#### 能源效益及相關事項通訊

A Newsletter on Energy Efficiency and Related Matters



推動綠色復甦,邁向碳中和 Promoting Green Recovery, Towards Carbon Neutrality



## ISSUE 第三十六期



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第十六屆國際環保博覽已於十月二十 七日至三十日在香港會議展覽中心順 利舉行。本屆博覽的主題是「推動緣 色復甦,邁向碳中和」。 The 16th Eco Expo Asia was successfully held at the Hong Kong Convention and Exhibition Center from October 27th to 30th. The theme of this year's expo is "Promoting Green Recovery, Towards Carbon Neutrality".

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The Electrical and Mechanical Services Department Leading Regional Cooperation to moving toward Carbon Neutrality





第十六屆國際環保博覽已於十月二十七日至三十日在香港會議展 覽中心順利舉行。是次博覽由香港貿易發展局主辦,並由環境局 協辦,為環保業界提供一個多元化的商貿平台。本屆博覽的主題 是「推動綠色復甦,邁向碳中和」。

The 16th Eco Expo Asia was successfully held at the Hong Kong Convention and Exhibition Center from October 27th to 30th. The Expo is organized by the Hong Kong Trade Development Council and coorganized by the Environment Bureau to provide a diversified business platform for the environmental protection industry. The theme of this year's expo is "Promoting Green Recovery, Towards Carbon Neutrality".



■ 環境局局長 黃錦星先生(中間)、總工程師/能源效益A 李學賢先生(右二)、總工程師/能源效益B 江茂誠先生(左二)及總工程師/能源效益C 馮子峯先生(左一)與機智啤啤(右一)拍照留念。

Mr. WONG Kam-sing, GBS, JP, the Secretary for the Environment (Middle) Mr. LEE Hok Yin, Arthur, Chief Engineer/Energy Efficiency A (Second from right) Mr. KONG Mau Shing, Marsden, Chief Engineer/Energy Efficiency B (Second from left) Mr. FUNG Chi Fung, Chief Engineer/Energy Efficiency C (First from left) WItty Bear (First from right), EMSD's promotion ambassador at EMSD's booth of Eco Expo Asia 2021 機電工程署亦應邀到現場設置展覽攤位,向參展商、買家 及市民分享及推廣本署在「節能綠建」(Energy Saving and Green Buildings)、「綠色基建」(Green Infrastructure)及 「綠色創科」(Green Innovation and Technologies) 三大範 疇下對能源效益及節能的相關工作及成效,當中包括《強 制性能源效益標籤計劃》、《建築物能源效益條例》、 《重新校驗》、《區域供冷系統》、《政府物聯通》及其 他創新節能科技等。

為期四天的博覽會吸引眾多環保業界人士及公眾參與,環 境局局長 黃錦星先生於展覽開幕當日更親臨現場參觀本署 展覽攤位,並由能源效益事務處的同事介紹展覽內容。署 長彭耀雄先生、副署長/規管服務潘國英先生及助理署長/電 力及能源效益朱祺明先生亦親力親為,聯同首次擔任宣傳 大使的機智啤啤,到現場為我們的展覽團隊打氣。機智啤 啤更落力向業界人士及公眾介紹部門為配合香港力爭碳中 和目標的相關工作。環保博覽的最後一天是「公眾日」, The Electrical and Mechanical Services Department (EMSD) was invited to set up an exhibition booth to share and promote the Department's effort in three major areas in "Energy Saving and Green Buildings", "Green Infrastructure" and "Green Innovation and Technologies" for energy efficiency and energy conservation and the related works including the "Compulsory Energy Efficiency Labelling Scheme", "Building Energy Efficiency Ordinance", "Retro-commissioning", "District Cooling System", "Government IOT" and other innovative energy-saving technologies, etc.

The four-day expo had caught numerous eyes from the environmental protection industry and the public. On the opening day of the exhibition, Mr. WONG Kam-sing, the Secretary for the Environment, visited the exhibition booths and was greeted by EMSD's colleagues from the Energy Efficiency Office to showcase the exhibition contents. Mr. Eric PANG, Director of EMSD, Mr. Raymond



■ 機電工程署署長 彭耀雄先生(後排右三)、副署長/規管服務 潘國英先生(後排右 二)及助理署長/電力及能源效益 朱祺明先生(後排左二)、聯同首次擔任宣傳大使 的機智啤啤一起"撐碳中和"並為我們的展覽團隊打氣。

*Mr. Eric PANG, Director of Electrical and Mechanical Services (Third from right at the back), Mr. Raymond POON, Deputy Director/Regulatory Services (Second from right at the back), Mr. Barry CHU, Assistant Director/Electricity and Energy Efficiency (Second from left at the back) and Witty Bear jointly taken a photo with the Exhibition Team.* 





宣傳大使機智啤啤與在場公眾打招呼, 幫忙推廣"撐碳中和"。

Witty Bear is actively promoting Carbon Neutral and asking one of the visitors to follow his social media account for more related information.



「公眾日」當日有不少學生到機電署的攤位參觀,同學們都在用心聆聽我們工程師的講解。
 Primary school students are learning about EMSD works on energy efficiency and energy conservation from our Engineer.

當天攤位開放予公眾人士免費入場,其中更有學校帶同中 小學生到機電署的攤位參觀及了解本署對能源效益及節能 的工作。

本署會繼續積極參與及舉辦相關宣傳活動,除了希望提高 市民大眾對節能減排的環保意識,更希望讓大家了解政府 節能減排的決心,並將節能減排的概念更廣泛地推廣到社 會各界,從而一起朝著碳中和的目標邁進,為香港締造一 個健康、宜居和可持續發展的環境。



工程師/能源效益B8/2羅婷丰女士代表本署出席博覽會的「政府部門論壇」介紹區域供冷系統的最新發展。

Miss Michelle LAW, Engineer/ Energy Efficiency B8/2 was sharing the Development of District Cooling System in Hong Kong in the Government Departments' Forum in the Expo. POON, Deputy Director/Regulatory Services and Mr. Barry CHU, Assistant Director/Electricity and Energy Efficiency, together with Witty Bear as the promotion ambassador for his very first time, also visited the Expo and showed support to EMSD's exhibition team which paid efforts to introduce the Department's initiatives in achieving carbon neutrality for Hong Kong to the industry and the public. The last day of the Expo was a "Public Day" during when the Expo was opened to the public for free admission and some primary and secondary school students came and learnt the Department's works on energy efficiency and energy conservation.

To raise public's environmental awareness of energy conservation and emission reduction, EMSD will strive to organize and participate in more publicity activities of similar scale to promote the concept of energy conservation and emission reduction to the society more widely. We also hope that everyone can understand the Government's determination to save energy and reduce emissions. All walks of life will thus work together towards the goal of carbon neutrality and create a healthy, livable and sustainable environment for Hong Kong.



政府自2009年起實施強制性能源效益標籤計劃(強制性標 籤計劃),至今涵蓋八類電氣產品,包括空調機、雪櫃、 慳電膽、洗衣機、抽濕機、電視機、儲水式電熱水器和電 磁爐。相關電器佔住宅總能源的使用量約五成。簡潔易明 的強制性能源效益標籤計劃,有助市民將節能意識融入消 費行為。我們一直與時並進,持續提升並擴大強制性標籤 計劃的標準和涵蓋範圍。

強制性標籤計劃的第二次評級標準提升已於2021年12月31 起全面實施,所有進口商供應計劃涵蓋的獨立式空調機、 抽濕機和慳電膽時須貼有新能源效益級別標準的標籤。新 標籤會在參考編號前加入「U2」字頭作為識別。

## 強制性能源效益標籤計劃最新發展 The Latest Development of Mandatory Energy Efficiency Labelling Scheme (MEELS)

The Government has implemented the Mandatory Energy Efficiency Labelling Scheme (MEELS) since 2009, which currently covers eight types of electrical products including room air-conditioners, refrigerating appliances, compact fluorescent lamps, washing machines, dehumidifiers, televisions, storage type electric water heaters and induction cookers. These electrical appliances account for about 50% of the total energy consumption in the residential sector. The concise and easy-tounderstand MEELS helps members of the public practise energy conservation in their consumption behaviour. We take proactive approach to tighten grading standards and expand the scope to raise the energy efficiency performance of various appliances.

The second Upgrading of Grading Standards has been fully implemented since 31 Dec 2021, energy label of the new grading standard shall be affixed to single package type room air conditioners, dehumidifiers and compact fluorescent lamps (CFLs) under MEELS when they are being supplied in Hong Kong. A prefix "U2" is added



為協助市民挑選具能源效益的器具及節約更多能源,政府 建議在強制性標籤計劃第四階段新增涵蓋下列產品: to the reference number on the energy label of the new grading standard.

With a view to help the general public choose energy efficient appliances and capitalise further energy saving, in the fourth phrase of MEELS, the Government proposed to extend the coverage to three additional types of products as shown below:



相關公眾及立法會事務委員會諮詢工作已經完成,並正進 行修改條例以涵蓋新增產品的工作,預計將於2023年完 成。強制性標籤計劃第四階段預計於同年生效並建議預設 有十五個月的過渡期。

配合有關計劃進程,政府已於2021年11月15日更新氣體煮 食爐及即熱式氣體熱水爐的自願性能源效益標籤計劃(自 願性標籤計劃),以採用建議的測試標準(即對氣體煮食 爐採用GB 30720:2014及對即熱式氣體熱水爐採用GB 20665:2015)。持份者可及早了解已更新的自願性標籤 計劃,有助其氣體用具從自願性標籤計劃順利過渡至強制 性標籤計劃。

當強制性能源效益標籤計劃擴展涵蓋以上的三類產品,並 連同首三階段涵蓋的八類訂明產品,所佔的住宅總能源的 使用量會由約五成大幅上升至約八成。我們估計每年可額 外節省能源約568.8太焦耳(即約1.6億度電),減少約7.5 萬公噸碳排放。

有關能源標籤及強制性能源效益標籤計劃最新發展的詳 情,請瀏覽機電工程署的能源標籤網: The public and LegCo panel consultations on the proposal had been completed. Amendment of the Ordinance for inclusion of new products is in progress and anticipated to be completed in 2023. It is anticipated that the fourth phase of the MEELS would be commenced in 2023 with proposed 15 months of transitional period

For the implementation of the new phase, the Government had revamped the Voluntary Energy Efficiency Scheme (VEELS) of gas appliances to adopt the proposed testing standards (i.e. GB30720:2014 for gas cookers and GB20665:2015 for gas instantaneous water heaters) on 15 November 2021. Stakeholders can be familiar with the requirements of the new revamped VEELS to allow a smooth transition from the VEELS to the MEELS.

By incorporating the proposed three products into the MEELS, together with the existing eight prescribed products in the first three phases of the MEELS, the total coverage of energy consumption in the residential sector by the MEELS will increase from 50% to about 80%. It is estimated that an additional 568.8 terajoules of energy (i.e. about 160 million kWh of electricity) can be saved each year and about 75 000 tonnes of carbon emissions can be reduced.



For details about energy labels and latest development of the Mandatory Energy Efficiency Labelling Scheme (MEELS), please visit the EMSD's Energy Label Net:



### 綠色創新科技 Green Innovation and Technology

政府於2021年10月公布《香港氣候行動藍圖2050》以 「零碳排放 • 綠色宜居 • 持續發展」為願景,講述淨零 發電、節能綠建、綠色運輸、全民減廢四大減碳策略和措 施,邁向碳中和目標。針對實現碳中和,除了制定加強節 能、發展可再生能源等有效措施以外,開發及引用創新科 技亦是關鍵的一環。

#### 數據中心浸沒式冷卻技術

根據機電工程署於2021年出版的《能源最終用途數據》, 商業類別於2019年的用電量佔全港用電量約百分之67。而 數據中心組別的用電量則佔商業類別的用電量約百分之4。 數據中心是智慧城市的重要基礎建設,其需求和用電量不 斷增加,故需要開發創新科技以減少其用電量。 The Government announced Hong Kong's Climate Action Plan 2050 in October, setting out the vision of Zero-carbon Emissions • Liveable City • Sustainable Development and outlining four major decarbonisation strategies and measures: net-zero electricity generation, energy saving and green buildings, green transport and waste reduction. Despite the strengthening of energyefficient measures and exploring the use of renewable energy, the introduction and implementation of innovative technology is a key element to pursue decarbonisation.

#### **Immersion Cooling System for Servers**

According to the Energy End-use Data published by the EMSD, the electricity consumption for the Commercial Sector in 2019 is around 67% of the total electricity consumption in Hong Kong. The electricity consumption for Data Centre Segment is around 4% of the Commercial Sector. Data centre being an essential infrastructure for smart city, the demand of "data centre" is predicted to be fast-growing, so it is essential to explore the use of innovative technology in electricity reduction for data centre.



Figure 1 Operation mechanism of 2-phase immersion cooling for servers



Figure 2: LED lighting with advanced heat dissipation technology

有見及此,機電工程署於其總部大樓的數據中心內安裝了 一套由初創公司研發的2相浸沒式冷卻系統以作試驗。

有別於傳統的冷卻系統,伺服器直接浸泡在不導電但導熱 的液體中,並直接將組件產生的熱能傳導給液體及令其蒸發。蒸氣通過熱交換器冷卻、凝結再回流繼續循環吸收熱 能。冷凝水進行熱交換後把熱量經由散熱器排至室外。

相比傳統的散熱系統,此系統更能提升資訊科技硬件的冷 卻,及大幅降低數據中心能耗並提高電源使用效率 (PUE), 降低運營成本和環境影響。

#### 發光二極管("LED")燈具先進散熱技術

照明系統佔全港用電量約10%。根據最近的能源使用調查,目前市場逐步由傳統的燈具轉換成LED,其能效開始引 起持份者的關注。

LED燈具通常使用自然對流式的鋁材散熱器。由於鋁的導熱 性低,其散熱效率有限,大量熱量仍留在LED內,導致其效 率下降。LED的光輸出會隨著溫度的升高而下降,這不但影 響了燈具的發光效率,並同時造成能源浪費。

作為試點項目,機電工程署在其總部試用了一種以先進流 體動壓散熱技術的LED燈具。該燈具的散熱器由許多銅毛細 管組成,呈熱管迴路形式。在熱管中內循環流動的流體吸 收了LED釋放的熱量,大大提升散熱效果及燈具的發光效 率。

測試結果顯示,相比採用傳統散熱方式的LED燈具,估計可 節省約 10% 的能源。 In view of such, EMSD has installed a 2-phase immersion cooling system for server cooling, developed by a local start-up, at Data Centre of EMSD HQs.

Unlike conventional air conditioning system, IT servers are submerged in a non-electrical conductive but thermally conductive liquid bath. Heat generated from the servers is removed from the servers by evaporation of the liquid. Through the heat exchanger, the vapor condenses into liquid and return to the tank for continuous cooling. The heat rejected from the vapor is absorbed and transported by the cooling water. Finally, the dry cooler rejects the heat into the atmosphere.

On comparison to the traditional heat rejection system for servers, this system is proved to offer advanced cooling solutions to IT hardware. The system's Power Usage Effectiveness (PUE), which measures the efficiency of power usage, is lowered, resulting a reduction in operating costs and mitigating environmental impacts.

# Advanced Heat Dissipation Technology for LED lighting fitting

10% of electricity in Hong Kong was consumed in lighting. According to the recent energy survey, traditional lighting system is progressively switching to LED lighting fittings, so the energy efficiency of LED lighting has caught the attention of the stakeholders.

Typical LED lighting fittings use aluminium heat sink for heat dissipation in form of natural convection. Due to the low thermal conductivity of aluminium, heat dissipation is restricted and much heat remains inside the fitting. The efficiency of LED drops with high temperature and thus degrades the light output. This affects the luminous efficacy of the LED and eventually causes energy wastage.

As a pilot project, EMSD tested an advanced heat dissipation technology for LED lighting fitting which adopts fluid dynamic pressure technology. There are many copper capillary tubes which form a heat pipe circulation. A working fluid circulating inside the heat pipe absorbs heat from the LED. This improves its heat dissipation as well as its luminous efficacy.

This advanced heat dissipation technology results in an estimated energy saving of about 10% for LED lighting fittings in comparison to those with traditional convection method.



洪水橋/廈村區域供冷系統項目 批出勘查研究、設計及建造顧問合約 Hung Shui Kiu / Ha Tsuen District Cooling System Award of Consultancy for Investigation, Design and Construction



■ 助理署長/電力及能源效益朱祺明(前排右二)和合約顧問1蕭漢光(前排右一)與奧雅納工程顧問董事李達強先 生(前排左二)、董事鄭世有博士(前排左一)及多位能源效益C部同事在簽約儀式後合照

Assistant Director of Electrical and Mechanical Services Department, Mr Chu Kei-ming (front row, 2nd from right), Contract Advisor 1 for Electrical and Mechanical Services Department, Mr Siu Hon-kwong (front row, 1st from right), Director of Ove Arup & Partners Hong Kong Ltd., Mr Lee Tat-keung (front row, 2nd from left), Director for Ove Arup & Partners Hong Kong Ltd., Dr Cheng Sai-yau (front row, 1st from left) and other staff members of Energy Efficiency Office Division C attended the Contract Signing Ceremony. 行政長官在《2021年施政報告》中表示,政府會研究各種 減低碳排放量的方法和措施,致力爭取於2050年前實現碳 中和,當中包括在新發展興建區域供冷系統。洪水橋/廈村 是報告提及的新發展區之一,亦已被納入同期公佈的《北 部都會區發展策略》當中,區內設施包括商業樓宇、商 場、社區中心、學校、體育場館及醫院等規劃發展。環境 局及機電工程署正在推展洪水橋/廈村的區域供冷系統,為 區內不同建築物的空調需求,提供靈活空調系統方案的基 建設施,從而提高能源效益。

洪水橋/廈村新發展區將興建的區域供冷系統項目由多個 部份組成,包括供冷站、冷凍水配水管道網絡,以及新發 展區用戶樓宇內的接駁設施。根據現時設計方案,整個區 域供冷項目共設有東、南、北三個廠房作為供冷站,設計 和建造會分三個階段進行,以迎合新發展區內對空調的需 求。

本署於10月19日批出洪水橋/廈村新發展區區域供冷系統第 一期第一階段的顧問合約,正式展開該項目的建造工程前 期工作。相關顧問合約採用了新工程合約第四版,有助改 善整體合約流程,提高設計和工程質素。 As mentioned by the Chief Executive in the 2021 Policy Address, the Government will explore various methods and measures to reduce carbon emissions, striving to achieve carbon neutrality before 2050. A key sustainable infrastructure is construction of District Cooling Systems (DCS) in new development areas. Designated as one of the new development areas and included as part of the Northern Metropolis Development Strategy, Hung Shui Kiu / Ha Tsuen New Development Area (HSK/HT NDA) will accommodate a mix of facilities including commercial buildings, shopping arcades, community centres, educational institutions, sports centres, hospitals, etc. The Environment Bureau and Electrical and Mechanical Services Department (EMSD) are combining efforts to implement a DCS in HSK/HT NDA capable of addressing the diversified cooling demand of different buildings and promoting flexible air-conditioning solutions, whilst achieving enhanced energy efficiency.

The DCS project being implemented in HSK/HT NDA will comprise various components including central chiller plants, chilled water distribution piping network and energy transfer stations at consumer buildings in the new development area. According to the current scheme design, three individual central chiller plants (namely East, South and North) will be established and their design and construction will be carried out in three phases to meet the cooling demand of different buildings within the district.

EMSD awarded the consultancy of Phase 1 Stage 1 of the HSK/HT DCS project on 19 October 2021, commencing the pre-construction works for the project. The fourth version of the New Engineering Contract (NEC4) has been adopted in this consultancy, which will help to streamline project management processes and will enhance the quality of design and construction.



## 機電工程署領導區域能源協同邁向碳中和 The Electrical and Mechanical Services Department Leading Regional Cooperation to moving toward Carbon Neutrality



機電工程署助理署長/電力及能源效益朱祺明先生於亞太經合組織能源工作組第62次會議中報告香港最新的能源發展。
Mr. CHU Kei-ming, Assistant Director/ Electricity and Energy Efficiency of the EMSD presented Hong Kong's notable energy development at the 62nd Meeting of APEC Energy Working Group.

能源工作組是亞太區經濟合作組織(亞太經合組織)轄下的區 域論壇,成員包括亞太經合組織全部21個經濟體。能源工 作組自1990年成立以來,每年舉行兩次會議,討論提高能 源對亞太經合組織地區人民經濟和社會福祉的貢獻,同時 減輕能源供應和使用對環境的影響事宜。

作為亞太經合組織能源工作組的香港官方代表,機電工程 署一直積極參與能源工作組及其轄下4個專家組,2個工作 組和2個研究所的工作,以加強各成員經濟體在能源相關範 疇的知識分享和經驗交流。 The Energy Working Group (EWG) is a regionallybased forum operating under the Asia-Pacific Economic Cooperation (APEC) umbrella with participation by all 21 APEC economies. Since its launch in 1990, the EWG meets twice a year to maximize the energy sector's contribution to the economic and social well-being of the people in the APEC region, while mitigating the environmental effects of energy supply and use.

As Hong Kong's official representative in the APEC EWG, the Electrical and Mechanical Services Department (EMSD) has been actively engaging in the works of EWG and its sub-fora, including four Expert Groups, two Task Forces, and two Research Centres to fortify knowledge and experience sharing in energy-related areas.



機電工程署署長彭耀雄先生(右)祝賀助理署長/電力及能源效益 朱祺明先生(左)成功當選亞太經合組織能源工作組副主席。

Director of Electrical and Mechanical Services, Mr PANG Yiu Hung, congratulates Assistant Director/ Electricity and Energy Efficiency, Mr. CHU Kei-ming, for his successful selection as the Deputy Lead Shepherd of APEC EWG.



機電工程署署長彭耀雄先生為亞太經合組織「減少區內都市化 城市能源強度」研討會致閉幕辭。

Director of Electrical and Mechanical Services, Mr PANG Yiu Hung, delivering closing remarks at APEC Workshop on Energy Intensity Reduction in the APEC Regions' Urbanised Cities.

機電工程署助理署長/電力及能源效益朱祺明先生於2021年 10月19日至21日舉行的亞太經合組織能源工作組第62次會 議中獲成員經濟體一致推選為能源工作組副主席,是繼機 電署代表於2021年5月連任能源工作組轄下能源效益及節能 專家小組主席一職後,再有同事晉身能源工作組的領導崗 位。



At the 62nd Meeting of APEC Energy Working Group held on 19-21 October 2021, Assistant Director/ Electricity and Energy Efficiency of the EMSD, Mr CHU Kei-ming was unanimously selected by APEC member economies as the Deputy Lead Shepherd of EWG. It was the second time that the colleagues of EMSD took up a leadership position in EWG following our representative being selected as the Chair of the APEC Expert Group on Energy Efficiency & Conservation (EGEE&C) for second term in May 2021.