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Newsletter

May 2021 • Volume 3 (2020-2021)

ASHRAE THAILAND CHAPTER

President Message Newsletter #3 – 2020-2021

เรียน ท่านสมาชิก ASHRAE ประเทศไทย และเพื่อนๆ ทุกท่าน

วารสารฉบับนี้ เป็นฉบับที่สอง สำหรับวารสารการทำงานของ ASHRAE 2020-2021 ครับ ณ ขณะนี้ สถานการณ์โควิดในบ้านเราก็ก่อการระบาดระลอกใหม่อีกแล้ว โดยการระบาดครั้งนี้มีความรุนแรงมากขึ้นเรื่อยๆ ครอบคลุมไปทั่วประเทศเรียบร้อยแล้ว ปริมาณผู้ติดเชื้อเพิ่มสูงขึ้นเป็นหลักพันแทบทุกวัน ส่งผลทำให้ทางรัฐบาล จำเป็นต้องยกระดับมาตรการป้องกันควบคุมโรค เพื่อลดการแพร่ระบาดเป็นวงกว้างอย่างน้อย 2 สัปดาห์ ดังนั้น ในช่วงนี้ ควรงดเดินทางออกนอกพื้นที่ หรือหลีกเลี่ยงที่จะไปในที่ที่มีคนพลุกพล่าน และ หากสามารถทำงานแบบ Work From Home ได้ ก็จะเป็นเรื่องที่ดีมากเช่นกัน อย่างไรก็ตาม เรื่องของการดูแลในเรื่องสุขอนามัยของตนเอง รวมไปถึงบุคคลในครอบครัวจึงเป็นเรื่องสำคัญมาก เราจะละเลยในเรื่องนี้ไม่ได้ เพราะเรายังคงต้องอยู่กับเรื่องโควิดนี้อีกนานอย่างแน่นอน



สำหรับในช่วงเดือนที่ผ่านมา ทาง ASHRAE ประเทศไทย ก็ได้จัดกิจกรรมต่างๆ มากมาย สำหรับสมาชิก เช่น Virtual Webinar ในหัวข้อที่น่าสนใจและเป็นเทรนของโลกในขณะนี้ อาทิเช่น

- เรื่อง “Testing Adjusting and Balancing (TAB) – HVAC” โดยวิทยากรคือ Mr. Ross Montgomery (DL จาก ASHRAE)
- เรื่อง Conducting a Commissioning Kickoff Meeting” โดยวิทยากรคือ Mr. Dennis Knight (DL จาก ASHRAE)
- และในเดือนพฤษภาคม 2564 เป็นต้นไป ASHRAE ประเทศไทย ก็ยังมีกิจกรรมเพิ่มเติมอีก ดังต่อไปนี้
- สัมมนา ครั้งที่ 2: วันพฤหัสบดีที่ 20 พฤษภาคม 2021 หัวข้อ “Energy analysis and modelling with software” โดย วิทยากรคือ ดร. วิวัฒน์ และ ทีมงาน SCG

- เยี่ยมชมฐาน: โรงงานผลิตคอมพิวเตอร์ Britol บ. กุลธร วันอังคารที่ 8 เดือนพฤษภาคม 2021

• สัมมนา ครั้งที่ 3: วันพุธที่ 16 มิถุนายน 2021 เวลา 9:00-16:00 หัวข้อ Smart Building, Smart City + 5G Technology โดย วิทยากรคือ รศ.ดร.พันธุ์ตา และ ทีมงาน

- Virtual Seminar: วันศุกร์ที่ 11 มิถุนายน 2021 เวลา 19:00-21:00

• หัวข้อ 1: Myth or Reality - “Facing the Realities & Challenges in Sustainability & Energy Efficiency” - Bridging The Gap In Performance From Concept Through Operations - Design, Construction, Operations & Maintenance Measures for Improving Performance of Buildings

- หัวข้อ 2: Operation & Maintenance Measures for Improving Performance of HVAC Systems & chiller plants โดยวิทยากรคือ

Dr. Om Taneja (DL จาก ASHRAE)

สำหรับวารสารฉบับนี้ ยังมีเรื่องราวที่น่าสนใจอีกหลายเรื่อง อาทิเช่น

- เรื่อง Technology Trends to Prepare For In 2021
- เรื่อง ASHRAE VIRTUAL ANNUAL CONFERENCE, June 28-30, 2021
- เรื่อง ASHRAE Epidemic Task Force Releases Updated Airborne Transmission Guidance
- เรื่อง ASHRAE: Healthcare Design and Data Center Training
- เรื่อง Analyzing How Data Centers Can Better Recycle Waste Heat
- เรื่อง An Organic Material For The Next Generation Of HVAC Technologies

สุดท้ายนี้ ขอให้ทุกท่าน รักษาสุขภาพ และ ติดตามความคืบหน้าของสถานการณ์โควิดเป็นระยะ จนกว่าทุกอย่างจะคลี่คลาย ด้วยความปรารถนาดีจาก ASHRAE THAILAND CHAPTER

ท่านสามารถติดตามข่าวสาร ASHRAE Thailand chapter
จะมีการจัดกิจกรรมต่างๆ ได้ที่



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ขอแสดงความนับถือ

ดร. รัชนี ธีรวัฒน์พรกุล

Dr. rapeerat thanyawatpornkul

President 2020-2021 ASHRAE Thailand Chapter

INSIDE ISSUE

- | | |
|--|---|
| 1 President Message | 5 ASHRAE Global Training Center Offers Healthcare Design and Data Center Training |
| 2 ASHRAE and CIBSE Sign Strategic Partnership Agreement | BANGKOK RHVAC 2021 |
| 3 ASHRAE VIRTUAL ANNUAL CONFERENCE | 6 Analyzing How Data Centers Can Better Recycle Waste Heat |
| 4 ASHRAE and UN Environment Programme Launch Three-Year Workplan | 7 An Organic Material For The Next Generation Of HVAC Technologies |
| 5 ASHRAE Epidemic Task Force Releases Updated Airborne Transmission Guidance | กิจกรรมของสมาคมแอสเอ และ ASHRAE Thailand Chapter ปี 2021 |
| | 8 ขอบคุนบริษัทสเปซเซอร์ผู้สนับสนุนปี 2020-2021 |

ASHRAE and CIBSE Sign Strategic Partnership Agreement

ATLANTA (December 15, 2020) – ASHRAE and the Chartered Institution of Building Services Engineers (CIBSE) have signed a Strategic Partnership Agreement (SPA) formalizing the organizations' relationship.

The Strategic Partnership Agreement (SPA) was signed by Charles E. Gullledge III, P.E., 2020-21 ASHRAE President and Stuart MacPherson, CIBSE President, during a virtual signing ceremony on December 10. The agreement outlines how ASHRAE and CIBSE will work cooperatively on activities that serve their respective memberships, to promote the advancement of a more sustainable built environment through HVAC&R technologies and their applications.

Areas of collaboration include:

- Joint initiatives aimed at accelerating the progression of digital technologies and research.
- Virtual design and construction to improve the resilience of buildings and the health of occupants in an increasingly challenging climate.
- Coordinated promotion of joint grassroots meetings and conferences.

- Advocacy and work on common public affairs goals and ideologies.
- Consistent leadership communication
- Publication development and distribution.
- Education and professional development co-development and cross marketing.

"Our continued collaboration with CIBSE provides a meaningful opportunity to coordinate efforts on innovative technologies and resources to advance the growth of the built environment," said Gullledge. "We value this partnership with CIBSE and are excited to leverage this collaboration to move the industry and buildings towards a more sustainable future."

"We are delighted to sign this agreement with ASHRAE and strengthen the long-standing relationship between our organizations," said MacPherson. "The increasing local and global challenges of maintaining safe, healthy and efficient built environments marks this as a particularly auspicious time to share knowledge and expertise to enhance our offerings for the benefit of both our members and wider society."

Technology Trends to Prepare For In 2021

We're living in a time of rapid change. Technology trends, as a result of the COVID-19 pandemic, are allowing for more efficient workplace environments. As the engineering industry is characterized by innovation and progression, the digital revolution is transforming the field as we know it.

So, what are some of the latest trends that engineers should aware of?

1. Artificial Intelligence

Artificial Intelligence (AI) involves using computer systems to perform tasks, normally requiring human intelligence or physical input. It has already gained attention in recent years, being utilized in computer search engines, medical diagnosis, handwriting recognition, and much more.

Predicted to grow to an AUD \$250 billion industry by 2025, the proliferation of AI is happening rapidly and will continue to act as a main technological innovator for the foreseeable future. Furthermore, AI-specific roles were mentioned as one of the top 15 emerging jobs for 2020 with 74% annual growth. If you're considering entering the AI field, 2021 will be the year to make a move.

2. Virtual Reality and Augmented Reality

Virtual Reality (VR) immerses a user in an environment while Augmented Reality (AR) enhances the environment. Despite being primarily used for gaming in its early stages, it is beginning to be used for training in some industries.

In 2021, we can expect these technologies to be further integrated into our lives. VR and AR have potential in training, entertainment, education, marketing and much more. From training doctors for surgery to enhancing customer experience, there will be an increasing demand for knowledge in these technologies.

Furthermore, it is predicted that the engineering industry will derive great benefits from the adoption of VR. According to VR statistics for 2020, the implementation and development of VR in engineering can reduce model design time by 10%, and construction time by 7%.

3. Internet of Things (IoT)

The Internet of Things (IoT) is one of the biggest technology trends to emerge recently. Modern creations are increasingly being built with Wi-Fi connectivity, meaning they can be connected to the Internet – and each other. The Internet of Things (IoT) is the future, enabling devices, appliances, cars, and much more to be connected using the Internet.

Industry has a lot to gain from the implementation of the IoT, enabling for better safety, efficiency and decision making. It can enable predictive maintenance, enhance medical care and improve customer service, for example.

Predictions suggest that by 2030, around 50 billion IoT devices will be in use around the world, interconnecting anything from smartphones to ovens. IoT will transform our society in the coming years, so now is the time to get ahead of the learning curve.

4. 5G

You are most likely already familiar with 3G and 4G technologies. They enable us to browse the Internet, use data services, stream music, and so much more. However, 5G services are expected to revolutionize our daily lives.

By enabling services that rely on advanced technologies, 5G has the potential to make our lives smarter, safer, and more efficient. It is expected to be used in factories, safety, traffic management, smart grid control, and much more.

Just about every telecom company is now working on creating 5G applications, expecting to launch worldwide in 2021. Aside from the increased speed, 5G's low latency will be fundamental to furthering upcoming technology trends, especially IoT.

5. Digital Twins

Digital twins are virtual models of real products, processes, or services. This technology allows the secure transmission of data between the virtual and real-world, monitoring objects' behavior and predicting various outcomes.

Digital twins benefit industrial processes by reducing asset downtime and lowering overall maintenance costs, making them extremely valuable in the future of industry. Gartner predicts that almost half of the world's large industrial organizations will be using digital twins to improve productivity by 2021.

In the coming years, we will see digital twins expand to more applications, use cases and industries, combining with other technology trends to further the digital transformation.

6. Edge Computing

Predicted to grow to \$250.6 billion by 2024, edge computing is a networking philosophy that focuses on bringing computing as close to the data source as possible. It makes the approach much more powerful and efficient than the cloud itself.

The rise of edge computing is mainly accredited to the growing IoT devices connecting to the Internet. Edge computer allows generated data from these devices to be processed closer to its source, rather than sending it across storage networks.

With the growing capabilities of edge systems, 2021 might be the year that edge computing will replace traditional cloud computing infrastructure.

7. Robotics, Drones, and Vehicle Automation

Advances in machine learning and automation are ushering in the new age of digital assistants. In 2021, drones, automated vehicles, and robots will be further integrated into our daily lives, seamlessly assisting in transportation, communication, and productivity.

Within industry, robotics has changed the way we work. Sensors combined with cloud-based applications enable robots to react to changes in the environment, allowing them to perform tasks previously belonging to human workers. Many factories are now fully autonomous, with minimal human interaction.

These technology trends have even made their way to more rural areas. AI-powered drones help farmers keep a wide eye on their infrastructure, such as using thermal imaging to identify potential leaks.

Back in the city, autonomous vehicles are coming all the more common. Transforming mobility and logistics, self-driving cars use technology to improve traffic safety and efficiency. This benefits both consumers and commercial operations by making transportation more accessible.

The increasing incorporation of robotics, drones, and vehicle automation will see an increasingly autonomous and digital society. Furthermore, these drastic industry developments mean all the more employment opportunities and a career within a quickly growing sector.

These are just some of the top technology trends that will be present in 2021. As we can see around us, technology has already become our present-day reality. This technological influx is only going to increase with every passing day. Prepare for the changing future with a qualification in Industrial Automation from the Engineering Institute of Technology (EIT).

What technology trends do you think we will see next year?



ASHRAE VIRTUAL ANNUAL CONFERENCE

▶▶▶▶ June 28-30, 2021

The 2021 Annual Conference originally scheduled to be held June 26-30, 2021 in Phoenix, AZ is now going to be held online in a virtual format. The conference will include a mixture of live and on-demand technical and interactive sessions that will take place Monday, June 28-30, 2021.

TECHNICAL PROGRAM

The 2021 Virtual Annual Conference will begin on Monday, June 28 at 12:00 PM EDT, and will end on Wednesday, June 30 at 6:00 PM. On-demand seminars and conference papers will be made available at the start of the conference, and the live portion will contain a mix of standalone and concurrent sessions, similar to the schedule of the 2021 Virtual Winter Conference.

The 2021 ASHRAE Annual Conference technical program is comprised of seven tracks, selected to represent areas of focus common among ASHRAE membership.

Track	Description	Track Chair
1	Fundamentals and Applications: Fundamentals are the foundation for understanding applications in engineering. Key components of ASHRAE fundamentals include thermodynamics, psychometrics, fluid and mass flow. This track provides opportunities for papers and presentations of varying levels across a large topic base. Concepts, design elements and shared experiences for theoretical and applied concepts of HVAC&R design are included.	Sonya Pouncy sonyapouncy@gmail.com
2	HVAC&R Systems and Equipment: HVAC&R Systems and Equipment are constantly evolving to address the changing requirements of the built environment. Papers and programs in this track will focus on the development of new systems and equipment, improvements to existing systems and equipment and the proper application and operation of systems and equipment.	Rupesh Iyengar rupesh_iyengar@yahoo.com
3	Research Summit: Active research, and the exchange of those research findings, are critical to the development of our HVAC&R industry and built environment. The 8th annual research summit invites researchers to share those results, including ASHRAE-sponsored research and research of interest to the ASHRAE community. Researchers are invited to present papers, extended abstracts, seminars, forums or participate in panel discussions. The Research Summit includes a partnership with ASHRAE's archival journal, Science and Technology for the Built Environment.	Kristen Cetin cetinkri@msu.edu
4	Professional Development: As members of a professional organization, we not only participate for the great value of technical exchange, but also the interpersonal exchange. We recognize that the single greatest strength of our organization is its membership. This track is designed to allow those professionals an opportunity to develop in the areas of presentation skills, leadership, team-building, understanding various business operations, interpersonal skills, etc. In short, the Professional Development Track will cover all aspects of business outside of engineering/technical applications and lends itself to interactive session types such as workshops and forums.	Marites Calad mcalad@norman-wright.com
5	Design, Control, and Operation of Critical Environments: Critical environments often present design, control, and operation challenges that require innovation, attention to detail, and a thorough understanding of the intended operational parameters. This track includes innovative designs and strategies that adapt to the standards and special requirements presented by healthcare, cleanrooms, data centers, laboratories, isolation rooms, and pharmacies. Papers and presentations will also address how controls systems, smart building technologies, and security systems and other technologies are adapting to the emerging needs of critical environments.	Raul Simonetti raul.simonetti@carel.com
6	HVAC&R for Indoor Plants & Animals: This track addresses HVAC&R systems design for controlled environments that host plants & animals. Papers and programs in this track will present the challenges and opportunities associated with energy and water utilization for indoor growing spaces, including standards and regulations that guide the design of plant & animal habitats. Environmental parameters for indoor agriculture, including controlling temperature, humidity, air movement, air quality will be covered. This track will also address reducing consumption of energy & water and compare how crop types and animal species impact HVAC analysis and design.	Ryan MacGillivray ryan.macgillivray@dwel.com
7	Future Proofing - Renewable, Regenerative, and Resilient: The HVAC&R industry faces many challenges including climate change, pandemics, natural disasters, catastrophic accidents, and terrorism. Rising to meet these challenges are a host of technologies and strategies, including grid-enabled buildings, demand response, decarbonization, resiliency, zero energy design, energy-efficiency and renewable energy systems. This track invites papers, abstracts, seminars and forums that highlight the innovative technologies and strategies that are reimagining our relationship with the built environment now and into the future.	Andy Cochrane acochrane@industria

Live Sessions Available for Attendees Across the Globe!

Several technical sessions have been scheduled strategically so registered attendees from around the globe can participate in live sessions during their core work hours! Sessions scheduled at 7:00 a.m. EDT are perfect for attendees joining live from the Middle East, Europe and Africa. Sessions scheduled at 7:00 p.m. EDT are perfect for US West Coast attendees as well as people joining live from Asia and Oceania!

	Middle Eastern, European, African Audiences	US West Coast, Asian and Oceanian Audiences
Tuesday, June 28		1. Impact of IoT on Building Controls 2. Plant and Animal Environments: What Makes Them So Unique?
Wednesday, June 29	COVID-19 Particle Removal by Air Filter Devices	Reducing Ozone: A Critical Factor in Improving IAQ
Thursday, June 30	Development of Reference Building Information Model (BIM) Test Cases for Improving Usage of Software Interoperability Schemas	



Interactive Technical Panels and Forums

All Technical Panels and Forums will be presented via Zoom. Attendees will be able to unmute themselves and turn their webcam on to ask questions during these sessions as well as use the chat box feature.

Panel topics include:

- The Efforts of ASHRAE Chapters to Help Reduce Risks of COVID-19 Transmissions
- Importance of Achieving Verified Net Zero Goals
- Lessons Learned from Adapting BAS to Meet Changing Requirements
- What Indoor Farmers Need and Want from their HVAC System
- Controlled Environment Agriculture and the Future of Secure and Sustainable Food Production

Forum topics include:

- Post Pandemic Resiliency Measures for Transportation Facilities
- Is there a Magic Formula for Combining Multiple Air Cleaning Technologies to Improve Air Quality?

**Non-members receive a one free year of ASHRAE membership. Benefits include a revised copy from the four-volume ASHRAE Handbook series, Access to the ASHRAE Handbook Online and more!*

***Receive between 15-25% discount off the Member rate per person when registering for a Company Package! The more employees you register, the greater the savings!*

Registration includes:

- More than 50 sessions presented live, including sessions scheduled for live participation from attendees in different time zones across the globe.
- Sessions addressing the latest information relating to the COVID-19 pandemic, as well as eight other tracks.
- Meeting of the Members providing updates from Society leaders and 2021-2022 ASHRAE President Mick Schwedler's Society Address.
- Live 60-minute forum and panel sessions with interactive participation.
- Opportunities to interact with fellow attendees in 30-minute round table discussions and social meet ups throughout the conference.
- Recognition of award recipients of ASHRAE's most prestigious Society awards.
- Downloads of conference proceedings. Includes technical papers, conference papers and extended abstracts.
- Access to the Research Summit which includes more than ten, 60-minute Conference Paper Sessions presented in PechaKucha-style, with live Q&As with paper authors.
- All live sessions will be recorded and available on-demand until December 30, 2022.
- Over 80 additional on-demand sessions accessible on your terms for 18 months.

Registration will open soon!

Registration Fees for 2021 Virtual Annual Conference	Rate
ASHRAE Member	\$ 285.00
Non Member*	\$ 505.00
Student Member and Student Branch Advisor	\$ 25.00
Student Non Member	\$ 60.00
Speaker	\$ 75.00
Life Member	\$ 75.00
Company Package (3-5)	\$ 1,215.00
Company Package (6-10)	\$ 2,280.00
Company Package (11-20)	\$ 4,275.00

ASHRAE and UN Environment Programme Launch Three-Year Workplan

ATLANTA (April 15, 2021) – ASHRAE and the United Nations Environment Programme (UNEP) announced the launch of its 2021-23 workplan. The workplan's theme is "Refrigeration Management for Developing Economies" and was signed by Charles E. Gullledge III, P.E., 2020-21 ASHRAE President and James S. Curlin, Acting Head of UNEP OzonAction Programme.

In 2007, ASHRAE and UNEP OzonAction, signed an agreement aimed at promoting the adoption of state-of-art technologies and practices in developing countries, that avoid the use of ozone depleting substances and promote the deployment of lower global warming potential (Lower-GWP) refrigerants. The two global organizations also worked to offer tools and knowledge to help in eliminating emissions of refrigerants while servicing refrigeration and air conditioning applications. Both parties renewed their commitment of the continuing strategic partnership through a new umbrella MOU signed in 2019, replacing the original 2007 agreement. This is the fifth joint workplan.

The theme of the workplan recognizes the important role that refrigeration and air conditioning play in developing countries both in terms of societal benefits, ranging from protecting the food supply and vaccine storage to cooling for increased comfort and productivity, as well as environmental goals, including compliance with international commitments. The workplan emphasizes the deployment of all ASHRAE-UNEP developed tools and programs, to make them reachable and accessible to different stakeholders in developing countries.

"One of the most important elements of ASHRAE's work plan with UNEP is our collective ability to contribute meaningful resources to the critically important challenge of shifting to the use of refrigerants with lower global warming potential," said Gullledge "We are delighted to continue our work with UNEP as we share knowledge and expertise to prioritizing the adoption of energy efficient solutions that lessen the impact of ozone depletion."

"By offering a suite of state-of-art products and services, UNEP OzonAction and ASHRAE are helping to connect industry and policy-makers in developing countries to enhance environmental performance in the critical refrigeration and air conditioning sector. This partnership helps those countries meet their international commitments and ultimately to realize the Sustainable Development Goals (SDGs)," said Curlin. "The successful ASHRAE-UNEP cooperation model has helped us, UNEP OzonAction, to build similar meaningful partnerships with other organizations and associations."

All ASHRAE-UNEP products and services included in the joint workplans are offered free of charge and are accessible to National Ozone Units (NOUs) and certain refrigeration and air conditioning sector stakeholders in developing countries through ASHRAE and UNEP OzonAction.

To view the complete work plan, please visit <https://www.ashrae.org/professional-development/ashrae-unep-portal>

ASHRAE Epidemic Task Force Releases Updated Airborne Transmission Guidance

ATLANTA (April 5, 2021) – The ASHRAE Epidemic Task Force released an updated, unequivocal statement on the airborne transmission of SARS-CoV-2 in buildings.

ASHRAE has released the following statement:

“Airborne transmission of SARS-CoV-2 is significant and should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems, can reduce airborne exposures.”

It replaces the April 2020 statement that said airborne transmission was “sufficiently likely” that airborne precautions should be taken. At that time both, the World Health Organization (WHO) and the Centers for Diseases Control (CDC), contended that transmission of SARS-CoV2 was by droplet and fomite modes, not airborne. Subsequently, both have acknowledged the risk of airborne transmission indoors.

“This may seem like a small step, but we feel it is important to leave no doubt about our position, given the muted support for ventilation and filtration as important tools in the effort to stop the pandemic, from some organizations that should be leading more strongly,” said William P. Bahnfleth, Ph.D., P.E., ASHRAE Epidemic Task Force chair.

The ASHRAE Epidemic Task Force has been developing and disseminating guidance for the control of airborne transmission of SARS-CoV-2 since its formation in March 2020.

“ASHRAE volunteers have played a huge role in evaluating evidence and developing detailed guidance to improve indoor environmental quality,” said Bahnfleth. “The public, globally, is benefitting from the volunteer efforts of some of the most knowledgeable scientists and engineers in our field and this updated guidance is proof of it.”

To view the complete airborne transmission statement and other COVID-19 resources, visit ashrae.org/COVID-19. Questions specific to Epidemic Task Force guidance can be emailed to covid-19@ashrae.org

ASHRAE Global Training Center Offers Healthcare Design and Data Center Training

ATLANTA (April 7, 2021) – The ASHRAE Global Training Center will offer two courses to address the rapidly evolving needs of healthcare facilities and data centers.

“Today’s data center environments and healthcare facilities are faced with ever-increasing challenges, including the protection sensitive data and reducing the risk of infectious disease spread,” said Ayah Said, ASHRAE Global Training Center manager. “ASHRAE Global Training Center is pleased to provide timely, practical training on these topics along with some many others, with concepts that are applicable to a variety of building projects.”

High Performance Healthcare Facilities Design:

Complying with ANSI/ASHRAE/ASHE Standard 170-2017 (MENA), covers general and specific requirements of HVAC design of hospital rooms including airborne infectious isolation rooms, protective isolation rooms, operating rooms, emergency departments, Intensive Care units, pharmacies, psychiatric and sterile processing departments, and infection control risk assessment. The course addresses the role of HVAC systems in reducing Hospital Associated Infections (HAI), explaining airborne versus contact transmission and offers best practices of HVAC design, along with the complexities of designing renovations in operating hospitals. This course is included on the preparatory list for those seeking to sit for the ASHRAE Healthcare Facility Design Professional (HFDP) Certification Exam.

Two Part Virtual Training

Part I – Monday, 24 May 2021 | 4:00 PM to 7:00 PM GST
Part II – Tuesday, 25 May 2021 | 4:00 PM to 7:00 PM GST
Fee: \$284 (\$218 ASHRAE Member)

Designing & Operating Data Centers for the Internet of Everything:

Mitigating Risk & Optimizing Performance, examines data center best practices by focusing on ASHRAE’s evolving thermal guidelines for data processing environments, telecommunications, and actual high-density data centers in operation today. The course focuses on guidance from ASHRAE Technical Committee 9.9, Data Center Networking Equipment – Issues and Best Practices and challenges participants to gain an understanding of equipment trends, performance measurements, and effectiveness as critical principles of data integrity.

Two Part Virtual Training

Part I – Wednesday, 26 May 2021 | 4:00 PM to 7:00 PM GST
Part II – Thursday, 27 May 2021 | 4:00 PM to 7:00 PM GST
Fee: \$284 (\$218 ASHRAE Member)

Developing economy fees as well as group registrations are available. To register for these courses and for more information about all ASHRAE Global Training Center training offerings, please visit ashrae.org/globaltrainingcenter or contact Ayah Said at asaid@ashrae.org.

BANGKOK RHVAC 2021
Bangkok E&E 2021

ONE STOP SOLUTIONS

งานแสดงสินค้า เครื่องปรับอากาศ และเครื่องทำความเย็น

1-4 กันยายน 2564
Trade Day 1-3 SEP 2021 Public Day 4 SEP 2021

10.00 - 18.00 น. ณ ไบเทค บางนา

Organized by **DITP**

Co-Organized by

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ASHRAE Thailand Chapter ขอเรียนเชิญท่านผู้สนใจ นักวิชาการและวิศวกรเทคโนโลยีเครื่องปรับอากาศ และเครื่องทำความเย็นได้ในงาน BANGKOK RHVAC 2021 ในวันที่ 1-4 กันยายน 2564 นี้ ณ ศูนย์แสดงสินค้า BITEC บางนา

Analyzing How Data Centers Can Better Recycle Waste Heat

Cost and distance are significant challenges when reusing waste heat from data center cooling systems. In Denmark, Facebook has secured a tie-up between its third facility and the local district heating company to recycle warm air extracted from the “hot aisle” of the data center. The following article presents more details on this issue.

Waste heat warms up

Re-using waste heat from servers is not a new idea, but it remains mired in challenges

By Graeme Burton

When Facebook was looking to Denmark as a key location in its network of global data centers, part of the brief for the designers was to maximize every possible aspect of sustainability. One item on that list was the idea of reusing waste heat from data center cooling systems – a proposal that has excited interest for some time, but has often foundered on the practical realities of implementation.

It doesn't take complex technology to convert waste heat into something useful. The challenge is the expense, combined with the fact that data centers are often a long way from the locations that can actually do something useful with their second-hand energy.

But that's changing, and Facebook is just one high-profile proponent, along with Amazon Web Services, Google, and others. In Denmark, Facebook was able to secure a tie-up between its third facility, in Odense, and the local district heating company, Fjernvarme Fyn, to recycle warm air extracted from the ‘hot aisle’ of the data center.

“The warm air is directed to our cooling units. This warm air is directed over a coil – cold water comes in, the air heats up the water, and the warm water is then piped across the street to the heat pump,” says Lauren Edelman, energy program manager at Facebook.



Once the air reaches Fjernvarme Fyn the temperature is boosted using a heat pump – powered by renewable energy – before the water is delivered into the district heating network.

This scheme is expected to recover some 100,000-megawatt-hours of energy per year, which Facebook estimates will warm around 6,900 homes.

The drive behind such sustainability initiatives comes after 10 to 15 years of technology companies and data center operators pushing the power usage effectiveness (PUE) down from above two – the US average is around 2.5 – to figures ever-closer to one, says S&P Global Market Intelligence senior research analyst Daniel Bizo.

Improving PUE means data centers consume less energy. Reusing their waste heat is an additional benefit, but it needs infrastructure. And, while the European Union has been pushing district heating schemes as an environmentally friendlier alternative to electric or gas central heating, these are not widely used outside of Germany, Scandinavia (excluding Norway), and a handful of other places.

The difficulty of finding alternative uses for data centers' waste heat is illustrated by Google's latest data center opening in Middenmeer, the Netherlands.

While the company claims it has been able to radically slash power consumption per unit of compute power in its data centers, compared to the data centers it opened less than ten years ago, its waste heat re-use at Middenmeer doesn't currently extend any further than helping to heat the office space at the data center for its 125 employees.

Staying cool

Erik Barentsen, a senior policy officer, energy and sustainability, at the Dutch Data Center Association notes that there are basically three main forms of data center cooling. The first one, direct air cooling, “is not really applicable for recovering waste heat,” says Barentsen.

“The second is where you have computer room air conditioning, in which the air in the IT room is chilled,” he adds. With servers arranged in ‘cool’ and ‘hot’ aisles, the exhaust air can be extracted, run through a heat exchanger and returned to the cool aisles, helping to lower air conditioning costs, as well as extracting heat for re-use.

However, the typical exhaust heat from an ordinary air-cooled data center is only between about 25 degrees and 35 degrees celsius, he adds, limiting its value without the addition (and expense) of a heat pump to boost its temperature.

The third system, says Barentsen, is by deploying liquid cooling. “Liquid cooling can be done either through immersed technology, where the whole system is immersed in oil and the oil itself is conditioned to a certain temperature, or you can use a closed-loop liquid cooling system,” he says.

The main benefit of liquid cooling, adds Andy Lawrence, executive director of research at the Uptime Institute, is that servers can be run hotter and harder, while higher exhaust temperatures widens the scope for re-use. Using liquid cooling, server racks can be also more densely packed.

“The exhaust heat is going to come out piping hot – above 50 degrees Celsius would be quite common – and using it for hot water or heating would make a lot of sense,” says Lawrence.

But, notes Barentsen, liquid cooling doesn't improve overall data center efficiency – it merely makes exhaust heat re-use more viable.

“In essence, the amount of waste heat recovered compared to the electrical input will remain the same: 90 percent of the thermal energy that goes into a data center can be recovered,” says Barentsen. “However, at least for the time being, the residual heat temperature will make a difference because with liquid cooling the residual heat is easier to use in a district heating system.”

Even then, there are challenges over how to re-use this resource if there isn't a friendly neighborhood district heating company willing to take it off of the data center operator's hands.

The US National Renewable Energy Centre, for example, used excess warm air to heat the pathways around its HQ in Golden, Colorado in order to keep them free from snow and ice in winter, but that is scarcely an efficient use of a valuable resource.

A more practical alternative solution has been developed by Dutch tech company Blockheating, together with consultancy IT Renew. It has devised a containerized data center that can use liquid cooling to maximize heat capture, piping the result to commercial greenhouses – for which the Netherlands is famed – to help keep tomatoes and bell peppers growing throughout the autumn and winter months without the use of gas.

Its 200kW Edge data centers use liquid cooling – enabling more compute power to be packed into a relatively small space – that can be converted into water at a toasty temperature of 65 degrees celsius.

However, the demand for such Edge data centers next to greenhouse facilities is likely to be highly niche, and while gas prices are low it's unlikely to gain much traction, suggests Barentsen.

Tighter regulation

What may help drive data center exhaust heat re-use is a combination of the broader corporate push towards carbon neutrality and sustainability – especially among well-healed organizations that can most easily shoulder upfront expenses – and regulation, particularly in the European Union.

For around the past decade, the EU has been pushing member states to implement district heating schemes, providing funds for start-ups, arguing that district heating is more efficient and less carbon-intensive than either electric or gas central heating.

Indeed, part-funding from the EU is behind a district heating scheme in Dublin, Ireland. South Dublin County Council – under whose authority the Castlebagot ‘digital business hub’ falls – has established its own publicly owned energy company, called Heatworks, to pipe heat from data centers in the hub to the newly established Tallaght District Heating Network.

More recently, there have been calls for tighter regulation of the data center industry, especially following a December 2020 United Nations report claiming that carbon emissions from the construction and operation of buildings now accounts for 38 percent of total global energy-related CO₂ emissions. Heating (and cooling) buildings around the world is responsible for just under 10 gigatonnes of CO₂ emissions, it claimed.

But for the time being, warns Lawrence, proponents of liquid cooling need to convince an industry geared towards air cooling that it is the way forward.

“The case for liquid cooling is quite strong, but... every designer knows air systems. There's lots of equipment out there, lots of standardized designs and it's cheaper in terms of capital outlay,” says Lawrence.

An Organic Material For The Next Generation Of HVAC Technologies

Texas A&M researchers have enhanced the dehumidification efficiency of a polymer that could help develop more energy-efficient systems with a smaller carbon footprint.

By Vandana Suresh, Texas A&M University College of Engineering



Dehumidifiers with enhanced polyimide membranes (white disc) will be energy efficient and have a smaller carbon footprint

Dharmesh Patel/Texas A&M Engineering

On sultry summer afternoons, heating, ventilation and air conditioning (HVAC) systems provide much-needed relief from the harsh heat and humidity. These systems, which often come with dehumidifiers, are currently not energy efficient, guzzling around 76% of the electricity in commercial and residential buildings.

In a new study, Texas A&M University researchers have described an organic material, called polyimides, that uses less energy to dry air. Furthermore, the researchers said polyimide-based dehumidifiers can bring down the price of HVAC systems, which currently cost thousands of dollars.

"In this study, we took an existing and rather robust polymer and then improved its dehumidification efficiency," said Hae-Kwon Jeong, McFerrin Professor in the Artie McFerrin Department of Chemical Engineering. "These polymer-based membranes, we think, will help develop the next generation of HVAC and dehumidifier technologies that are not just more efficient than current systems but also have a smaller carbon footprint."

The results of the study are described in the Journal of Membrane Science.

Dehumidifiers remove moisture from the air to a comfortable level of dryness, thereby improving air quality and eliminating dust mites, among other useful functions. The most commonly available dehumidifiers use refrigerants. These chemicals dehumidify by cooling the air and reducing its ability to carry water. However, despite their popularity, refrigerants are a source of greenhouse gases, a major culprit for global warming.

As an alternative material for dehumidification, naturally occurring materials known as zeolites have been widely considered for their drying action. Unlike refrigerants, zeolites are desiccants that can absorb moisture within their water-attractive or hydrophilic pores. Although these inorganic materials are green and have excellent dehumidification properties, zeolite-based dehumidifiers pose challenges of their own.

"Scaling up is a big problem with zeolite membranes," Jeong said. "First, zeolites are expensive to synthesize. Another issue comes from the mechanical properties of zeolites. They are weak and need really good supporting structures, which are quite expensive, driving up the overall cost."

Jeong and his team turned to a cost-effective organic material called polyimides that are well-known for their high rigidity and tolerance for heat and chemicals. At the molecular level, the basic unit of these high-performance polymers are repeating, ring-shaped imide groups connected together in long chains. Jeong said the attractive forces between the imides gives the polymer its characteristic strength and thus an advantage over mechanically weak zeolites. But the dehumidification properties of the polyimide material needed enhancement.

The researchers first created a film by carefully applying polyimide molecules on a few nanometers-wide alumina platforms. Next, they put this film in a highly concentrated sodium hydroxide solution, triggering a chemical process called hydrolysis. The reaction caused the imide molecular groups to break and become hydrophilic. When viewed under a high-powered microscope, the researchers uncovered that the hydrolysis reactions lead to the formation of water-attractive percolation channels or highways within the polyimide material.

When Jeong's team tested their enhanced material for dehumidification, they found that their polyimide membrane was very permeable to water molecules. In other words, the membrane was capable of extracting excess moisture from the air by trapping them in the percolation channels. The researchers noted that these membranes could be operated continuously without the need for regeneration since the trapped water molecules leave from the other side by a vacuum pump that is installed within a standard dehumidifier.

Jeong said his team carefully designed their experiments to partial hydrolysis wherein a controlled number of imide groups become hydrophilic.

"The strength of polyimides comes from their intermolecular forces between their chains," Jeong said. "If too many imides are hydrolyzed, then we are left with weak material. On the other hand, if the hydrolysis is too low, the material won't be effective at dehumidification."

Although polyimide membranes have shown great promise in their potential use in dehumidification, Jeong said their performance still lags behind zeolite membranes.

"This is a new approach to improve the property of a polymer for dehumidification and a lot more optimizations need to be done in order to further enhance the performance of this membrane," Jeong said. "But another key factor for engineering applications is it has to be cheap, especially if you want the technology to be reasonably affordable for homeowners. We are not there yet but are certainly taking strides in that direction."

Sunghwan Park in the chemical engineering department also contributed to this study.

This research is funded by the National Science Foundation and the Qatar National Research Fund.

กิจกรรมของสมาคมแอสเอ และ ASHRAE Thailand Chapter ปี 2021

1. การจัด Virtual Webinar วันเสาร์ที่ 9 มกราคม 2021 หัวข้อ "Testing Adjusting and Balancing (TAB) – HVAC" โดยวิทยากรคือ Mr. Ross Montgomery (DL จาก ASHRAE)



Mr. Ross Montgomery

2. การจัด Virtual Webinar วันศุกร์ที่ 5 มีนาคม 2021 หัวข้อ "Conducting a Commissioning Kickoff Meeting" โดยวิทยากรคือ Mr. Dennis Knight (DL จาก ASHRAE)



Mr. Dennis Knight

3. การจัดสัมมนาครั้งที่ 2 วันพฤหัสบดีที่ 20 พฤษภาคม 2021 หัวข้อ "Energy analysis and modelling with software" โดยวิทยากรคือ ดร. วิวัฒน์ และทีมงาน SCG

4. **เยี่ยมชมดูงาน:** โรงงานผลิตคอมเพรสเซอร์ Britol บ. กุลธร วันอังคารที่ 8 เดือนพฤษภาคม 2021

5. สัมมนาครั้งที่ 3 วันพุธที่ 16 มิถุนายน 2021 เวลา 9:00-16:00 หัวข้อ Smart Building, Smart City + 5G Technology (วิทยากร: รศ.ดร.พันธุ์ตา และ ดร. รพีรัฐ)

6. การจัด Virtual Webinar วันศุกร์ที่ 11 มิถุนายน 2021 เวลา 19:00-21:00

หัวข้อ 1. Myth or Reality - "Facing the Realities & Challenges in Sustainability & Energy Efficiency" - Bridging The Gap In Performance From Concept Though Operations - Design, Construction, Operations & Maintenance Measures for Improving Performance of Buildings

หัวข้อ 2. Operation & Maintenance Measures for Improving Performance of HVAC Systems & chiller plants โดยวิทยากรคือ Dr. Om Taneja (DL จาก ASHRAE)

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