

# The Buildings Energy Efficiency Ordinance and its Codes – Key Driver of Building Energy Efficiency

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# Agenda

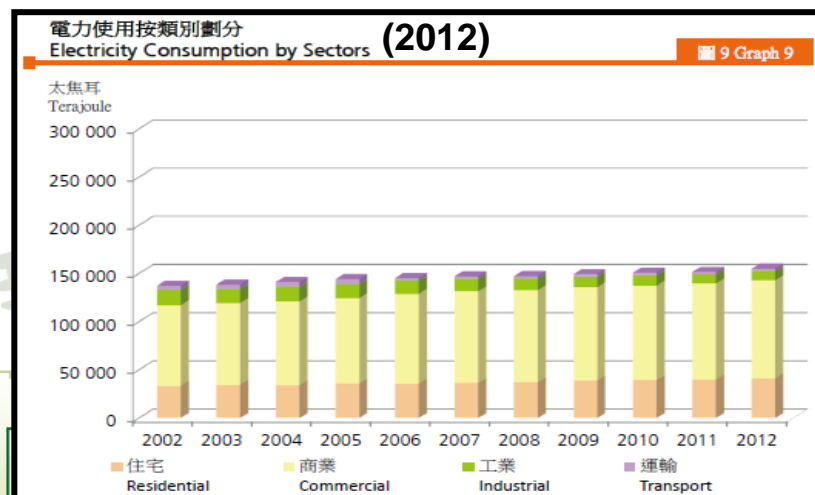
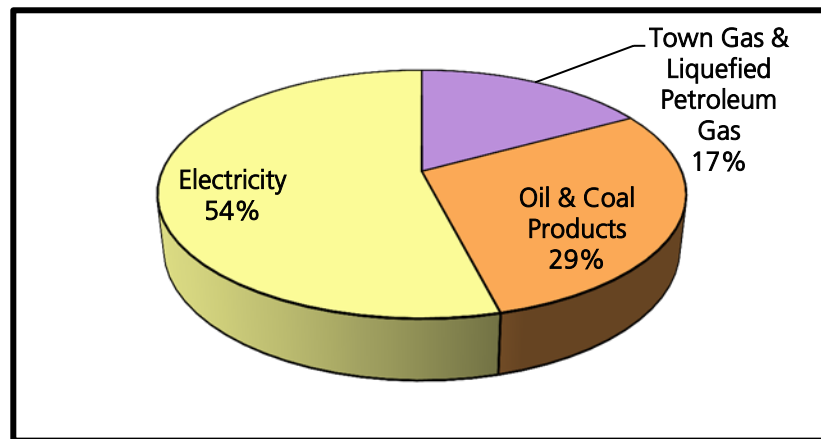
1. Buildings Energy Efficiency Ordinance (BEEO)
2. Development of the Building Energy Code (BEC) and the Energy Audit Code (EAC)
3. Tools to facilitate the trade to comply with the requirements

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# Status of Energy Use in HK



- 54% total energy is electricity consumption
- About 90% of the electricity consumed by buildings
- Total electricity consumption remains on a rising trend in the past years



Source: Hong Kong Energy End-use Data 2014, EMSD

# Milestone of BEEO



Oct 1998  
HK Energy Efficiency  
Registration Scheme for  
Buildings (Voluntary Basis)

03.12.2010  
BEEO was published  
in gazette

21.09.2012  
BEEO came into  
full operation

1998 1999 2000 2001 2002 2003 2004 2009 2010 2011 2012 2013 2014



# Coverage



## BEC Coverage

- Hotel & guesthouse
- Educational building
- Community building
- Municipal services
- Hospital & clinic
- Government building
- Airport passenger building
- Railway station
- Commercial building
- Industrial building – **common area**
- Residential building – **common area**
- Composite building –
  - commercial portion
  - common area of portion for residential or industrial use

## EAC Coverage

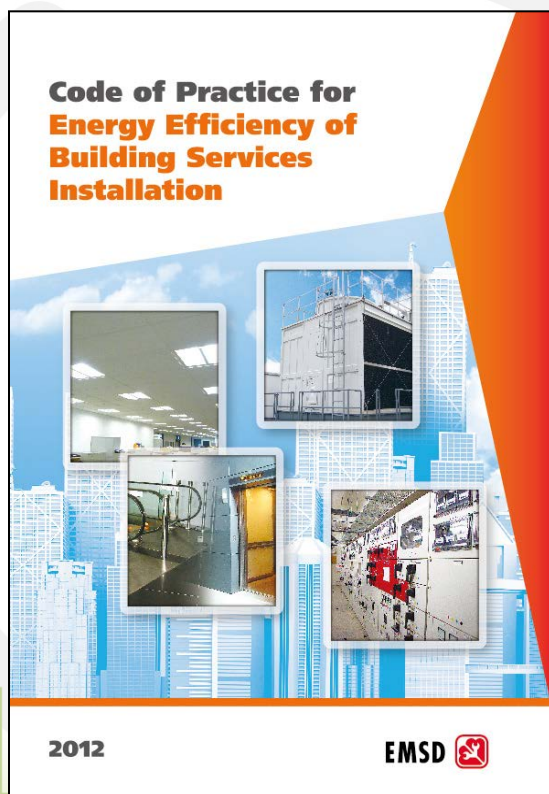
- Commercial building
- Composite building – commercial portion



Building Services Installations

# Key Requirements of BEEO

## Compliance with BEC



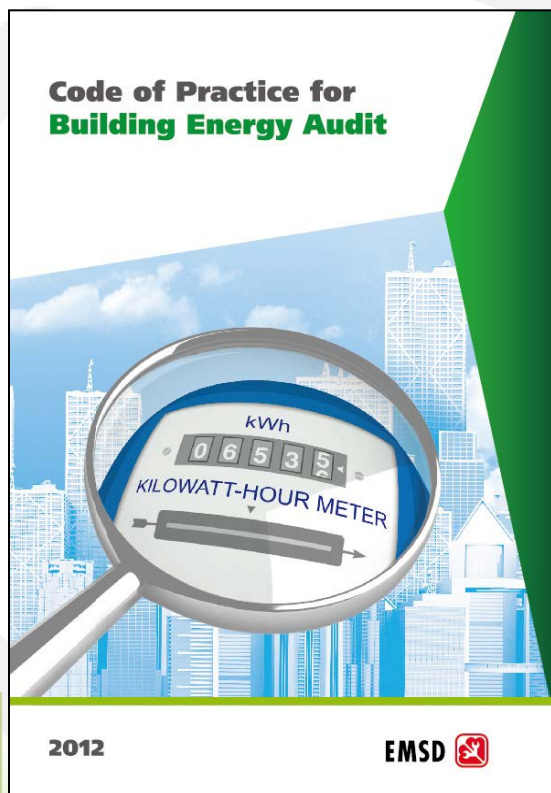
- Newly constructed buildings and
- Major retrofitting works in units or common areas

Building services (BS) installations including lighting, electrical, air-conditioning, and lift and escalator installations are required to comply with the min. design standards of the Building Energy Code (BEC)



# Key Requirements of BEEO (Cont'd)

## Compliance with BEC



- Commercial Buildings
- Commercial Portion of Composite Buildings

In addition to the compliance with the BEC:

- Conduct energy audit for central BS installations every 10 years

# Key Requirements of BEEO (Cont'd)

## Display Energy Audit Form

- Obtain from Registered Energy Assessor (REA) the Energy Audit Form with Energy Utilization Index (EUI in MJ/m<sup>2</sup>/annum or kWh/m<sup>2</sup>/annum) and Energy Audit Report
- Exhibit Energy Audit Form at building main entrance



Form EES 表格 EES 機電工程署 EMSD

The Government of the Hong Kong Special Administrative Region  
Buildings Energy Efficiency Ordinance (Chapter 610, Section 22)  
Energy Audit Form

香港特別行政區政府  
建築物能源效益條例  
(第 610 章 第 22 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  
Address of Building 建築物地址  
Street 街道  
District 地區

Section B 乙 部: Declaration 聲明

To: Building owner 建築物擁有人  
Cc: Director of Electrical and Mechanical Services 機電工程署 (See note 3 overleaf 見背面第 3 項附註)

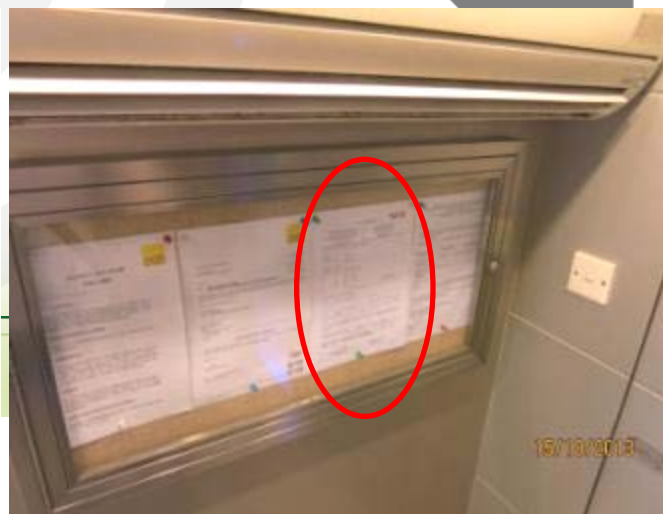
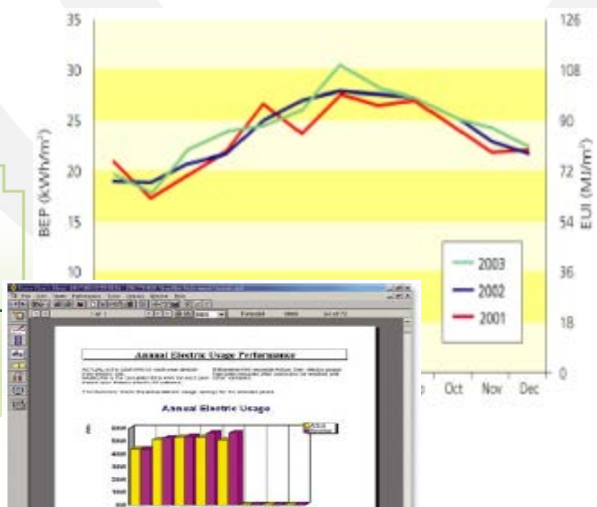
In accordance with section 22 of the Buildings Energy Efficiency Ordinance (Chapter 610), I, (full name) \_\_\_\_\_, certify that an Energy Audit in respect of the above building was completed on \_\_\_\_\_ (DDMM/YYYY). This Energy Audit Form will expire on \_\_\_\_\_ (DDMM/YYYY) (See note 4 overleaf).

The energy utilization index (EUI) per annum of the past 12-month period of the above building is \_\_\_\_\_ MJ/m<sup>2</sup>/annum, equivalent to \_\_\_\_\_ kWh/m<sup>2</sup>/annum. (See note 5 overleaf)

茲根據建築物能源效益條例 (第 610 章) 第 22 條之規定, 本人 (姓名) \_\_\_\_\_, 現證明上述建築物的能源審核已於 \_\_\_\_\_ 年 \_\_\_\_\_ 月 \_\_\_\_\_ 日完成。本能源審核表格將於 \_\_\_\_\_ 年 \_\_\_\_\_ 月 \_\_\_\_\_ 日屆滿。(見背面第 4 項附註)

有關上述建築物過去 12 個月期間的按年對能使用指數為 \_\_\_\_\_ 兆焦耳/平方米年, 相當於 \_\_\_\_\_ 兆瓦時/平方米年。(見背面第 5 項附註)

Signature of Registered Energy Assessor 註冊能源審核人員簽名  
Date of Issue (DDMM/YYYY) 簽發日期 (西曆年)





# Implementation of BEEO



<b>Stage One Declaration</b>	About 500 nos.
<b>Application for Certificate of Compliance Registration</b>	About 20 nos.
<b>Form of Compliance</b>	About 2000 nos.
<b>Energy Audit</b>	About 1600 nos.

## Schedule 5 of BEEO

<b>Issue date of OP</b>	<b>Deadline</b>
After 1987 (Batch 1)	20.9.2013
1978 – 1987 (Batch 2)	20.9.2014
1970 – 1977 (Batch 3)	20.9.2015
Before 1970 (Batch 4)	20.9.2016

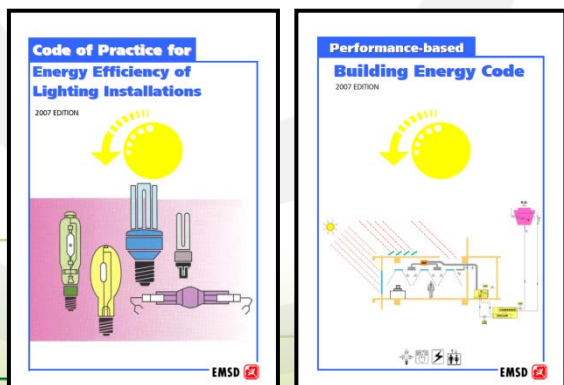
Improvement Notice (IN)



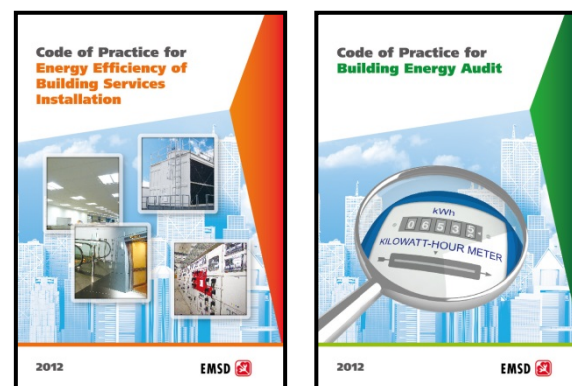
**Prosecution after specified period**

# Codes

## Voluntary compliance



## Mandatory implementation



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# BEC Key Energy Efficiency Requirements (2012 Edition)



## Lighting Installation

- Lighting Power Density
- Lighting Control



## Electrical Installation

- Motor Efficiency
- Motor Sizing
- Power Distribution Loss
- Power Quality
- Energy Metering



## Air-conditioning Installation

- Design conditions
- System Fan Power
- Coeff of Performance
- Piping Frictional Loss
- Thermal Insulation
- System Control
- Energy Metering



## Lift and Escalator Installation

- Electrical Power of motor drive
- Lift Decoration Load
- Lift ventilation / AC upon idling
- Power Quality
- Energy Metering



# Energy Audit

- Energy Audit Code (EAC) published in 2012
- To be reported in specified form (no. EE5 (V.1)) and technical forms (EE-LG (V.0), EE-EL (V.1), EE-AC (V.0), EE-LE (V.0), EE-PB (V.0), EE-EA (V.1) and EE-EAes (V.1))
- Provides useful information for building owners and operators:
  - to study energy performance and Energy Management Opportunities (EMOs); and
  - to make decision on implementation of the EMOs based on their environmental consideration and economic benefits.

## (B) Building Characteristics

(EAC Clause 8.1)

### (I) Building Type, Usage & Operation (Please tick where applicable and insert N/A for non-applicable items.)

#### 1) Type of building

(a) Please choose the type (tick one item only) of building of the building entity<sup>^2</sup> audited :

- ☐ Commercial building      ☐ Commercial portion of composite (commercial & residential) building      ☐ Commercial portion of composite (commercial & industrial)<sup>^3</sup> building

(b) Please indicate the portion of the building entity being common area<sup>^4</sup> :  %

(c) Please indicate the no. of blocks<sup>^2</sup> of the building entity :  no. of blocks

2) Total internal floor area<sup>^5</sup> of the building entity (m<sup>2</sup>) :

3) No. of floors<sup>^6</sup> of the building entity :

4) Major type of building façade (tick one item) :

- ☐ Curtain wall      ☐ Non-curtain wall

5) Date(s) of issue of occupation approval (dd/mm/yyyy) :

6) Type of central air-conditioning<sup>^8</sup> provided : ☐ Cool air    ☐ Chilled water    ☐ Condenser water only    ☐ Not applicable

7) Summary of operation characteristics of categorized major usages of CBSI-served areas :

Operation characteristics	%tage area of total of building entity <sup>^9</sup>	%tage AC area of total of building entity <sup>^10</sup>	Average weekly operating hours (hrs/week) <sup>^11^12</sup>	Daily average no. of occupants <sup>^12</sup>
Major usage				
(a) Office				
(b) Shopping & leisure				
(c) Back of house area				
(d) Restaurant				
(e) Car park				N/A
(f) Others <sup>^13</sup>				
Total <sup>^14</sup>			N/A	

Daily average occupant density (m<sup>2</sup> per person)<sup>^15</sup>

# 8) Details of operation characteristics of CBSI-served areas grouped under categorized major usages<sup>^16</sup>

(energy consumption on account of the building owner) :

CBSI served Categorized major usages		Operation Characteristics		Norm <sup>^17</sup> of operation	%tage area of total of building entity	Weekly operating hours <sup>^12</sup> (hrs/week) [sum up hours of “weekday” and hours of “weekend” to obtain hours of “week total”]		
		General or 24-hour	AC or non-AC			weekday	weekend	week total
(a)	(i) Commonly used areas <sup>^18</sup> on office floors (office tower entrance lobby, lift lobbies, common corridors, common toilets etc.)	General	AC					
		24-hour	Non-AC					
	(ii) Areas specific for office works (general office, private office, meeting rooms, data centres, server rooms, clinics, laboratories, tutorial schools, private toilets etc.)	General	AC					
		24-hour	Non-AC					
(b)	(i) Commonly used areas <sup>^18</sup> on shopping & leisure floors (shopping mall entrance lobby, public circulation areas, atrium, visitor toilets, etc.)	General	AC					
		24-hour	Non-AC					
	(ii) Areas specific for shopping & leisure (retail shops, department stores, cinemas, health clubs, private toilets etc.)	General	AC					
		24-hour	Non-AC					
(c)	Back of house areas (plant rooms, cleaner rooms, staircases (outside public circulation areas))	General	AC					
		24-hour	Non-AC					
(d)	Restaurants	General	AC					
		24-hour	Non-AC					
(e)	Car parks	General	AC					
		24-hour	Non-AC					
(f)	Others <sup>^13</sup> (if applicable, please specify)	General	AC					
		24-hour	Non-AC					



## 1) Air-conditioning Installation (continued)

(b) Air-conditioning pumps		Pump rated motor power (kW)	Pump rated flow (L/s)	Quantity	Performance (W per L/s)
(i) Chilled water pumps	Primary circuit, sub-total of all pumps <sup>^27</sup>				
	Secondary circuit, sub-total of all pumps <sup>^27</sup>				
	<b>Total, of all chilled water pumps<sup>^27A</sup></b>				
(ii) Condenser water pumps	Fresh water, sub-total of all pumps <sup>^27</sup>				
	Sea water, sub-total of all pumps <sup>^27</sup>				
	<b>Total, of all condenser water pumps<sup>^27B</sup></b>				
(iii) Heated water pumps – total of all heated water pumps <sup>^27</sup>					
(c) Heat rejection		Fan rated motor power (kW) <sup>^27C</sup>	Rated heat rejection capacity (kW) <sup>^27C</sup>	Quantity	Performance (kW / kW) <sup>^27C</sup>
Sub-total, of all cooling towers <sup>^27C</sup>					
Sub-total, of all radiators <sup>^27C</sup>					
<b>Total, of all heat rejection equipment<sup>^27C</sup></b>					
(d) Air-conditioning fans		Fan rated motor power (kW)	Fan rated flow (L/s)	Quantity	Performance (W per L/s)
Sub-total, of all AHUs & FCUs (excluding primary air AHU) <sup>^27</sup>					
Sub-total, of all primary air AHUs, fresh air and return air fans (for conditioned areas) <sup>^27</sup>					
<b>Total, of all air-conditioning fans<sup>^27D</sup></b>					
Percentage (based on total fan rated motor power) of all air-conditioning fans (add up to 100%) :					
		for office floors	for shopping & leisure floors	for other floors	
(e) Chilled / Heated water plant sequencing control		<input type="checkbox"/> Yes <input type="checkbox"/> No			
(f) Overall representative indoor room temperature set point in summer (°C) :					
(g) Major type of air-side system (CBSI) : (may tick more than one item, if it serves 20% or more of AC area of building entity)					
<input type="checkbox"/> Chilled water AHU (VAV/CAV) <input type="checkbox"/> Chilled water FCU <input type="checkbox"/> Unitary air-conditioner <input type="checkbox"/> Not applicable					
(h) Power supply to air-side system AHU/FCU fans is mainly on account of :		<input type="checkbox"/> building owner <input type="checkbox"/> tenants <input type="checkbox"/> Not applicable			

# Revised LPD Standards

- With reference to:-
  - LPD data of lighting installations reported in the submissions for major retrofitting works under BEEO and
  - Similar overseas standards
- Revised LPD standards gazetted on 28.2.2014

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# Revised LPD Standards (Cont'd)



- In general, it contributes to an improvement by 10 to 15% in lighting energy efficiency of buildings

Type of Space	Maximum Allowable LPD (W/m <sup>2</sup> )	
	Initial version	Rev. 1
Car Park	6	5
Corridor	10	8
Office	15	13
Public Circulation Area	15	13
Restaurant	20	17
Retail	20	17
Staircase	8	7

Extracted from *Building Energy Code (BEC) 2012 Edition (Rev. 1)*

# Effective Date of Revised LPD Standards



Submission	Date
Stage One Declaration	Signed by a developer on or after 28 August 2014
Form of Compliance	Signed by an REA on or after 28 November 2014

# Review of BEC and EAC

- Being reviewed by the Technical Taskforce and Working Groups of Mandatory Implementation of BEC
  - to take advantage of new technologies;
  - to capture prevailing good practices;
  - to tighten energy efficiency requirements with reference to the development trend worldwide;
  - to address the community aspiration and comments received during the implementation of the BEEO.
- Anticipated to complete the review in 2015

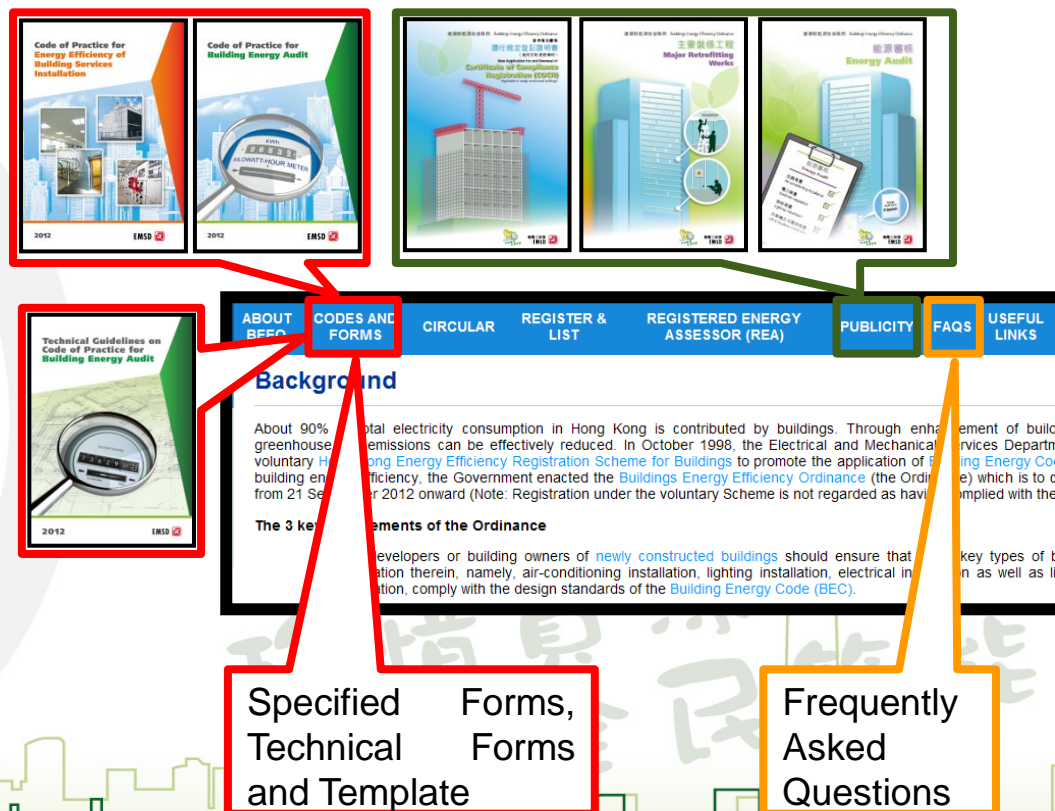
# Tools to facilitate the trade to comply with the requirements



- The following tools are available at the dedicated website of BEEO

([www.beeo.gov.hk](http://www.beeo.gov.hk))

- Technical guidelines
- Specified forms
- Technical forms
- Frequently asked questions





# Tools to facilitate the trade to comply with the requirements (Cont'd)



- Workshops to REA
- Workshops and seminars to the trade and the public
  - HK & Kowloon Electrical Engineering & Appliances Trade Workers Union
  - Property management companies
  - Building management committees
  - Building management workshops hosted by Home Affairs Department



# Conclusion



- The BEEO:
  - governs the minimum energy efficiency standards of building services installations for new buildings and major retrofitting works
  - requires the owners of CBSI of commercial buildings and commercial portions of composite buildings to carry out energy audit
- Disclosure of Energy Utilization Index (shown in energy audit form) of buildings may drive building owners and building operators to implement more EMOs
- Useful tools (e.g. BEC, EAC, technical guidelines and technical forms) facilitate REAs, building owners and responsible persons
- Delivery of workshops and seminars to the trade and the public

# Energy Efficiency Office

## 能源效益事務處

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**Website : <http://www.beeo.emsd.gov.hk/>**