, scroll / screw	2.7 – 2.9	2.2 – 2.5	2.80	2.80	Requirement is set on overall air-conditioning system performance instead of on coefficient of performance for chillers	2.40 – 2.60
Water cooled, screw, 500 – 1000kW	4.6	4.5	4.45 – 4.90	4.90		4.30
Water cooled, screw, >1000kW	5.5	5.5	4.90 – 5.50	5.50		4.60
Water cooled, centrifugal, 500 – 1000kW	4.5	4.5	5.00 – 5.55	5.55		4.70
Water cooled, centrifugal, >1000kW	5.7	5.5	5.55 - 6.10	6.10		5.10

Table 7: Comparison of some standards of Electrical Motor Efficiency in various jurisdictions

Motor (4-pole) Rating, P (kW)	Minimum Efficiency (%)					
	Hong Kong Mandatory BEC ³ (Draft)	Australia BCA	Singapore SS 530	US ASHRAE 90.1	Europe (e.g. CEMEP ²)	Mainland GB 50189
1.1 ≤ P < 5.5	76.2 – 84.2	No specific requirement	83.8 – 88.3	84.0 – 87.5	76.2 – 84.2	No specific requirement
5.5 ≤ P < 22	85.7 – 90.0		89.2 – 92.2	89.5 – 92.4	85.7 – 90.0	
22 ≤ P < 55	90.5 – 92.5		92.6 – 93.9	92.4 – 93.6	90.5 – 92.5	
55 ≤ P < 90	93.0 – 93.6		94.2 – 94.7	94.1 – 94.5	93.0 – 93.6	
P ≥ 90	93.9		95.0	94.5	93.9	

² The motor efficiency figures represent the major market share of electrical motors in European countries.

³ The draft of mandatory BEC can be viewed at <http://www.emsd.gov.hk/emsd/eng/pee/mibec.shtml>.

Table 8: Comparison of some standards of Lighting Power Density in various jurisdictions

Spaces	Maximum Allowable Lighting Power Density (W/m ²)					
	Hong Kong Mandatory BEC ³ (Draft)	Australia BCA	Singapore SS 530	US ASHRAE 90.1	Europe (e.g. UK Approved Document L2)	China GB 50034
Open Plan Office / Cellular Office	17	7-10	15	11.8 - 16.1	Not less than 40 luminaire-lumen per circuit watt	11 – 18
Retails	20	25	25	18.3	No specific requirement	11 – 20
Restaurant	23	20	15	15		13
Atrium / Foyer	20	10	10	-		-

8. LEGISLATIVE FRAMEWORK OF MANDATORY IMPLEMENTATION OF THE BUILDING ENERGY CODE

8.1 The following categories of buildings will be governed by the proposed mandatory BEC:

- i) Commercial building (e.g. office, shopping complex etc.);
- ii) Hotel and guesthouse;
- iii) Non-residential or non-industrial portion of a composite building
- iv) Common areas of residential building and industrial building;
- v) Common areas of residential or industrial portion of a composite building;
- vi) Educational building;
- vii) Community building (e.g. community centers, elderly homes, youth centres etc.);
- viii) Government building (e.g. government office buildings, fire stations, police stations etc.);
- ix) Municipal building (e.g. markets, libraries etc.); and
- x) Hospital and clinic.
- xi) Airport passenger terminal building
- xii) Railway station

8.2 However, the following categories of buildings will be exempted from the legislative proposal:

- i) Buildings with the main electrical switch at approved loading of 100A or below, 1-phase or 3-phase;
- ii) New Territories exempted houses;
- iii) Declared or proposed monuments or historical building under the Antiquities and Monuments Ordinance; and
- iv) Buildings that will be demolished or redeveloped in the coming one year.

8.3 Besides, it is proposed to exempt some certain types of Building Services Installations based on operational and technical grounds such as those involving fire protection, life safety, construction site, industrial undertaking, research, air traffic safety, railway traffic safety, decorative lighting etc. Special exemption on individual Building Services Installation may also be granted by the Director of Electrical and Mechanical Services of HKSAR (DEMS) upon receiving written applications with adequate justifications.

- 8.4 Different control regimes will be imposed on post-enactment buildings and pre-enactment buildings. Post-enactment buildings mean buildings that obtain the consent to the commencement of building works for superstructure construction from the Building Authority of HKSAR after the new legislation come into operation. Vice versa, pre-enactment buildings mean buildings that obtain the consent to the commencement of building works for superstructure construction on or before the new legislation come into operation.
- 8.5 Developers of post-enactment buildings will be required to submit self-declarations which are certified by Registered Energy Assessors (REAs) (professional engineers who have been registered with the EMSD) to DEMS to declare that the buildings have complied with the BEC. DEMS will then issue Certificates of Compliance Registration (COCR) to developers upon receipt of the required information and document. A register of buildings issued with COCR will be made available for public inspection. Subsequent building owners are required to apply for renewal of the COCR every ten years.
- 8.6 The mandatory BEC will also govern to the major retrofitting works both in post-enactment buildings and pre-enactment buildings. The major retrofitting works are defined as
- i) addition or replacement of a specified building services installation in a retrofitting work covering an aggregate floor area of 500 m² or above under the same series of works within 12 months in a unit/common area; or
 - ii) addition or replacement of a main component of central building services installations, including
 - a) addition or replacement of a complete electrical circuit at rating 400A or above;
 - b) addition or replacement of a unitary air-conditioner or a chiller at rating 350kW;or
 - c) addition or replacement of the motor drive and mechanical drive of a lift or escalator etc.).
- Responsible persons (e.g. owners, tenants) of the relevant unit or common areas are then required to engage or appoint Registered Energy Assessors (REAs) to certify that the relevant retrofitted building services installations have complied with the BEC. The REAs will then be required to issue Forms of Compliance (FOC) to the responsible persons upon certification.
- 8.7 The developers, building owners, responsible persons or REA will be required to also submit technical information (such as drawings, specifications and factory test reports etc.) of the relevant equipment when they submit their application for COCR or copy of FOC to EMSD for checking/record.
- 8.8 The prime objective of the proposed legislation is just to promote energy efficiency. We don't intent to start prosecution immediately when non-compliance is found. We shall first advise the relevant parties to make improvement before starting any prosecution. Thus, we propose a mechanism of improvement notice. Under this mechanism, DEMS may serve Improvement Notice on developer or responsible person if contravention to the statutory requirements is found.
- 8.9 Energy audit is another key part of the proposed legislation. The mandatory energy audit is only applicable to the commercial buildings or commercial portions of composite buildings. The owners of these buildings should appoint Registered Energy Assessor, REAs to conduct energy audits for the common areas only in their buildings once every ten years.
- 8.10 The mandatory energy audit will be applied to both post-enactment and pre-enactment buildings. For post-enactment buildings, the first energy audit should be conducted

within 10 years after the issue of the first COCR. In order to allow sufficient time for the public to conduct energy audit for pre-enactment buildings, the first round of energy audits for these buildings will be allowed to be conducted in batches according to the age of the buildings, the newer the earlier. We expect to complete the first round of energy audits in 4 years for pre-enactment buildings.

- 8.11 The energy audit under the proposed legislation will only be an assessment of the performance in energy performance and energy management in order to identify the Energy Management Opportunities for the buildings. However, the building owners will not be compulsorily required to follow the improvement measures recommended by the energy audit in consideration of the wide variety of the possible measures in terms of scope and cost.
- 8.12 Monetary penalties will be imposed on developers, building owners, responsible persons or REAs for non-compliance under the legislative proposal.
- 8.13 Registered Energy Assessors, REAs, will play a key role under the proposed legislation. They will be appointed by developers, building owners or responsible persons to carry out the following major duties -
- i) certifying compliance with the BEC for developers / building owners to apply for COCR;
 - ii) issuing FOC to responsible persons of unit/common area, and copy it to EMSD; and
 - iii) conduct energy audits for building owners
- 8.14 Registered Professional Engineers and Corporate Members of the Hong Kong Institution of Engineers in electrical, mechanical, building services or environmental discipline, who possess relevant post-qualification working experience and knowledge, could register with the EMSD as REA under the proposed legislation. A register of REAs will be made available for public inspection. REAs failing to comply with requirements as imposed on them under the legislative proposal may be subject to disciplinary actions.

9. WAY FORWARD

HKSAR Government is committed to promoting a low carbon economy with mandatory BEC as one of the major initiatives. The proposed legislation had been introduced into the Legislative Council of HKSAR by the end of 2009. The Buildings Energy Efficiency Bill is being vetted by the Legislative Council. Once the Bill is passed by the Legislative Council, the mandatory BEC and EAC will be put into effect.

It is roughly estimated that there will be approximately 2.8 billion kWh saving in the post-enactment buildings at the first decade after the implementation of this proposed legislation. In terms of reduction in carbon dioxide emission, it will be in the region of approximately 1.96 million tonnes at the first decade.

As a long-run strategy, EMSD will review and update the BEC from time to time with the following objectives -

- i) to take advantage of new energy efficiency technologies and capture prevailing good engineering industry and trade practices;
- ii) to uplift the minimum energy efficiency requirements with reference to the development trend worldwide; and
- iii) to address the community aspiration and comments received during the implementation of the mandatory scheme.

Apart from the above, we are planning to collect the energy data through the legislation by energy audit so as to update the existing building energy database for formulating the benchmarking indicator to compare the energy performance of energy efficient buildings.

In conclusion, energy efficiency and conservation is no doubt an essential means for sustainable development, a low carbon economy and a better tomorrow. Mandatory implementation of the BEC will balance social, economic and environmental needs, both for present and future generations.

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