

EnergyWits

智能

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亞太經濟合作組織能源工作小組 第34次會議

The 34th Meeting of APEC Energy Working Group(EWG)

機電工程署能源效益事務處代表中國香港於2007年9月3至7日主辦了亞太經濟合作組織能源工作組第34次會議，超過六十位來自亞太經濟合作組織成員經濟體的代表及專家出席會議。是次會議由來自澳洲的Mr. John Griffiths 聯同機電工程署副署長陳鴻祥先生主持。

環境局局長邱騰華先生為大會致歡迎辭及向與會人士簡述香港如何處理環境問題。晚餐敘會由機電工程署署長何光偉先生主持。

能源安全倡議始終是能源工作組主要討論的議題。能源安全倡議包括針對能源供應短暫中斷的緊急應變措施和解決區內日益嚴重的能源穩定供應問

On behalf of Hong Kong, China, the Energy Efficiency Office of the Electrical and Mechanical Services Department (EMSD) hosted the 34th Meeting of APEC Energy Working Group (EWG) in Hong Kong on 3-7 September 2007. Over 60 delegates and energy experts from the APEC Member Economies participated in the event. Mr. John Griffiths of Australia and Mr. Stephen CHAN Hung-cheung, Deputy Director of EMSD, Hong Kong co-chaired the meeting.

Mr. Edward YAU Tang-wah, Secretary for the Environment presented a welcome speech and briefly introduced the approaches of Hong Kong in addressing the environmental issues. Also, Mr. HO Kwong-wai, Director of EMSD hosted the official dinner.

Energy Security Initiative (ESI) remained as the major agenda item discussed by the EWG. The ESI comprises contingency measures to handle temporary energy supply disruptions and strategies that could tackle the region's



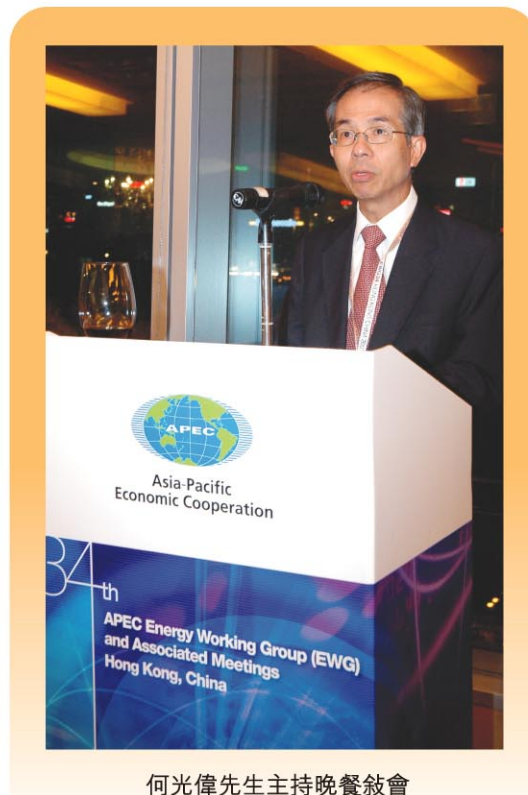
亞太經濟合作組織能源工作組第34次會議 The 34th APEC Energy Working Group Meeting

題的策略。為確保可持續發展，能源安全倡議在致力於加強可負擔能源的安全性與可靠性的同時，亦會致力於舒緩由亞太地區能源生產及使用量上升而對環境帶來的衝擊。其主要探討的題目包括共同石油數據倡議、即時緊急資料通報機制、能源緊急應變措施、對能源方面的投資及天然氣貿易等。

能源數據及分析專家小組、新及可再生能源技術專家小組、清潔化石能源專家小組和能源效益專家小組的主席，能源效益及可再生能源財務專責小組的主席，以及生物燃料專責小組的主席都分別於會上匯報其工作進度。

亞太能源研究中心亦於會上匯報其四個研究項目的進度。

亞太經濟合作組織能源工作組第34次會議除了為其成員經濟體的能源專家及主要官員提供交換資料及意見的平台外，機電署亦能藉此機會參與制定新的國際能源措施及提升香港的國際地位。



何光偉先生主持晚餐敘會
Mr. HO Kwong-wai hosted the official dinner

growing energy security problems. The ESI also addresses energy for sustainable development by strengthening the security and reliability of affordable energy, while mitigating against the environmental impacts caused by the increasing production and consumption of energy in the APEC region. The topics discussed included joint oil data initiative, real-time emergency information sharing system, energy emergency responses, energy investment and natural gas trade.

The Chairs of the Expert Groups on Energy Data and Analysis, New and Renewable Energy Technologies, Clean Fossil Energy, and Energy Efficiency and Conservation; and the Chairs of the Task Forces on Energy Efficiency and Renewable Energy Financing and Biofuels respectively reported the progress of their groups.

The Asia Pacific Energy Research Center (APEREC) reported their progress of their four research projects.

The EWG34 provided a platform for the energy experts and ministries to exchange information and views with other member economies in APEC. It also allows us to participate in international energy initiatives and thus raise the international standing of Hong Kong.

慳電膽 - 對環境的好處

CFL - Environmental Benefits

我們曾於「智能」第8期概述慳電膽的特性。本期我們會著重說明使用慳電膽對環境的好處及為讀者提供使用慳電膽作為陳列燈飾用途的最新發展。

使用慳電膽對環境的好處

慳電膽比鎢絲燈膽更具能源效益，以綜合式電子慳電膽取代鎢絲燈膽，能節省約百分之七十五的電能。由於慳電膽比鎢絲燈膽用電少，間接亦減少了發電時消耗的化石燃料和排放的污染物。以下的粗略估計顯示，改用慳電膽能大幅地減少能源消耗及溫室氣體的排放量。本港約有二百萬個家庭，若每個家庭都將一個鎢絲燈泡更換成相應光度的慳電膽，每年全港整體可節省約2億度電（約1億9千萬元），相等於每年減少140,000公噸二氧化碳的排放。

此外，慳電膽比鎢絲燈膽長壽；一般有能源效益標籤的綜合式電子慳電膽，其壽命至少有6,000小時，而有些慳電膽產品的壽命，甚至長達10,000小時，比傳統鎢絲燈膽的壽命長約10倍。因此，若以慳電膽代替鎢絲燈膽，固體廢物（即棄置的廢慳電膽）的產生量便可大大降低。

使用慳電膽作為陳列燈飾

過去兩年慳電膽科技的發展迅速，市面上有一些慳電膽是專為取代用於陳列燈飾的鎢絲鹵素射燈而設計的，其額定功率介乎7瓦與11瓦之間，可直接接駁至於220伏市電，因此無須像鎢絲鹵素射燈般配合降壓火牛使用。若以這些慳電膽取代常用的35瓦或50瓦鎢絲鹵素射燈，可大大省電。

以下實驗比較一個功率11瓦的慳電膽和一個功率35瓦的鎢絲鹵素射燈的照明效果和耗電情況。

In Issue No. 8 of the EnergyWits, we gave an overview of the characteristics about Compact Fluorescent Lamps (CFLs). We would take this opportunity to highlight the environmental benefits of using CFLs and update readers with the latest development of CFLs for display lighting application.

Environmental Benefits of CFLs

CFL is more energy efficient than incandescent lamp. Integrated electronic CFL, when used to replace incandescent lamp, will save around 75% electrical energy. Less electrical energy consumed by CFLs also means less fossil fuel burnt & less pollutants released from power plants. The following rough estimation can show the huge amount of reduction of energy consumption and greenhouse gas emissions of using CFL. If each of the two million households in Hong Kong uses a CFL in place of an incandescent lamp, up to 200 million kWh electricity (about \$190 million) could be saved annually, equivalent to a reduction of around 140,000 tonnes of carbon dioxide emissions.

Furthermore, CFL has longer lamp life than incandescent lamp. The lifetime of an integrated electronic CFL with energy label is at least 6,000 hours and some products can have lifetime as high as 10,000 hours, which is about 10 times longer than the traditional incandescent lamps. Hence, the amount of solid waste from used lamps can be reduced significantly if CFLs are used instead of incandescent lamps.

CFLs for Display Lighting Applications

With technology development of CFLs in the past 2 years, there are CFLs on the market specifically designed to replace dichoric tungsten halogen lamps for display lighting application. They are rated from 7W to 11W and powered directly from 220V supply mains, and do not need step-down transformers as required by the tungsten halogen lamp. Substantial savings can be achieved if they are used to replace the commonly installed 35W and 50W tungsten halogen lamps.

The illumination effect and electricity consumption of an 11W CFL and a 35W tungsten halogen lamp are demonstrated below for comparison.



(慳電膽 CFL)



(鎢絲鹵素射燈 Tungsten halogen lamp)

從以上兩幀照片顯示，我們可看到兩者可達到相近的重點照明效果，因此，慳電膽在某些應用上應被考慮作為大耗電量鎢絲鹵素射燈的代替品。

From the above 2 pictures, it can be seen that both types are able to achieve similar accent effect on the object being illuminated. So CFL can be a potential candidate for consideration in substituting the non-energy efficient tungsten halogen lamp in some of the applications.

類型 Type	2700K色溫慳電膽 CFL 2700K	鎢絲鹵素射燈配上降壓火牛 Tungsten halogen lamp + Transformer
額定功率(瓦) Rated power (W)	11	35
測出功率(瓦) Measured Power (W)	9.61	33.20

在耗電方面，使用慳電膽可節省超過70%電力。

For electricity consumption, CFL can save over 70% of energy.

棄置慳電膽

廢慳電膽的棄置方法與其他電子產品的棄置方法相似。由家居產生的少量廢慳電膽可與其他家居廢物一起棄置於堆填區。堆填區裝有防滲漏膜，滲濾污水收集及處理系統以防止污染環境。然而，在棄置大量廢慳電膽時，必須遵守廢物處置(化學廢物) (一般)規例的規定。對於那些需要處理大量廢慳電膽的使用者，例如公共交通機構、商場及公、私營住宅，我們鼓勵他們使用位於青衣的化學廢物處理中心正確地處理廢慳電膽。

Disposal of CFLs

Used CFLs could be disposed of in a way similar to other electronic products. Small quantity of used CFLs from households can be disposed of together with domestic waste at landfills which are equipped with impermeable liner and leachate collection and treatment system to prevent pollution to the environment. However, disposal of bulk quantity of used CFLs should comply with the Waste Disposal (Chemical Waste) (General) Regulation. Those users who need to handle large quantity of used CFLs, such as public transport companies, shopping malls and public and private residential developments, are encouraged to use the treatment facilities at the Chemical Waste Treatment Centre in Tsing Yi for proper disposal of the waste CFLs.

無刷直流電動機推動 盤管式風機

Brushless DC motor Fan Coil Unit

普遍而言，辦公室內的空調負荷會因應陽光、室內人數及設備操作等因素而整天不停地變化，空調的供冷量必須緊貼負荷的變化，才能使室內保持穩定。傳統的盤管式風機以三段風速控制供冷量，而由於無刷直流風機採用無刷直流電動機，供冷量可因應負荷的變化作無段調控，因此可避免供冷量過盛而浪費能源。此外，無刷直流電動機的耗電量，基本上亦比傳統風機的單相感應電動機為少。

機電工程署能源效益事務處有見及此，以先行性項目型式，對「無刷直流風機」的節能效果進行了評估；涉及評估的場地，包括有電梯大堂、分格式辦公室、開敞式設計辦公室及公共服務場所。

評估結果顯示，以同等功率的「無刷直流風機」與傳統的風機作比較，「無刷直流風機」的耗電量在不同空氣流量下均較少，其節能效果在非額定負荷的情況下尤為顯著。在我們的先行性項目研究中，耗電量的減少幅度介乎8%(分格式辦公室，只有短時間在非額定負荷下操作)與50%(電梯大堂，長時間在非額定負荷下操作)之間。因此，將傳統的風機更換成「無刷直流風機」後的節能效果，主要視乎風機有多少時間是在非額定負荷的情況下操作。

雖然有好的節能效果，但「無刷直流風機」比傳統風機的價格較高，我們因此亦應考慮其投資成本。此外，其電子線路所產生的高諧波和低功率因素，會影響電力素質，應加以處理，使其符合「供電守則」和「電力裝置能源效益守則」內的要求。

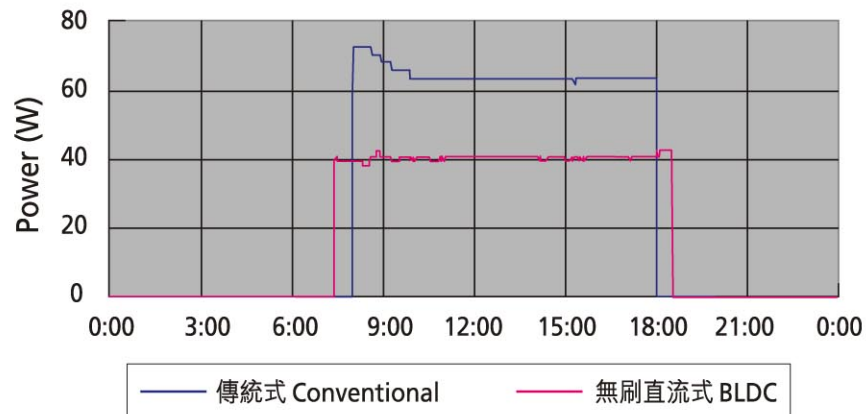
The cooling load demand in a room fluctuates throughout the day due to the changes in solar gain, occupancy and equipment operation. The room temperature can be maintained stable if the supplied cooling capacity matches well with the cooling load. Unlike the conventional 3-speed fan coil unit (FCU) employing step control for the cooling capacity, FCU with Brushless Direct Current (BLDC) Motor can vary its fan speed continuously to provide more precise control in cooling capacity in response to changes in demand for cooling, and thus will not waste excessive cooling energy to the room. The other benefit of BLDC is that the power consumption of the FCU motor is lower than that of the single-phase induction motor commonly used in the conventional FCU.

EMSD has conducted a pilot project to look into the energy saving potential of the BLDC motor for application in FCUs. Areas selected for the study include (i) lift lobby; (ii) cellular offices; (iii) open plan office; and (iv) public service area.

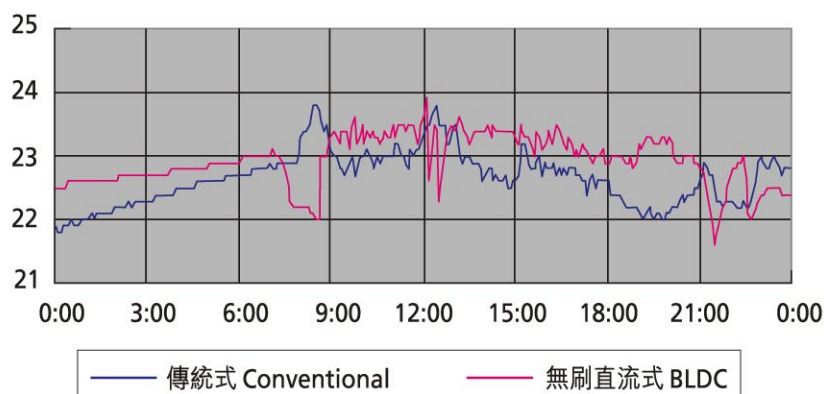
The study results show that BLDC FCU consumes less power than conventional FCU of same rating at various air flow rates, especially under part load condition. The amount of energy saving in retrofitting conventional FCUs by FCUs with BLDC motors depends very much on the duration of part-load condition out of the operation hours. In the pilot project study, energy saving was achieved in the range from 8% (for cellular office with short duration of part load) up to 50% (for lift lobby with long duration of part load).

However, FCUs with BLDC motors are more expensive than conventional FCUs and the amount of capital outlay should also be considered. In addition, power quality issues including high harmonic current and low power factor due to the electronic control components also need to be handled in order to meet the requirements of Supply Rules and Code of Practice for Energy Efficiency of Electrical Installations.

電梯大堂風機耗電量 Power Consumption of FCU at Lift Lobby



電梯大堂溫度 Lift Lobby Temperature



Remark (備註):

風機中使用的離心式風扇的能源消耗量遵從下列定理：

The energy consumption of centrifugal fans used in FCU obeys the following fan law:

$$\frac{P1}{P2} = \left(\frac{RPM1}{RPM2} \right)^3$$

P1 = 風機在轉速RPM1時的消耗功率 Power Consumption at fan rotating speed RPM1

P2 = 風機在轉速RPM2時的消耗功率 Power Consumption at fan rotating speed RPM2

RPM1, RPM2 = 風機轉速 Rotating speeds of fan

以上公式顯示輕微地減低風機轉速可明顯地降低其耗電量。「無刷直流風機」可根據冷量需求無段調校風機轉速，從而為風機在非額定負荷情況下提供自動節能機制。

The above equation shows that a slight reduction of fan rotating speed can result in significant reduction in power consumption. BLDC FCUs can provide stepless adjustment of fan speed to match with the cooling demand, which provides an automatic mechanism for power saving during part load conditions.

香港可持續科技網

HK Sustainable Technology Net

為了推廣使用可持續科技，機電工程署最近建立了「香港可持續科技網」（網址：<http://sustech.emsd.gov.hk>）。這網站旨在向公眾提供有關環保科技的全面資訊，並重點介紹那些適合香港應用的技術，使這些技術在香港得以廣泛使用。

「香港可持續科技網」是個富有特色的入門網站，它包含了三個主題網站，分別是介紹可再生能源技術的「香港可再生能源網」、介紹節能科技的「香港節能網」及介紹綠色建築科技的「香港綠色建築科技網」。



「香港可再生能源網」HK RE Net
(<http://re.emsd.gov.hk/>)

「香港可再生能源網」（網址：<http://re.emsd.gov.hk>）集中介紹可再生能源技術（例如太陽能熱水、太陽能光伏、風力發電、堆填沼氣、厭氧分解等），並對每類技術有詳細的描述，包括技術大綱、應用考慮和本地應用實例等。

「香港節能網」（網址：<http://ee.emsd.gov.hk>）集中介紹可應用於各類屋宇裝備（例如空調系統、照明設備、升降機和自動梯等）的節能科技。這網站提供

To promote the use of sustainable technologies, EMSD has recently developed the **HK Sustainable Technology Net** (<http://sustech.emsd.gov.hk>). The website aims for providing comprehensive information on environmentally friendly technologies with emphasis on those technologies suitable for applications in Hong Kong and facilitating wider adoption of such technologies in Hong Kong.



「香港可持續科技網」HK Sustainable Technology Net
(<http://sustech.emsd.gov.hk/>)

It is a unique portal site containing three thematic websites focusing on renewable energy technologies, energy efficient technologies and green building technologies. The three thematic websites are the **HK RE Net**, the **HK EE Net** and the **HK Green Building Technology Net**.

The **HK RE Net** (<http://re.emsd.gov.hk/>) focuses on renewable energy technologies such as solar water heating, solar photovoltaic, wind turbines, landfill gas utilisation and anaerobic digestion and so on. There are in-depth description of each type of technologies including technology outlines, application considerations, and local example projects. The **HK EE Net** (<http://ee.emsd.gov.hk/>) focuses on energy efficient technologies that can be applied to various kinds of building services installations such as air conditioning systems, lighting, lifts and escalators. The website contains

逾50種被廣泛應用的節能科技以及一些極有潛力在本港使用的新興節能科技的資料。網站在「教育資源」部分內提供了一些與節能科技有關的本地教育中心及網上教學資源的資料，這些資料對老師和學生極具參考價值。



「香港節能網」HK EE Net (<http://ee.emsd.gov.hk/>)

「香港綠色建築科技網」（網址：<http://gbtech.emsd.gov.hk>）提供了各種可循環再用的可持續建築材料的資訊，以及其應用範圍和表現。網站在「易拆卸設計」部分內，更為建築物設計師提供易拆卸設計的簡易步驟，好讓他們從建築物設計階段開始便把善用資源和易拆卸的概念融入設計內。

以上網站深入且宏觀地介紹適用於香港的環保技術，而三個主題網站及入門網站的內容均是中英對照的。

information of over 50 proven energy efficient technologies as well as information on the emerging energy efficient technologies which are of good potential for wider applications in local situation. The Education Resources section provides useful information on education centres and web resources relating to energy efficient technologies available in Hong Kong, which are good references for teachers and students.



「香港綠色建築科技網」HK Green Building Technology Net (<http://gbtech.emsd.gov.hk/>)

The HK Green Building Technology Net (<http://gbtech.emsd.gov.hk/>) provides information on various types of sustainable building materials that are recyclable as well as their applications and performance. The Design for Deconstruction section provides easy-to-follow steps for building designers to plan for efficient use of resources right from the design stage.

The above websites introduce in depth and breadth the treatment of environmentally friendly technologies suitable for application in Hong Kong. The contents of the three technological thematic websites and the portal site are in full word-for-word bilingual edition.

建議的強制性

能源效益標籤計劃

Proposed Mandatory

Energy Efficiency Labelling Scheme

為鼓勵市民採用具能源效益的產品，政府於二零零七年四月向立法會提交《能源效益（產品標籤）條例草案》，建議推行強制性能源效益標籤計劃。該條例草案正由條例草案委員會進行審議。根據該條例草案，三類產品（即空調機、冷凍器具和緊湊型熒光燈）將被納入首階段的強制性能源效益標籤計劃內。當首階段的強制性能源效益標籤計劃推行後，每年可額外節省1.5億度電，相等於每年減少105,000公噸的二氧化碳排放量。

To encourage the use of energy efficient products, the Government introduced the Energy Efficiency (Labelling of Products) Bill to the Legislative Council in April 2007 with a view to implementing a proposed mandatory energy efficiency labelling scheme. The Bill is being scrutinized by the Bills Committee. Three kinds of products, namely room air conditioners, refrigerating appliances and compact fluorescent lamps, are included in the initial phase of the proposed mandatory energy efficiency labelling scheme. With the implementation of the mandatory scheme for these three products, additional electricity saving of 150 GWh per year can be achieved, equivalent to a reduction of 105,000 tonnes of carbon dioxide emission per year.



香港能源最終用途數據

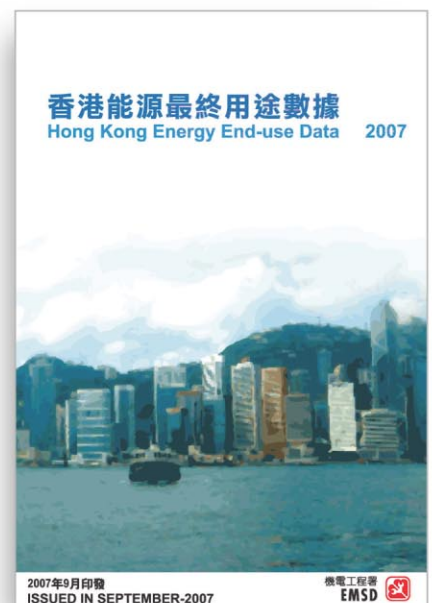
edition of the Hong Kong Energy End-use Data

該刊物記錄了1995至2005年的能源最終用途數據。全港最終能源消耗在2005年減少了0.6%至286,255太焦耳，當中住宅、商業、工業及運輸業類別的消耗量分別佔總能源消耗量的19%、37%、8%和36%。在過去十年，能源密度都能維持著向下趨勢，直至2005年，每十億港元生產總值的能源消耗量共下降了22%至176太焦耳。有興趣的讀者可於下列網址免費下載更加詳細的數據。

http://www.emsd.gov.hk/emsd/e_download/pee/HKEEUD280907.pdf

The publication contains energy consumption data from 1995 to 2005. In year 2005, the total energy finally consumed in Hong Kong dropped by 0.6% to 286,255 TJ, in which the Residential, Commercial, Industrial and Transport Sectors are in the proportion of 19%, 37%, 8% and 36% respectively. In the past decade, the energy intensity maintains a downward trend. In 2005, the energy end-use per GDP (Billion HK dollars) dropped by 22% over the past ten years to 176 TJ. Interested readers may download more detailed information from the following website free of charge:

http://www.emsd.gov.hk/emsd/e_download/pee/HKEEUD280907.pdf



節能小貼士 Energy Saving Tips



機電工程署為了讓公眾認識更多簡單有效的節能方法，最近出版了兩本刊物，其中一本是〈節能小貼士(家居)〉，顧名思義，該刊物提供了多種針對常用家庭用具的節能要訣，這些家庭用具包括：照明、冷氣機、雪櫃、煮食爐具、洗衣機、乾衣機、熨斗、熱水爐、電暖爐、抽濕機及影音器材。而另一本是〈節能小貼士(辦公室)〉。根據香港能源最終用途數據，辦公室內的空調、照明及其他辦公室設備的能源消耗量約佔辦公室的總能源使用量百分之九十，因此，〈節能小貼士(辦公室)〉對使用那些設備時的相關節能措施有詳細講解。

建議在使用家庭用具或辦公室空調、照明及其他辦公室設備時應採取的簡單節能措施包括：

1. 選用貼有一級或二級能源標籤型號的家居和辦公室設備
2. 長時間不使用各類電器時，應關掉電源，避免停留在備用狀態
3. 調校夏天室溫至攝氏25.5度
4. 儘量選用慳電膽代替鎢絲燈泡
5. 使用低耗能的幼身光管
6. 儘量善用日光
7. 定期維修設備

除印刷版本，〈節能小貼士(家居)〉及〈節能小貼士(辦公室)〉亦備有網上版本，市民可於以下網址(http://www.emsd.gov.hk/emsd/chi/pee/em_pub.shtml)瀏覽或下載，了解更多節能措施的詳細資料。

In order to let the public know more about the simple and effective means of energy saving, the Electrical and Mechanical Services Department has recently published two booklets. One of them is called Energy Saving Tips for Home. As its name implies, the booklet provides various means of energy saving for commonly used home appliances. These home appliances include lighting, room cooler, refrigerator, cooker, washing machine, dryer, iron, water heater, electric heater, dehumidifier and audio & video equipment. The other booklet is called Energy Saving Tips for Office. According to the Hong Kong Energy End-use data, the energy consumption of air conditioning system, illumination and other office equipment of an office accounts for approximately 90% of the energy consumption of the office. As such, the Energy Saving Tips for Office gives detailed description on the energy saving measures in relation to the uses of those office equipment.

Suggested energy saving measures to be adopted in using home appliances or the air conditioning system, illumination and other office equipment in the office include:

1. Use home appliances or office equipment with Grade 1 or Grade 2 Energy Label
2. Switch off those appliances that are not in use. Do not leave them in standby mode
3. Set room temperature to 25.5 °C in summer
4. Replace incandescent lamps with compact fluorescent lamps
5. Use energy saving thin fluorescent tubes
6. Make use of the sunlight for illumination whenever possible
7. Carry out regular maintenance of the equipment

Besides the printed versions, there are also on-line versions. The public may browse or download the energy saving tips from the following location (http://www.emsd.gov.hk/emsd/chi/pee/em_pub.shtml) so as to have better understanding on the details of the energy saving measures.

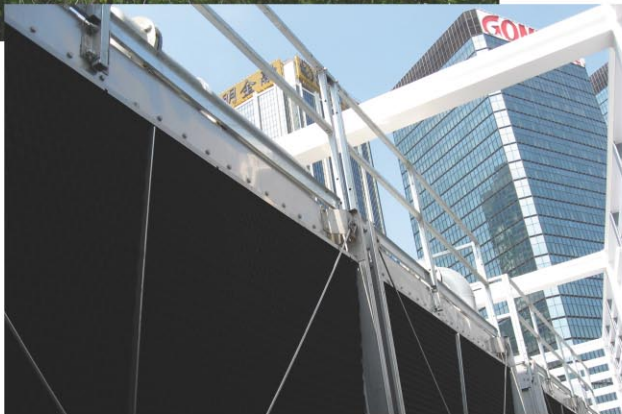
淡水冷卻塔的計劃進展

Updates on Promotion of Fresh Water Cooling Towers

淡水冷卻塔計劃旨在推廣使用淡水於節能空調系統中的蒸發式冷卻塔。現時，該計劃已覆蓋80個選定地區。

非住宅建築物的擁有人及發展商非常支持先行性計劃和選用較節能的水冷式空調系統，該計劃至今共收到超過280宗申請，落成啟用的水冷式空調系統總數和總製冷量在2007年9月已達101個及590兆瓦，估計每年可減省8千5百萬度用電和減少5萬9千噸溫室氣體排放。以下顯示三個新近完成的冷卻塔裝置。

香港中文大學李嘉誠醫學大樓 (製冷量：約1,000冷噸)
The Chinese University of Hong Kong - Li Ka Shing Medical Science Building (Cooling Capacity: about 1,000 TR)



The Fresh Water Cooling Towers Scheme aims for promoting the wider use of fresh water in the evaporative cooling towers for energy-efficient air conditioning systems. The Scheme now covers 80 designated areas.

The owners and developers of non-domestic buildings have been very supportive of the Scheme and adopted water-cooled air conditioning systems which are more energy-efficient. Up to now we received over 280 applications for participating the Scheme, and the total number and cooling capacities of commissioned water-cooled air conditioning systems reached 101 and 590 MW respectively in September 2007. The electricity saving and the associated reduction of greenhouse gases are anticipated to be 85M kWh per annum and 59,000 tonnes per annum respectively. Three newly completed cooling tower installations are shown here.



北角廉政公署總部 (製冷量：約1,500冷噸)
Independent Commission Against Corruption Headquarters Building at North Point (Cooling Capacity: about 1,500 TR)

金鐘夏慤道地下鐵路金鐘站 (製冷量：約2,000冷噸)
MTR Admiralty Distribution Station at Harcourt Road (Cooling Capacity: about 2,000 TR)

聯絡資料 Contact

任何人士如欲就本通訊提出意見或詢問，請與我們聯絡，資料如下：

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Anyone wishing to offer comments or make enquiries about this newsletter can contact us at:

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