

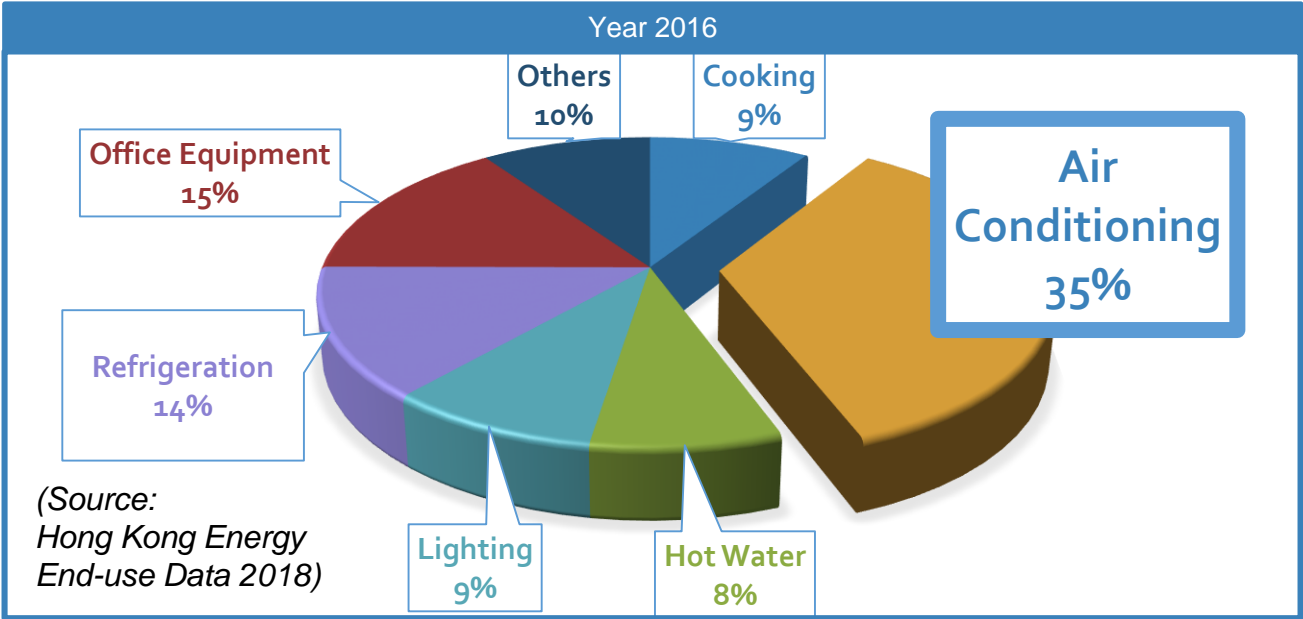
ASIA-PACIFIC ECONOMIC COOPERATION (APEC)

EGEE&C 53 Meeting
20-21 March 2019

ECONOMY UPDATES
Hong Kong, China

Energy Efficiency Standard and Label for LED
Lighting, Cooling Products and Motors

Electricity Consumption in Residential Segments



Energy Efficiency Labelling Scheme

❑ Voluntary Energy Efficiency Labelling Scheme (VEELS)

- Implementing since 1995
- Currently covers 22 types of household electrical & gas appliances and office equipment



❑ Mandatory Energy Efficiency Labelling Scheme (MEELS)

- Implementing since 2008
- Currently covers 8 types of household electrical appliances



Mandatory Energy Efficiency Labelling Scheme

1st Phase

2009



Room air conditioners



Refrigerating Appliances



Compact Fluorescent Lamps

2nd Phase

2011



Washing Machines



Dehumidifiers

3rd Phase

2019



電視機
Televisions



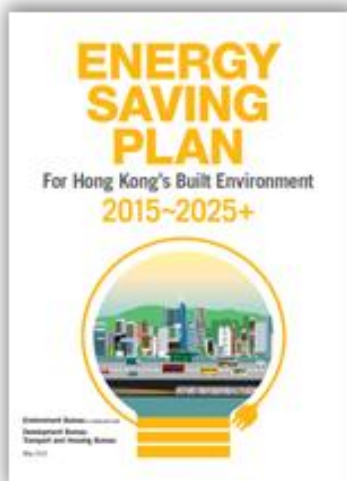
儲水式
電熱水爐
Storage type
electric water heaters
Storage Type Electric
Water Heaters



電磁爐
Induction cookers

Induction Cookers

Regular Review of MEELS



UPDATE



Energy Efficiency Labelling Scheme for Room Air Conditioners

Energy Label Journey of Room Air Conditioners

Energy Efficiency
EMSD



Established Energy
Efficiency Office
under EMSD

1994

Enactment EELPO
2008



New
Standard
2015



Extension of Scope
to Cover
Heating
2019



1996
VEELS

MEELS
2009

Legislative
Amendment
EELPO 2018

Reviewing of
Standard
2019

- Extension of product coverage
- Tightening efficiency standards

Room Air Conditioners

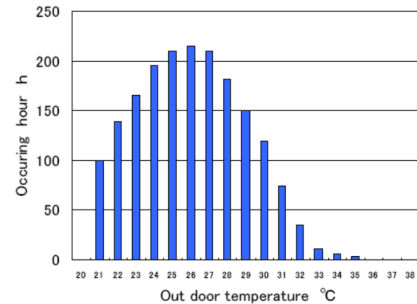
Energy Efficiency Test & Grading Standards

	Before re-grading	After re-grading
Test Standard	<ul style="list-style-type: none"> • ISO 5151 “Non-ducted air conditioners and heat pumps – Testing and rating for performance” 	<ul style="list-style-type: none"> • ISO 5151 • ISO 16358-1 (published in April 2013, applied for calculating CSPF)
Measurement	<ul style="list-style-type: none"> • One test point at full load 	<ul style="list-style-type: none"> • Fixed capacity: one test point at full load • Inverter: two test points at half load & full load
Energy Efficiency Index	<ul style="list-style-type: none"> • EER 	<ul style="list-style-type: none"> • CSPF (i.e. SEER)

Room Air Conditioners Energy Efficiency Test & Grading Standards

Outdoor Temperature Bin Distribution

- Weather information from
Hong Kong Observatory



Bin no. j.	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Outdoor temperature °C	24	25	26	27	28	29	30	31	32	33	34	35	36	---
Bin hours (hour)	67	117	147	177	210	183	114	75	56	33	15	5	1	1200

Room Air Conditioners

Energy Efficiency Test & Grading Standards



	Existing Grading Standard under MEELS				
CSPF	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Window type	≥ 3.00	≥ 2.80	≥ 2.60	≥ 2.40	< 2.40
Split type	≥ 4.50	≥ 3.50	≥ 3.15	≥ 2.80	< 2.80

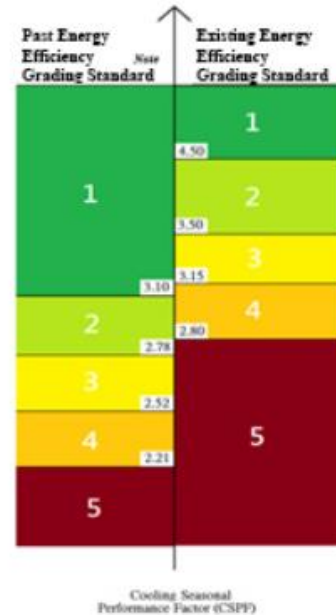


Energy Efficiency Ratio (EER)	Previous Grading Standard under MEELS				
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Window type	≥ 2.66	≥ 2.38	≥ 2.15	≥ 1.89	< 1.89
Split type	≥ 3.04	≥ 2.72	≥ 2.46	≥ 2.15	< 2.15

Room Air Conditioners

Energy Efficiency Test & Grading Standards

For split type room air conditioners, the energy efficiency standard of Grade 1 is increased by 45%.



Room Air Conditioners

Energy Efficiency Test & Grading Standards

For single package type room air conditioners, the energy efficiency standard of Grade 1 is increased by 13%.



Energy Efficiency Labelling Scheme for LED Lamps

Energy Efficiency Labelling Scheme for LED Lamps

The Hong Kong Voluntary Energy Efficiency Labelling Scheme for LED lamps was developed and implemented since 2011.

At that time, international testing standard for LED lamps on energy performance was still under development.



Energy Efficiency Labelling Scheme for LED Lamps

To suit the rapid change of the lighting market in adoption of LED lamps and the launch of international testing standard (IEC 62612), the scheme was revamped in 2017.

The type of energy label was changed from recognition type to grading type.



Energy Efficiency Labelling Scheme for LED Lamps

The scope of the scheme for the new version applied to:

Directional and Non-directional LED lamps and are intended for general lighting purposes having the following characteristics:

- those with a rated voltage **220V to 240V AC**;
- those with a rated frequency of **50Hz for AC**; and
- those with a rated lamp wattage **up to 60W**

LED lamps designed with dimming or non-dimming operations

Energy Efficiency Labelling Scheme for LED Lamps

Testing Standard and Performance Requirements:

Performance Requirements for VEELS for LED Lamps		
Test standard	Testing item	Requirement
Photoelectric performance: IEC 62612: 2013	Luminous Efficacy	The average efficacy value shall be calculated from the arithmetic means of each product's individual efficacy
	Lamp Survival factor at 6,000 hrs.	≥ 0.9
	Lumen Maintenance at 6,000 hrs.	≥ 0.8
	No. of switching cycles before failure	$\geq 15,000$ if rated lamp life $\geq 30,000$ hrs.; otherwise \geq half the rated lamp life expressed in hours
	Starting time	< 0.5 s
	Color Rendering (Ra)	≥ 80
	Color Consistency	Variation of chromaticity coordinates within a Six-step MacAdam ellipse or less
	Lamp Power factors	Power ≤ 2 W: no requirement; 2W $<$ Power ≤ 5 W: PF > 0.4 ; 5W $<$ Power ≤ 25 W: PF > 0.5 ; Power > 25 W: PF > 0.9

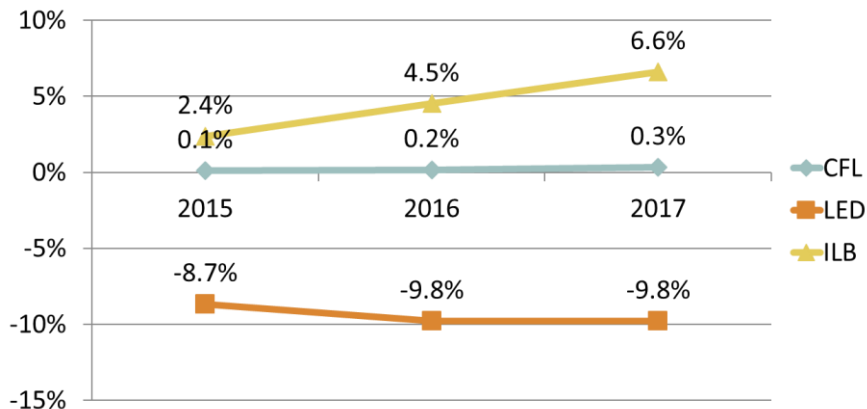
Energy Efficiency Labelling Scheme for LED Lamps

Energy Grading Standards :

Grading of Energy Efficient label	
Grade	Lamp Luminous Efficacy (Lumen/W)
1	$X \geq 110$
2	$110 > X \geq 90$
3	$90 > X \geq 63$
4	$63 > X \geq 50$
5	$50 > X$

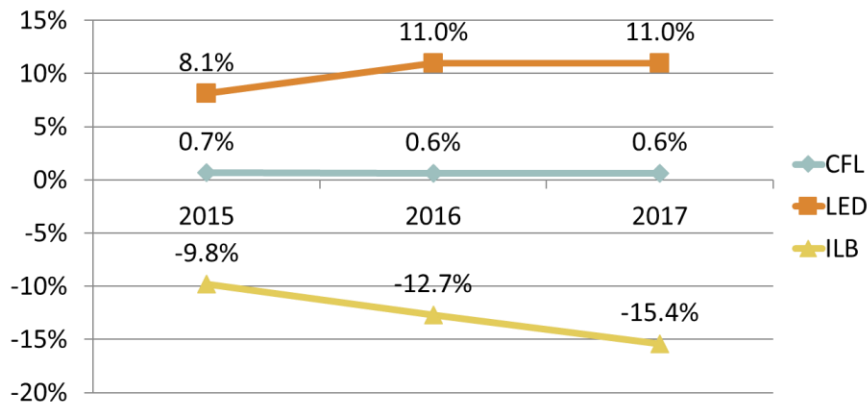
Energy Efficiency Labelling Scheme for LED Lamps

Changes in the Retail Prices of the Three Types of Lighting Products in Hong Kong in 2015 to 2017



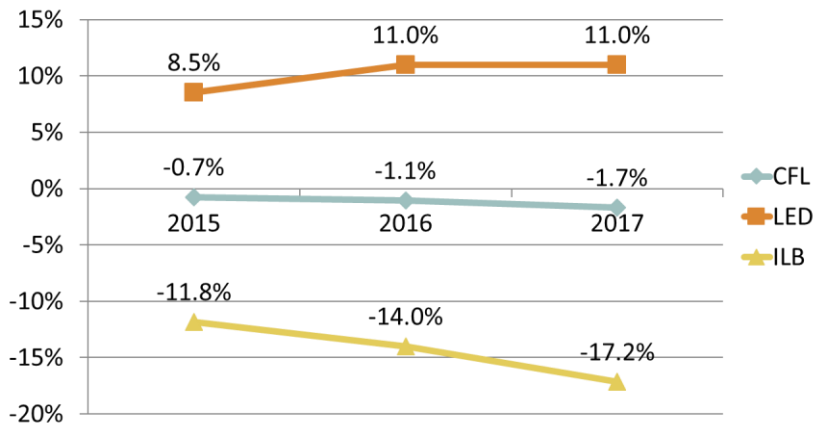
Energy Efficiency Labelling Scheme for LED Lamps

Changes in the Sales of the Three Types of Lighting Products in Hong Kong in 2015 to 2017



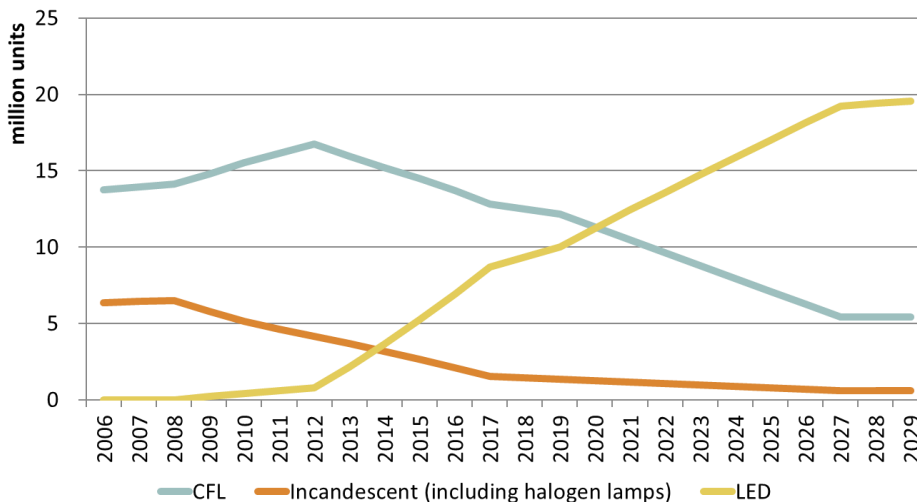
Energy Efficiency Labelling Scheme for LED Lamps

Estimated Number of Lamps in the Residential Sector

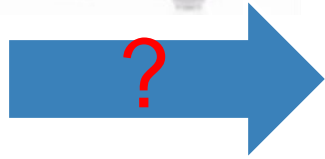


Energy Efficiency Labelling Scheme for LED Lamps

Estimated Number of Lamps in the Residential Sector



Energy Efficiency Labelling Scheme for LED Lamps



ENERGY LABEL 能源標籤	
Brand 牌名	ABC 某某牌
Model 型號	HK1234
Luminous Efficacy (Lumen/W) 發光效率 (流明/瓦)	110
Energy Efficient Grade* 能源標籤	1
EMSD Registration Number 能源標籤登記號碼	LED-001
<small>*For the first grade, Grade 1 is the most energy efficient. *此為最高級別，為1級能源標籤。</small>	
<small>EMSD</small>	

ENERGY LABEL 能源標籤	
more efficient 效益較高	
1	
2	
3	
4	
less efficient 效益較低	5
1 Grade	
53 Lumen/W (流明/瓦)	
Ref / Yr 編號 / 年份: L180123 / 18	
Compact Fluorescent Lamp 緊湊型螢光燈(慳電膽)	
機電工程署 EMSD	

Buildings Energy Efficiency Ordinance (BEEO)

BEEO Legislative Framework

Cap 610 - Buildings Energy Efficiency Ordinance (BEEO)

Cap 610A
Buildings Energy
Efficiency (Fees)
Regulation

Cap 610B
Buildings Energy Efficiency
(Registered Energy Assessors)
Regulation

**Building Energy Code
(BEC)**

**Energy Audit Code
(EAC)**

Milestone of the BEEO

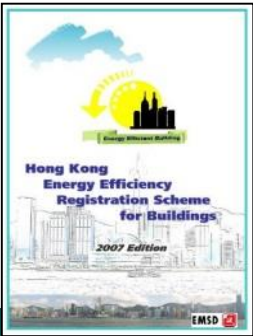
10/1998
HK Energy Efficiency
Registration Scheme for
Buildings (Voluntary Basis)

12/2010
BEEO was published in
gazette

12/2015
BEC 2015 & EAC
2015

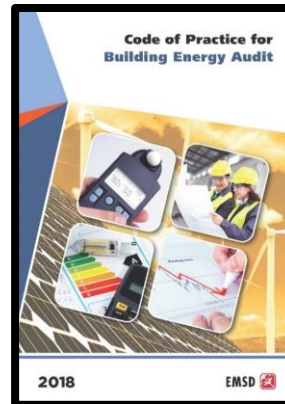
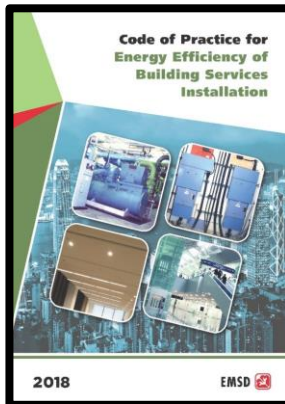
09/2012
BEEO came into full
operation
BEC 2012 & EAC
2012

11/2018
BEC 2018 & EAC
2018



Most Current Document Released

Issue Date	Document	Technical Circular Ref.
16 Nov 2018	BEC 2018, EAC 2018	1/2018



Review on the BEC 2018 & EAC 2018

- Review in a **3-year** interval
- Technical Taskforce with **34** organizations
- Making reference to:
 - a) **Maturity of latest technology** development;
 - b) Recognized **international standards** from other countries
 - c) *Data analysis from **statutory submission***
 - d) *Aspiration from **the public and stakeholders***



Lighting
Installation



A/C
Installation



Electrical
Installation



Lift/ Escalator
Installation

Lighting Installation - Compare with Global Standards

Energy efficiency requirements	HK BEC			Australia (BCA, 2016)	Singapore (SS 530, 2014)	USA (ASHRAE 90.1, 2016)	Mainland China (GB 50034, 2013)	UK (Approved Document L to Building Regulation)
	2012 Rev.1 (2014)	2015	2018					
<u>Space type</u>	<u>Max allowable LPD (W/m²)</u>							
i) Office	13	12	10 (15-200 m ²) (↑17%) 9 (>200 m ²) (↑25%)	9	12	10	15	delineate design parameters (in term of LPD similar to BEC 2015)
ii) Retail	17	17	16 (↑6%)	22	25	13.1	16-17	

Air-conditioning Installation – Comparison with Global Standards

Energy efficiency requirements	HK BEC		Australia (BCA, 2016)	Singapore	USA (ASHRAE 90.1, 2016)	Mainland China (GB 50189, 2015)	UK
	2015	2018					

COP for Air-Cooled Chiller

Screw	500kW & Above	3.0	3.1	(↑ ~3%)					
VSD Centrifugal	All ratings	3.1	3.2		2.5	3.07	2.866 – 2.985	2.9	2.7

Air-conditioning Installation – Compare with Global Standards

Energy efficiency requirements		HK BEC		Australia (BCA, 2016)	Singapore	USA (ASHRAE 90.1, 2016)	Mainland China (GB 50189, 2015)	UK
		2015	2018					
<i>COP for Water-Cooled Chiller</i>								
VSD Screw	Above 1000 kW	5.2	5.3	4.2	3.95	5.633-5.771	5.6	4.7
VSD Centrifugal	Above 3000 kW	5.6	5.8			6.018-6.286	5.9	
				(↑ 2 to 3.5%)				

Air-conditioning Installation – VRF System

	COP under BEC 2015	COP under BEC 2018
Air-cooled (cooling mode)	3.3 (7.5kW & Below 40kW)	3.6 (20 kW or below)
		3.6 (Above 20 kW to 40 kW)
	3.3 (40 to 200kW)	3.45 (Above 40 kW to 200 kW)
Air-cooled (heating mode)	3.8 (7.5kW & Below 40kW)	4.0 (20 kW or below)
		3.8 (Above 20 kW to 40 kW)
	3.6 (40 to 200kW)	3.8 (Above 40 kW to 200 kW)
Water-cooled (cooling mode)	4.3 (All Ratings)	4.5 (All Ratings)

(↑ 4 to 6%)

Electrical Installation – Compare with Global Standards

Energy efficiency requirements	HK BEC		Australia	Singapore (SS 530, 2014)	USA (ASHRAE 90.1, 2013)	Mainland China (GB 18613, 2012)	UK (directive EU 4/2014)
	2015	2018					
<i>Motor rating</i>	(↑ 2 to 3.6%) <i>Min allowable efficiency (4-pole motor)</i>						
0.75 kW ≤ P < 1.1 kW	79.6	82.5	80.5-84.5	82.5	85.5	79.6-85.6	82.5
1.1 kW ≤ P < 1.5 kW	81.4	84.1	82.2-85.9	84.1	86.5	81.4-87.4	84.1
1.5 kW ≤ P < 2.2 kW	82.8	85.3	83.5-87.0	85.3	86.5	82.8-88.1	85.3
2.2 kW ≤ P < 3 kW	84.3	86.7	84.9-88.2	86.7	89.5	84.3-89.7	86.7
3 kW ≤ P < 4 kW	85.5	87.7	86.0-89.1	87.7	89.5	85.5-90.3	87.7
4 kW ≤ P < 5.5 kW	86.6	88.6	87.0-89.9	88.6	91.0	86.6-90.9	88.6
5.5 kW ≤ P < 7.5 kW	87.7	89.6	87.9-90.7	89.6	91.7	87.7-92.1	89.6

Lift & Escalator Installation

Changes Between BEC 2018 & BEC 2015 Edition

Max. allowable traction lift electrical power ↓ **5 %**
(for new buildings)

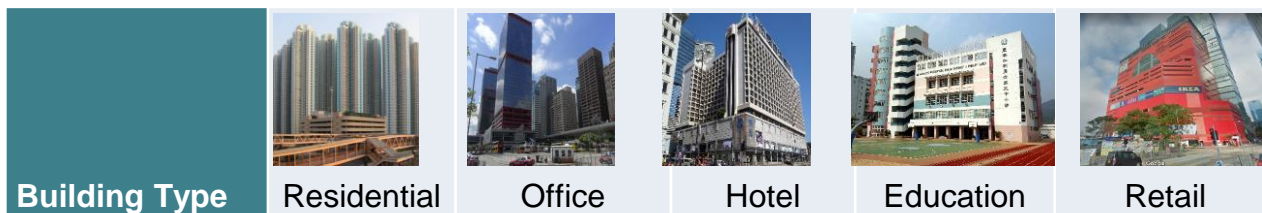
Max. allowable traction lift electrical power ↓ **5 %**
(for existing buildings)

Max. lift decoration load ↓ **10 %**

Max. allowable escalator electrical power – No change

BEC 2018 - Anticipated Energy Saving Effect

1) Anticipated tightening of BEC 2018



2) Make use of IES Energy Simulation Model to realize the potential saving

Energy Saving

5% - 11%

Total saving : Around **8%** (as compared with BEC2015)
or about **18%**(as compared with
BEC2012)

Thank You