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Thermal Energy Storage & LEED, Next Generation Refrigerant – R32 Performance, Refrigerant Selection for Next-Gen Chillers, The Challenges of Retro-Commissioning

熱能儲存及 LEED, 下一代冷媒 - R32 的特性, 新一代冷水機組的製冷劑研發經驗分享, 既有建築重新校驗的挑戰

Date 日期 : 14 June 2019 (Friday) 2019 年 6 月 14 日（星期五）
Time 時間 : 2:00pm – 5:30pm (Registration will start at 1:15pm) 下午 2 時至 5 時 30 分（下午 1 時 15 分開始註冊）
Venue 地點 : Macao Studio City (3/F - Grand Ball Room No. 3) 澳門新濠影匯 3 樓 - 3 號大宴會廳

ASHRAE Joint Chapters Seminar Program 香港及澳門分會聯合主辦研討會流程:

1:15PM – 1:50PM	**Registration** 註冊
1:50PM – 2:00PM	**Welcome Address and Opening Speech** 歡迎及開幕詞 *Mr. Syed Mubarak, President - ASHRAE MACAO Chapter* *美國供暖製冷及空調工程師學會 澳門分會 – 會長*
2:00PM – 2:45PM (45 minutes)	**Thermal Energy Storage and LEED** 熱能儲存及 LEED *Mr. Mark MacCracken*
2:45PM – 3:30PM (45 minutes)	**Next Generation Refrigerant - R32 Performance** 下一代冷媒 - R32 的特性 *Ms. Jessie Hu (胡靜霞 女仕)* *BEng, Msc(IBTM), AMASHRAE*
3:30PM – 3:40PM	**Question and Answers** 答問時間 *Moderated By: Ir Peter Chan, Immediate Past President - ASHRAE MACAO Chapter* *主持人 : 陳錫邦 工程師, 美國供暖製冷及空調工程師學會 澳門分會 – 前會長*
3:40PM – 4:00PM	**Tea Break** 茶點時間
4:00PM – 4:45PM (45 minutes)	**Refrigerant Selection for Next-Gen Chillers** 新一代冷水機組的製冷劑研發經驗分享 *Dr. Ir Philip CH Yu (余中海 博士 工程師)* *PhD, RPE, CEng, LEED-AP*
4:45PM – 5:30PM (45 minutes)	**Going All In – The Challenges of Retro-Commissioning for Existing Building (System Health Check, Diagnostics, Re-tuning and Retrofitting)** 全力以赴 - 既有建築重新校驗的挑戰 (系統健康檢查、診斷、重新調整和改造) *Dr. Benny CHOW (周家明 博士)* *PhD, MASHRAE, LEED AP BD+C, GB Faculty, BEAM Pro, WELL AP*
5:30PM – 5:45PM	**Question and Answers** 答問時間 *Moderated By: Ir Peter Chan, Immediate Past President - ASHRAE MACAO Chapter* *主持人 : 陳錫邦 工程師, 美國供暖製冷及空調工程師學會 澳門分會 – 前會長*

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Language 語言	English / Cantonese 英語 / 廣東話	**Application Deadline** 申請限期	4 June 2019 (Tuesday) 2019 年 6 月 4 日（星期二）
Fee 申請費用	Free of Charge 費用全免	**Quota** 名額	100 ; First Come, First Served 先到先得
On-Line Registration 網上申請	https://docs.google.com/forms/d/e/1FAIpQLScteqkoumddqtY0QfXlbPMLImY-xRayOC8vIz2W_4ArlOp1QQ/viewform?usp=pp_url Successful applicants will be notified by e-mail on or before 7 June 2019 (Friday). 成功申請者將於 2019 年 6 月 7 日（星期五）前經電郵被通知。		
Enquiry 查詢	For any query, please contact our Student Branch – President, Mr. Lin Bin at (853) 68276290 or email at info@ashrae-macao.com 如有任何疑問，請致電（853）68276290 聯繫學生分會 – 會長 林斌先生或發送電子郵件至 info@ashrae-macao.com		
Remark 備註	Target Attendee : Electrical Engineering, Electromechanical Engineering 對象: 電機工程、機電工程 3-Hour CPD certificate will be distributed after the Technical Seminar. 技術研討會後分發 3 小時 CPD 證書 (CPD Application to Macau Government - CAEU is in process.) 本研討會已向澳門政府 建築，工程及城規規劃專業委員會申請 CPD 批核進行中。		

Speakers 講者:

Mr. Mark MacCracken

Mark M. MacCracken is the CEO of CALMAC Manufacturing Corporation, whose main products are used for off-peak cooling of buildings using Thermal Energy Storage. In his almost 40 years with the firm, he has been involved in all aspects of the company including, R&D contracts, patents, manufacturing, marketing and finance. He was the principal investigator on research projects contracted by Oak Ridge National Labs, NASA and National Renewable Energy Research Lab (SERI).

Mr. MacCracken's company has been involved in over 4,000 thermal storage systems in 37 countries. He has three U. S. patents, is a licensed Professional Engineer in the state of New Jersey and has written numerous technical articles. He was the 2011 Chair of USGBC's Board of Directors, Vice-Chair of ASHRAE Standard 1891.1, the former Chair of ASHRAE's Thermal Storage Technical Committee, and on the Board of Director's of AHRI.

Mark M. MacCracken 是 CALMAC 製造公司的 CEO，其主要用於使用建築物的熱能存儲的非高峰冷卻。在公司工作近 40 年，他參與了各個方面事項，包括研發合同，專利，製造，營銷和財務。他於橡樹嶺國家實驗室，美國國家航空航天局和國家可再生能源研究實驗室（SERI）簽約為研究項目的首席研究員。

MacCracken 先生的公司已經涉及 37 個國家的 4,000 多個蓄熱系統。他擁有三項美國專利，是新澤西州的持牌專業工程師，並撰寫了大量技術文章。他曾擔任 USGBC 董事會 2011 年主席，ASHRAE 標準 1891.1 副主席，ASHRAE 熱存儲技術委員會前主席以及 AHRI 董事會成員。

Thermal Energy Storage and LEED
熱能儲存及 LEED

Presentation Abstract 演講摘要:

Thermal Energy Storage used for Off-Peak Cooling of buildings, has a long history around the world with over 7,000 commercial installations in 40 countries. By storing cooling at night, in the form of ice or chilled water, and using it during the day to cool the buildings, major reductions in on-peak electric demand and energy costs are realized. This talk will demonstrate the basic types of TES systems, how they save energy and reduce costs, how they relates to the LEED rating system and their relationship with renewable energy.

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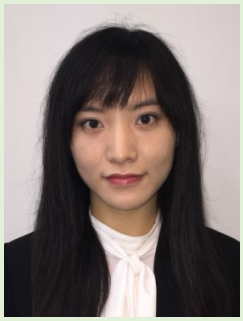
用於建築物非高峰冷卻的熱能儲存，在全球擁有悠久的歷史，已在 40 個國家擁有 7,000 多個商業設施採用。通過在夜間以冰或冷水的形式存儲冷卻，並在日間使用它來冷卻建築物，實現了峰值電力需求和能量成本的大幅降低。本演講將演示 TES 系統的基本類型，如何節約能源和降低成本，它們與 LEED 評級系統的關係以及它們與可再生能源的關係。。



Ms. Jessie Hu (胡靜霞 女仕)
BEng, Msc(IBTM), AMASHRAE
機械工程學士，理學碩士（智能建築技術與管理），美國供暖、製冷及空調工程師學會會員

Jessie was educated in Beijing and Hong Kong, majoring in Intelligent Building Technology and Management, which is also called Building Services. With the knowledge of Noise Control, Central Chiller System and DX System (Unitary AC & VRF), working experience in connection to other countries, Jessie has comprehensive thoughts and focuses on training young engineers with integrated considerations and solutions through hundreds of talks.
She had served as committee of ASHRAE Hong Kong Chapter for past three years. Now she also serves as Co-chair of ASHRAE Mainland Relations Committee.

胡靜霞於北京及香港接受教育，專業為智能建築技術與管理，亦稱之為屋宇裝備工程。由於她本人有噪音控制、中央水冷系統以及直膨系統（單式組裝空調 及 可變冷凍劑流量系統）方面的知識，與其他國家有關的工作經驗，使她的思維更全面。她專注於年輕工程師在整體考量和解決方案方面的培訓。
過去三年她均服務於 ASHRAE 香港分會，現在仍在內地關係委員會中任副主席。

Next Generation Refrigerant - R32 Performance
下一代冷媒 - R32 的特性

Presentation Abstract 演講摘要:

As the voice of environment protection and improving energy efficiency is getting louder and louder, at the same time the Kigali agreement has started from 2019, the good candidates of refrigerant have been selected instead of refrigerants with high GWP. This presentation shares the reasons why R32 becomes the most balanced choice from four aspects – environmental performance, efficiency, economic performance and safety. Service matters have also mentioned as a supplement. Together with all above mentioned, it indicates that R32 is the solution.

隨著環境保護和提升能源效益的呼聲越來越高，同時基加利協議也已從 2019 年開始生效，用以替代現在高溫室效應係數冷媒的替代品逐漸被推出。此次演講從四個方面闡述了為何 R32 冷媒成為最為合適的選擇——對環境友好、能效、經濟性以及安全性。相關安裝維修服務事項也進行了補充。綜合以上所有分析，R32 冷媒確實是個好的解決方案。

Dr. Ir Philip CH Yu (余中海 博士 工程師)
PhD, RPE, CEng, LEED-AP
博士，香港專業註冊工程師，英國特許工程師，LEED 專業人士

Dr. Philip Yu, environmental & applications engineering director of TRANEPACIFIC, has just received his Fellow Award from ASHRAE in January 2019 to acknowledge his distinction and substantial contributions in HVAC&R (heating, ventilating, air-conditioning and refrigeration), particularly in developing chillers with next-gen low GWP (global warming potential) refrigerant technology and pioneering green building concept since early 2000s. He has 30 years of professional experience in the HVAC&R field in Asia Pacific. He has been qualified as a Chartered Engineer (CEng, UK) since 1996, a Registered Professional Engineer (RPE, HK) since 1999.
Devoting most of his effort to energy efficiency especially for green buildings, Philip was appointed as Committee Member of China GBC (Green Building Council) since her inauguration on 31 March 2008. In the same area of interest, Philip has attained LEED-AP (accredited professional for Leadership in Energy and Environmental Design) of

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U.S. GBC in 2009 and GBL-Manager (eligible green expert for Green Building Label certification program) of China GBC in 2011. His other areas of interest include chiller technology, refrigerant piping design, and applications engineering for various air-conditioning systems such as low-temperature-low-flow, ice storage, geothermal heat pump, etc. He has given public presentations and talks in many countries including Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Thailand, Vietnam, and of course Greater China (i.e. Mainland China, Hong Kong and Taiwan). His publications include technical papers, application guides, books and engineering articles. Some publications are with high Citation Records and in international journals of high Impact Factor.

Philip is an active member of ASHRAE. He has served as the President of Hong Kong Chapter 1996-97, Regional Vice-Chair of Chapter Programs 1998-2001, Co-Chair of 2003 Asia Pacific Conference on Built Environment, General Chair for Chapters Regional Conference 2005, Governor of Hong Kong Chapter 2001-05, Chairman of the Technical Working Group for Energy 2006-10 with key contribution to local government's initiative in mandatory implementation of building energy code (i.e. Buildings Energy Efficiency Ordinance, Cap. 610). With a special task group of 25 members, Philip successfully published in 2011 the Chapter's first book "COOL Hong Kong" documenting the HVAC&R development in Hong Kong. This effort has been well recognized by the Society in light of 2012 ASHRAE Lou Flagg Award. In 2015, he served as the General Chair of Asia Pacific Conference for Built Environment held in Hong Kong.

Upon graduation from Building Services Engineering of the Hong Kong Polytechnic University in 1988, Philip received BSc(Hon) in Economics and Management from University of London in 1995. He obtained his PhD (doctor of philosophy) in 2001 also from the Hong Kong Polytechnic University.

余中海 博士·工程師,特靈公司亞太地區環保及應用技術總監，今年一月剛獲得 ASHRAE Fellow，成爲香港第八位獲得此殊榮的人，對他在 HVAC(暖通空調)技術領域，特別是研發新一代冷水機組和應用最新低碳環保冷媒技術方面，以及自 2000 年代初就開始推動的綠色建築理念等卓越貢獻加以肯定。余博士擁有 30 年的專業經驗，早於 1996 年便取得英聯邦皇家特許工程師(CEng)資格，1999 年成為香港專業註冊工程師(RPE)。

多年來致力於高效節能方面的研究，特別是綠色建築中的應用，余博士在 2008 年 3 月 31 日成立中國綠色建築與節能專業委員會(CGBC)當日獲國家建設部仇保興副部長親自委任為海外專家委員；而在同一技術領域，2009 年初獲取了美國綠建委 LEED-AP 專業資格，2011 年底取得 CGBC 的綠建認證師資格。其他專業技術範圍還包括冷水機組應用技術、冷媒管路設計和各種空調系統的應用，如低溫低流量系統、畜冰系統、地源熱泵系統等。余博士曾在許多國家和地區進行過公開演講、發表論文,包括印尼、日本、馬來西亞、南韓、新加坡、菲律賓、泰國、越南,當然還有中國內地、港澳和臺灣。已有多篇技術論文於國際期刊上刊登，其中包括高影響力(High Impact Factor)國際期刊，被引文次數非常多。

余博士也是 ASHRAE 一名積極的會員，曾任 1996-97 年度 ASHRAE 香港分會會長，1998-2001 年間擔任 ASHRAE 第十三區副主席專責技術活動。自 2001 年卸下區域副主席，他擔任香港分會理事的工作一直到 2005 年，並同時任 2003 年度建築環境亞太會議副主席、2005 年度 ASHRAE 第十三區年會主席，2006-2010 年間領導能源利用技術研究學組(TWG-Energy) ，曾為香港政府《建築物能源效益條例》(第 610 章)的立法工作作出貢獻。曾帶領 25 位專家並於 2011 年成功出版分會首本書，記錄了製冷空調在香港的發展及行業展望、機遇，其努力成果獲得總會確認並授予《ASHRAE Lou Flagg》獎項。2015 年他領導跨學會專業團隊，在香港成功籌辦了亞太區建築環境國際會議。

自 1988 年香港理工大學屋宇裝備工程專業畢業後，余博士繼續他的持續進修，於 1995 年取得英國倫敦大學(經濟與管理)榮譽學位，2001 年獲頒香港理工大學的博士(PhD)學位。

Presentation Abstract 演講概要:

Refrigerant Selection for Next-Gen Chillers

新一代冷水機組的製冷劑研發經驗分享

With enforcement of Kigali Amendment to the Montreal Protocol, countries around the world started phase-out/phase-down of high GWP refrigerants that has been used for decades by the HVAC industry. New refrigerants with low or ultra-low global warming potential (GWP) are emerging with increasing numbers and type of applications. Many are olefin-based (aka. HFO) but some become flammable if the GWP gets down to certain level. This presentation will share the experience of refrigerant selection for chillers, of which Trane/IR has been leading in next-gen chiller R&D throughout the AHRI program for low-GWP alternative refrigerants evaluation.

隨著《蒙特利爾條約》基加利修訂案正式生效和實施，全球許多國家開始了對全球暖化潛力（GWP）較高的製冷劑進行管制，逐步下降、淘汰，其中包括行界沿用多年的 HFC 類製冷劑。新型製冷劑大多是低或極低 GWP 的，且數量和應用範圍不斷增長，其中不少為含烯烴類（Olefin，或通稱 HFO）的製冷劑。不過，當 GWP 值的要求下降至某程度，有些

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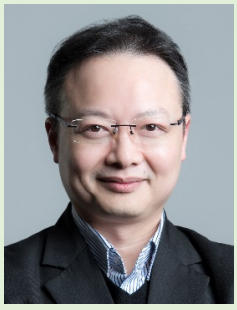
熱能儲存及 LEED, 下一代冷媒 - R32 的特性,

新一代冷水機組的製冷劑研發經驗分享, 既有建築重新校驗的挑戰

製冷劑卻會變得易燃。此簡報分享新一代冷水機組在選用新型製冷劑方面的一些研發經驗，而這方面 Trane/IR 為業內認同在 AHRI 低 GWP 替代冷媒研究計劃中領先的。

Dr. Benny CHOW (周家明 博士)
Director of Sustainability at Aedas
Co-Chair Sustainability Committee, ASHRAE Hong Kong Chapter
Aedas 董事(環保設計)，ASHRAE 香港分會可持續發展委員會副主任
PhD, MASHRAE, LEED AP BD+C, GB Faculty, BEAM Pro, WELL AP
博士，美國供暖、製冷及空調工程師學會會員，LEED 專業人士, 綠色建築專家，綠建專才，WELL 認証專家

Dr. Benny Chow is the Director of Sustainability at Aedas, focusing on the sustainable building design, building physics, Green-BIM and healthy building studies. Dr. Chow is appointed as the committee member of the LEED Data Centers Advisory (China) Committee, Chinese Society for Urban Studies Green Building Committee, Shenzhen Building Science & Technology Committee, the Directors of the Hong Kong Green Building Council, and the BEAM Society Limited. Dr. Chow also is the co-chairman of the Sustainability Committee of the ASHRAE Hong Kong Chapter. Besides, Dr. Chow was appointed as an Honorary Associate Professor in the HKU Department of Mechanical Engineering, the Adjunct Associate Professor of the CUHK Institute of the Earth and Space Information Science and is currently the Adjunct Assistant Professor of the Faculty of Medicine at CUHK focusing on health-related built environment research.



周家明博士是 Aedas 的董事(環保設計)一位屢獲殊榮的綠色建築設計、建築物理、綠 BIM 和健康建築的專家，項目經驗遍布世界各地。周博士同時爲 LEED 數據中心顧問(中國)會委員專家委員、中城科綠建委委員和綠建評審專家、深圳市建設科學技術委員會專業委員會委員、香港綠色建築議會和建築環保評估協會董事局成員，ASHRAE 香港分會可持續發展委員會副主任。周博士原爲香港大學機械工程學系名譽副教授、香港中文大學太空與地球科學研究所客座副教授，現爲香港中文大學醫學院客座助理教授，專注健康建築的研究。

Presentation Abstract 演講概要:

Going All In – The Challenges of Retro-Commissioning for Existing Building (System Health Check, Diagnostics, Re-tuning and Retrofitting)
全力以赴 - 既有建築重新校驗的挑戰 (系統健康檢查、診斷、重新調整和改造)

Retro-commissioning (RCx) is a systematic process to periodically check an existing building's performance to identify operational improvements that can save energy and in-turn lower energy bills and improve indoor environmental quality. Comparing to the Energy Audit, RCx is more focused on checking whether the energy consuming equipment/ systems operate properly as per design or user requirements, and to identify areas of improvement (e.g. shifting of system control settings, inaccurate sensors, improper operational schedules and improper air & water balancing, etc.).
The technical talk will cover the following topics, including the business model and financial incentive of RCx, knowledge-based energy management, procedures on conducting RCx, energy saving opportunities and providing healthy and comfortable indoor environment for occupants, and the sharing of business case studies. Hence, we are going all in on transforming all the existing building stocks to be high performance green buildings!

重新校驗 (RCx) 是一個具成本效益的系統性測試過程，用作適時檢查現有建築物的效能表現，以找出操作時可優化節能的地方，從而減低能源費用和提高室內環境質量。重新校驗着重於檢查能耗設備或系統是否依照設計或用戶需求下正常操作，並從中確定優化空間（例如系統控制設定偏移，傳感器不準確，不當操作日程表和配風與輸水系統配置等）。
本技術講座將涵蓋以下主題，包括 RCx 的商業運作模式和財務鼓勵，知識型能源管理，進行 RCx 的程序，能源管理機會和為用家者提供健康舒適的室內環境，以及案例研究分析共享。因此，我們將全力轉變所有既有建築，締造未來成為高性能綠色建築！

Organizers 主辦單位:

ASHRAE Hong Kong Chapter ASHRAE Macao Chapter

Supporting Organizations 支持單位:

澳門工程師學會 ASSOCIAÇÃO DOS ENGENHEIROS DE MACAU THE MACAU INSTITUTION OF ENGINEERS

MARCC 澳門空調制冷商會 Associação Comercial de Ar-Condicionado e Refrigeração de Macau Macau Air-Conditioning & Refrigeration Chamber of Commerce

ASE 澳門特種設備協會 ASSOCIAÇÃO DE EQUIPAMENTO ESPECIAL DE MACAU SPECIAL EQUIPMENT ASSOCIATION OF MACAO

澳門機電從業員協會 Associacao dos Profissionais de Electromecanica de Macau Macau Electrical & Mechanical Professionals association

中國綠色建築與節能(澳門)協會 China Green Building and Energy Saving (Macau) Association

澳門物業設施管理協會 Macau Properties and Facilities Management Association

SOE 中國機械工程學會 港澳會員聯絡專員辦公室 CMES Liaison Officer Membership Office (Hong Kong and Macau)

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Date & Time	:	14 June19 (Friday) 2:00pm – 5:30pm	**Registration**	:	1:15pm – 1:50pm
Assembly Point	:	Studio City, Level 3, Grand Ball Room No. 3（新濠影匯 - 3 樓 - 3 號大宴會廳）