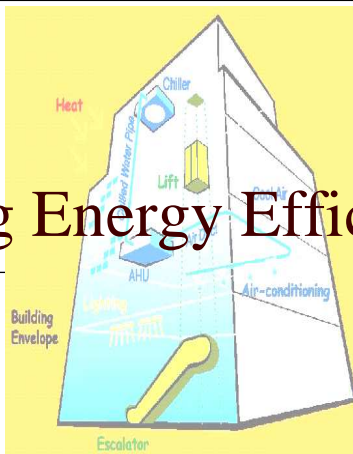# Building Energy Efficiency

Environment Bureau
The Government of the Hong Kong
Special Administrative Region

機電工程署
EMSD

60 周年紀念
th Anniversary

1

Contents

- ☐ House Keeping Measures
  - ■ Office equipment
  - ■ Facility management
- ☐ Cost Effective Energy Saving Measures
  - ■ Office equipment
  - ■ Lighting
  - ■ Air Conditioning
  - ■ Others
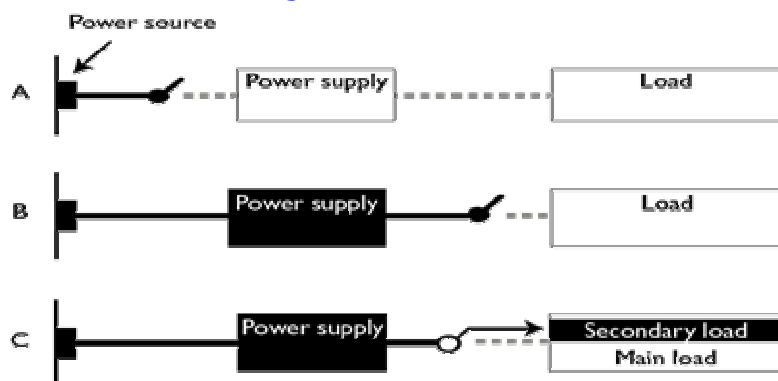- ☐ Schemes on Building Energy Efficiency

2

House Keeping Measures

- Simple measures that can be undertaken **today** to kick-start an energy efficiency programme
  - Office equipment
  - Facility management

Easy as ABC

3

Office Equipment

Is OFF Really OFF ?

Source: Lawrence Berkeley National Laboratory

4

Office Equipment

|	Range (W)	Average (W)
Computer, Idling	64 – 100	77
Computer, Screen saver	61 – 130	89
Computer, Stand-by/Hibernation	1.4 – 3.5	2.6
LCD Monitor, Idling	15 – 31	24
LCD Monitor, Screen saver	16 – 31	23
LCD Monitor, Stand-by	0.8 – 3.6	1.6
Ink-jet Printer	< 0.05 – 11.4	4.7
Laser Printer	4.6 – 51	19.5
Photocopier, Idling	33 – 78	55
Photocopier, Stand-by	33 – 77	52
Fax machine	8 – 22	14
Charger	1.0 – 3.1	1.7
Microwave Oven	2.0 – 3.1	2.5

Source: EEO and Choice Magazine

5

Office Equipment

- Typically accounts for 10 − 20% of total energy consumption of an office.
- The more office equipment powered on, the larger the air-conditioning load − 20 to30% of equipment load.
- Can easily save 1 hour of computer electricity use by switching off the computer or letting it enter sleep mode during lunch-time.
- Set all office equipment to energy saving mode during office hours.
- Turn office equipment off when not in use or before leaving the office.
- Unplug equipment chargers and adapters from socket outlets when not in use.
- Group essential services to a few servers and switch off non-essential servers after office hours and over weekends.

6

Facility Management

- Keep windows and doors shut for all air-conditioned areas.
- Avoid pre-cooling. Use "high" fan mode, rather than lowering the temperature, to provide adequate ventilation when high level of occupancy is expected.
- Use fan to achieve thermal comfort rather than extending AC time after office hours.
- Lower the window blinds to reduce direct sunlight during summer time.
- Switch off some AC in server rooms on Saturdays and on public holidays.
- Ensure sufficient air flow around equipment, Cool the servers, not the people !!
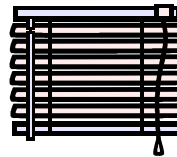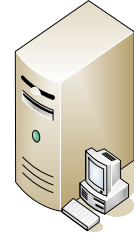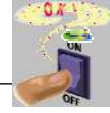
7

Facility Management

- Maintain the room temperature at 25.5 ^{0}C, 1°C may mean 3% AC energy.
- Turn off lighting at perimeter areas.
- Turn off some lighting and air conditioning units when the occupancy is low.
- Turn off lighting and AC in meeting rooms after meetings.
- Turn off unnecessary lifts and escalators during non-peak hours and when the venue is closed.
- Assign an Energy Manager.

8

Cost Effective Energy Saving Measures

□ Measures that could achieve good energy savings with a reasonable cash outlay

- Office Equipment
- Lighting
- Air Conditioning
- Others

9

Office Equipment

□ Use 7-day timer switch to automatically switch off equipment during non-office hours.

- Suitable for photocopier, printer, water dispenser, air purifier etc.
- Users can switch off according to pre-determined programme.
- If necessary, users may press the ON/OFF override button to switch on the equipment after office hours.
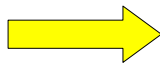
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5

Lighting

- Cut down the number of luminaires in over-lit areas.
- Reduce the illuminance level in over-lit areas.
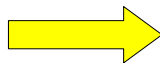- Delamping
- Lighting re-grouping
- Dimming

Lighting

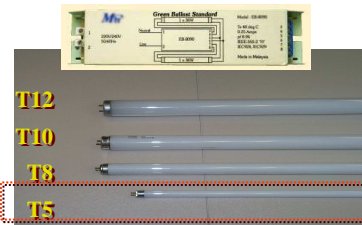- Replace incandescent light bulb with compact fluorescent lamp

  Energy Saving: 70%

- Replace T8 lamp with magnetic ballast with T5 lamp with electronic ballast

  Energy Saving: 30-40%

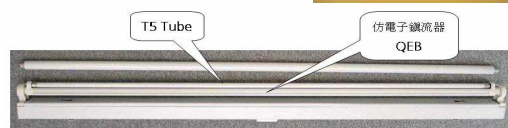- Use of timer, occupancy sensor, light sensor
- Use of LED

T12
T10
T8
T5

Lighting

☐ Indoor Games Hall
Replace high bay MBI & SON
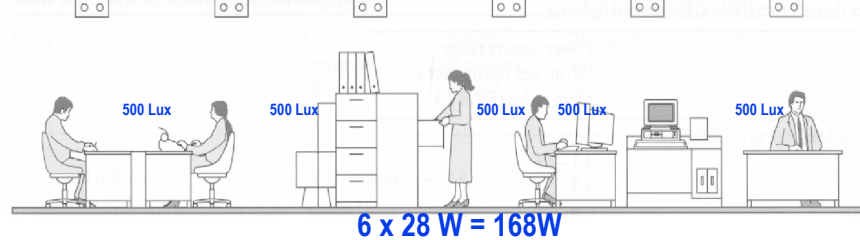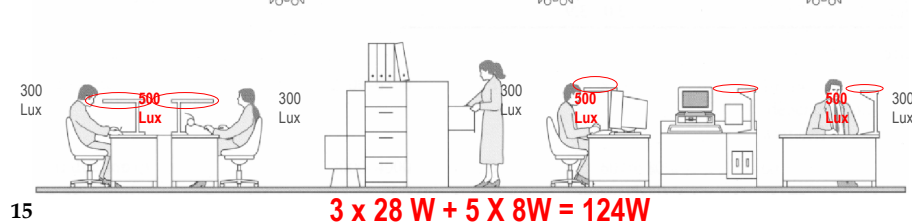with high output T5

13

Lighting

☐ Plug & enhance

T5 Tube

仿電子鎮流器
QEB

QEB 延伸配合器 Extension Adaptor

兜清器 Short Circuit Component

利用「亮度調正」技術裝上900 mm T8燈管
900 mm T8 tube in 1200 mm EMB fitting using LLA technology

延伸配件 Extension Unit

QEB 延伸配合器 Extension Adaptor

利用「亮度調正」技術裝上600 mm T8燈管
600 mm T8 tube in 1200 mm EMB fitting using LLA Technology

14

7

Lighting

General Lighting System

500 Lux   500 Lux   500 Lux   500 Lux   500 Lux

6 x 28 W = 168W

Low Energy Lighting System

300 Lux   **500 Lux**   300 Lux   300 Lux   **500 Lux**   **500 Lux**   300 Lux

15

3 x 28 W + 5 X 8W = 124W

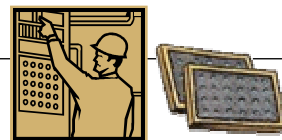
Air Conditioning

- ☐ Establish a maintenance programme to ensure efficient operation

   Properly clean filters and heat transfer surfaces

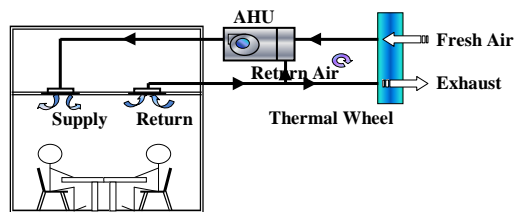- ☐ Re-commissioning / Rebalancing

- ☐ Thermostat to reflect cooling demand
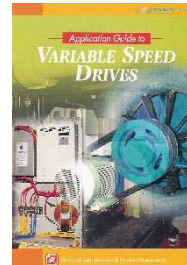
16

Air Conditioning

- Use of variable speed drives in air handling unit, water pump, etc
- Recovery of cooling energy from exhaust

AHU

Fresh Air

Return Air

Exhaust

Supply   Return

Thermal Wheel
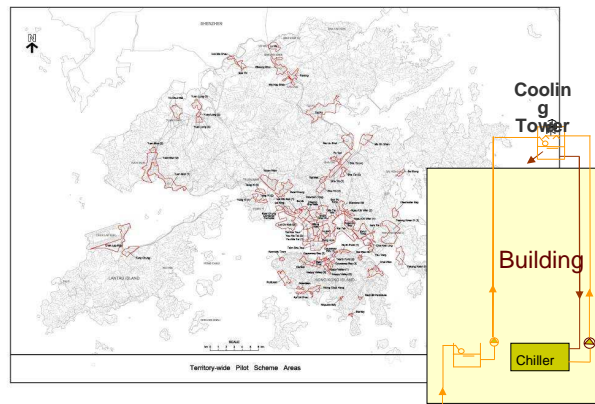
17

Air Conditioning

- Scheme for Wider Use of Fresh Water in Cooling Towers for Air Conditioning Systems

  - Launched in 2000, operating on a standing status from 1 June 2008
  - Designated areas increased from 6 to 86

Coolin g Tower

Building

Chiller

18

9

Air Conditioning

- During replacement adopt equipment with higher efficiency e.g. room cooler affixed with Grade 1 Energy Label
- Part Load Efficiency
- Fresh Air Demand Control
- Occupancy Sensor, Timer
- Static pressure reset
- Chilled water temp reset
- Operation hours optimization
- Adoption of shading
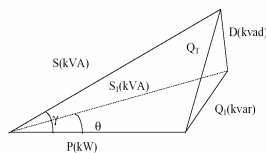- Use of anti-ultraviolet film
    Reduce ultraviolet: 70-90%

19

Others

- High efficiency motor
- Metering – identifies the inefficient user
- Good power quality – make use of bulk tariff
- VVVF lift motor drive
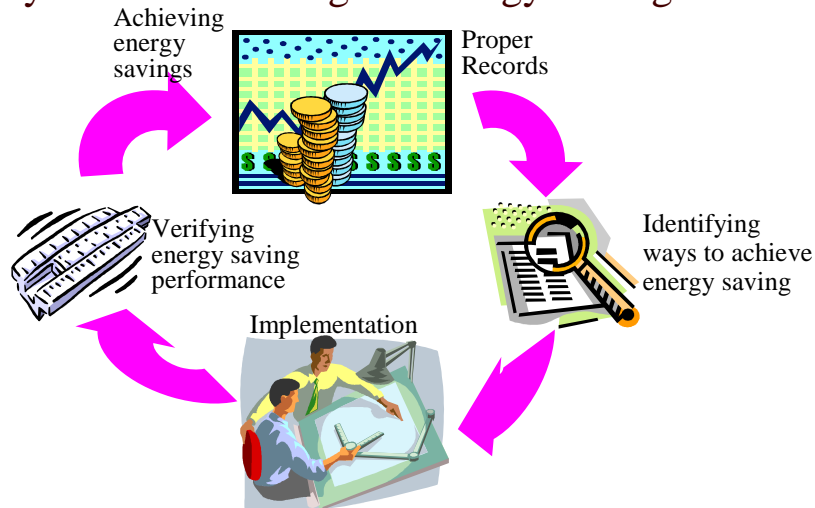- Optimize lift counter-weight
- Service-on-demand escalator
- Renewables

20

Others

Systematic Planning for Energy Saving

Achieving energy savings

Proper Records

Verifying energy saving performance

Identifying ways to achieve energy saving

Implementation

21

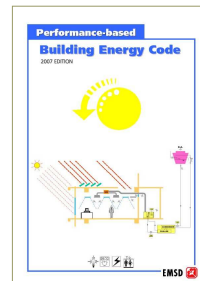
Buildings Energy Efficiency Schemes

Building Energy Codes (BEC)
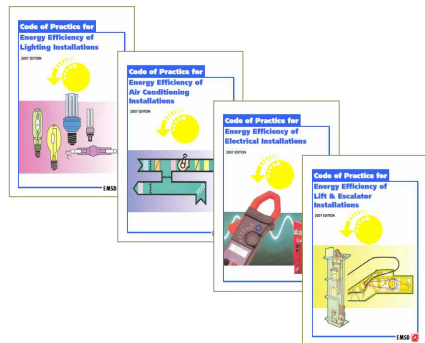
Four prescriptive codes on minimum energy efficiency standards of fixed building services installations

Performance-based code to assess the total energy efficiency performance of a building

22

Buildings Energy Efficiency Schemes

HK Energy Efficiency Registration Scheme for Buildings

HKEERSB

- Operated since 1998 to promote voluntary compliance of the Building Energy Codes
- Up to April 2009, 2351 registration certificates were issued to 974 building venues

23

Buildings Energy Efficiency Schemes

Mandatory Implementation of BEC

- To further promote the energy efficiency of new and existing buildings, the Government proposes to mandate the implementation of the BEC
- Public consultation concluded in March 2008
- Draft Bill being prepared

24

Mandatory Implementation of BEC

Coverage

- Commercial buildings (offices, hotels, shopping complex, etc.)
- Commercial portion of composite buildings
- Common area of residential and industrial buildings
- Educational buildings
- Community buildings (e.g. community center, elderly home, youth centre)
- Municipal buildings (e.g. library, cultural centre)
- Hospitals and clinics
- Institutional buildings (e.g. fire station, police station)

25

Buildings Energy Efficiency Schemes

Building Energy Efficiency Funding Schemes

- Low Carbon Economy – an economy based on low energy consumption and low pollution
- A total of $450 million has been reserved under the Environment & Conservation Fund –
  - **$150 million to subsidize energy-cum-carbon audits**
  - **$300 million to subsidize energy efficiency projects**
  - **Subsidies provided on a matching basis**
- Open for application from **8 April 2009**

全城綠色 業主得益

樓宇節能顯效益
Green Building Towards a Low Carbon Environment

建築物能源效益資助計劃
Buildings Energy Efficiency Funding Schemes

2009年4月8日開始接受申請
Open for application from 8 April 2009

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26

General – http://www.emsd.gov.hk

Energy efficiency publications:

   http://www.emsd.gov.hk/emsd/eng/pee/aest_pub.shtml

HK EE Net: http://ee.emsd.gov.hk

Funding Schemes - http://www.building-energy-funds.gov.hk

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