



**180 Technology Parkway NW, Peachtree City, GA 30092  
404-636-8400**

**TC 9.11 Clean Spaces Committee Meeting Minutes – Chicago 2024**

Meeting Date: **Monday , January 22nd, 2024**  
Meeting Location: **In-Person (Marriot Waterside, Meeting Room 1 (2) with Virtual option**  
Meeting time: **2:15-5:15 pm EDT Main Technical Committee**

**0.0 Call to Order**

Vincent Sakraida/ Chair called the meeting to order.

TC9.11 Scope: TC 9.11 is concerned with air conditioning systems for cleanrooms and spaces, including process, product and facility air conditioning and related process ventilation for Research and Development, manufacturing, assembly, test and clean medical areas. This includes electronic, microelectronic, pharmaceutical and aerospace facilities and operating rooms.

**ASHRAE Code of Ethics Commitment**

The ASHRAE Code of Ethics is to be adhered to by those doing ASHRAE business whether or not they are an ASHRAE member. “In this and all other ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, integrity and respect for others, and we shall avoid all real or perceived conflicts of interests.” See full ASHRAE Code of Ethics: <https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics>

**1.0 Introduction of Attendees:**

1.1 Roll Call of Voting Member

***VOTING MEMBERS FOR THIS MEETING (Need (4) or ½+1 for a Quorum)***

Voting Member	Roll-on Date	Roll-off Date
Phil Naughton	2/1/2024	6/30/2028
Sina Yousefi	2/1/2024	6/30/2028
Kurt Montiero	2/1/2024	6/30/2028
Wei Sun	2/1/2024	6/30/2028
Conor Murray	7/1/2021	6/30/2027
Vincent Sakraida	7/1/2021	6/30/2027
Roland Charneux	7/1/2021	6/30/2026

1.2 Phil Naughton – TC 9.11 Vice Chair led the Roll Call of Voting Members. Based on the official Roster, there were seven confirmed voting members present (online or in person). Vincent Sakraida confirmed TC 9.11 had a Quorum.

## **2.0 Review of Previous Meeting Minutes**

Vincent Sakraida shared the written minutes of the Tampa meeting.

Wei Sun– made motion to accept meeting minutes, Phil Naughton seconded motion. Meeting minutes were approved.

## **3.0 Section Reports**

Report from the Chair Breakfast and TAC Section Head 9

The Decarbonization Task force is looking for representation from TC9.11

- A. Net Zero by 2050
- B. Reach out to GAC to help drive local and national policy on energy conservation
- C. RAC meeting: Vince is looking for development of proposals.
- D. There is a new MTG AI adoption resource guides: They are to make sure chat bots reference ASHRAE publications correctly. How to use AI in the design and operation of buildings. How to make sure presentations are not all AI generated at ASHRAE conferences.
- E. May 1<sup>st</sup> is the deadline for Fellows. ASHRAE is looking to revise the criteria to make it easier for consulting engineers. Presently, there are only 1% of ASHRAE members that are fellows.

## **4.0 Membership Status**

Vince discussed the changes to the TC9.11 voting membership.

There are no voting members are rolling off this year

The following TC9.11 members are rolling on as voting members:

Roland Charneux 6/30/26

Sina Yousefi	6/30/28
Kurt Montiero	6/30/28
Conor Murray	6/30/26
Phil Naughton	6/30/28
Wei Sun	6/30/28

## **5.0 Sub-Committee Reports**

### 5.1 Research: Phil Naughton

- A. We have no current active research projects
- B. We have 1 RTAR that needs to be updated.
- C. Phil explained the process how to fill out an RTAR and get it approved. It is important to work closely with Roland Charneux, the Section 9 RAC liaison (Research Administration Committee). Deadline dates for submitting an RTAR are March 14<sup>th</sup>, June 15<sup>th</sup>, & December 15<sup>th</sup>.
- D. For those who have research project ideas please write an RTAR (Research Topic Acceptance Request) with P. Naughton's assistance.
- E. Roland Charneux noted that RAC can approve research projects up to \$350,000 without Board approval. There are no active RTAR proposals.

### 5.2 Programs: Roland Charneux

- A. Chicago program: Seminar 34, Design of HVAC Systems for Aseptic manufacturing facilities, Chair: Vince Sakraida, Speakers: Yusuf Bhetasiwala, Conor Murray, Wei Sun, Tuesday Jan 23, 8:00-9:30 AM, Marriott Marquis, 2nd floor, Watershed B.
- B. Chicago program: Seminar 64, The opportunity and Energy density challenge of lithium ion battery dry cleanroom in climate rebalancing and carbon reduction from fossil fuels. Chair: Roland Charneux, Speakers: Conor Murray, Vince Sakraida, Wednesday Jan 24, 11:00-12:30 AM, Marriott Marquis 2nd floor Great Lakes E.
- C. Planning programs for Indianapolis, June 22-26, 2024:
  - a. Panel : Moving away from using ACR Design Criteria. Can we do this Moderator Kurt Monteiro, Participants Kishor Khankari, Phil Naughton, Tom Smith, Conor Murray.
  - b. Seminar: In Cleanrooms, Moving away from using ACR, ISO-14644-4 2022 Design construction and start of cleanrooms, ISO-14644-6 2022: Chair: Vince Sakraida, Speakers: Conor Murray, Vince Sakraida, Kishor Khankari

- c. Seminar: Demand based ventilation in cleanrooms Chair: Wei Sun,  
Speakers: Wei Sun, Vince Sakraida, Howard Neville
- d. Seminar, Lifecycle cost analysis: Chair: Yusuf Bhetasi, Speakers: Keith Beattie, Yusuf Bhetasi, Wei Sun

### 5.3 Handbook: Connor Murray

- A. The focus will be on incorporating ISO standards into the Handbook chapter.
- B. There isn't a page limit yet for chapters, but it may happen.

### 5.4 Journal: Vincent Sakraida

- A. Vincent Sakraida noted Kishor Khankari had an article published in the ASHRAE Journal.
- B. There is an article on how on an operating room in Norway and the behavior of people (surgeons and nurses) in the space and the contamination generation, that might be published in the next 6 months after revisions.

### 5.5 Web page: Sina Yousefi

- A. Sina Yousefi has posed the agenda and minutes from Tampa 2024.

### 5.6 Energy Efficiency:

- A. New Chair: Chris Kirchner, new co-chair: Nikolas Nikolopoulos
- B. ASHRAE board voted to create a decarbonization center from the task-force, that will probably be higher than tech committees and members council.
- C. The energy efficiency sub-committees will fall under the decarbonization center.
- D. Cleanrooms are not a focus yet.

### 5.7 MTR ACR: Phil Naughton

- A. No update.

### 5.8 Design Guide

- A. The design guide will be updated with modular cleanrooms, dry cleanrooms, pharmaceutical requirements. and smoke visualization;
- B. The structure of the books might be modified to make it more user-friendly using tables and bullet points.
- C. Pages will probably increase from 426 to 550 pages. The design guide might be split into two volumes.
- D. There will be a limited number of authors working on the revised design guide.

## **6.0 Liaison Report**

6.1 YEA – Nikolas Nikolopoulos will be the new YEA liaison.

- 6.2 ISO 14644 – Vincent Sakraida is ASHRAE's representative to the ISO 14644 Standard US TAG. Vince sent out 3 sections (12, 18 & 21) this year for review and received some comments. The comments received from other countries is very educational.
- 6.3 IEST/ISO – Wei Sun noted IEST 12.4 was published last year and he will be doing a tutorial for it. Wei Sun has been requested to develop training for ISO 14644 Part 16 on energy efficiency.
- 6.4 ISPE – Yusuf Bhetasiwala - ISPE is looking to review its 2009 Good Practice Guide that has not been updated in 15 years. They want to start this year, which will be published by the end of the year. It is currently in draft format.
- 6.5 CDC/NIOSH - No Report.
- 6.6 TC 1.6 – No Report.
- 6.7 TC 9.6 – Wei Sun – Standard 170 is working on an RTAR to understand the effectiveness of ante room impact on isolation rooms, operating rooms & protective rooms. They might do testing.
- 6.8 TC 9.10 – Roland Charneux noted there is a study 178—RP on enthalpy recovery wheels showing there is cross contamination of some chemicals through absorption/desorption that is published on the website. The revised Laboratory Design Guide is going to be published later this year.
- 6.9 TC 7.1 – No Report.
- 6.10 TC 7.2 – No Report.
- 6.11 NEBB – Vince Sakraida reported the Cleanroom Functional Performance Testing Standard Committee had completed the standard and have submitted the completed standard to the NEBB board of directors for review on Feb 7<sup>th</sup> 2024. The Cleanroom Functional Performance Test Standard will be published later this year.

## **6.0 Old Business - None**

## **7.0 New Business**

A.

## **8.0 Future Meetings**

- 8.1 Indianapolis Meeting – June 22 through 26th - the main TC 9.11 Technical Committee Meeting will be held on Monday, June 24, 2024. This will be in person and virtual starting at 2:15 PM until 5:15 PM.

Meeting was adjourned by Wei Sun

## **TC-9.11 Sub-committee Program meeting January 15<sup>th</sup> ,2024**

**Participants:** Kurt Monteiro, Yousuf Bhetasi, Phil Naughton, Conor Murray, Mike Amstadt, Ivan Thomas, Vince Sakraida.

### **Chicago programs**

- 1- **Seminar 34, Design of HVAC Systems for Aseptic manufacturing facilities**, Chair: Wei Sun, Speakers: Yusuf Bhetasiwala, Conor Murray, Wei Sun, Tuesday Jan 23, 8h00-9h30, Marriott Marquis, 2<sup>nd</sup> floor, Watershed B.
- 2- **Seminar 64, The opportunity and Energy density challenge of lithium ion battery dry cleanroom in climate rebalancing and carbon reduction from fossil fuels**. Chair: Roland Charneux, Speakers: Conor Murray, Vince Sakraida, Wednesday Jan 24, 11h00-12h30, Marriott Marquis 2<sup>nd</sup> floor Great Lakes E.

### **Planning programs for Indianapolis, June 22-26, 2024**

1. Panel : Moving away from using ACR Design Criteria. Can we do this  
Moderator Kurt Monteiro, Participants Kishor Khankari, Phil Naughton, Tom Smith, Conor Murray.
2. Seminar: In Cleanrooms, Moving away from using ACR, ISO-14644-4 2022 Design construction and start of cleanrooms, ISO-14644-6 2022: Chair: Vince Sakraida, Speakers: Conor Murray, Vince Sakraida, Kishor Khankari
3. Seminar: Demand based ventilation in cleanrooms Chair: Wei Sun, Speakers: Wei Sun, Vince Sakraida, +.....
4. Seminar, Lifecycle cost analysis: Chair: Yusuf Bhetasi, Speakers: Keith Beattie, Yusuf Bhetasi, Wei Sun

### **Planning programs for Orlando, Feb 8-18, 2025**

1. Seminar; Demand based ventilation part 2
2. Seminar: Moving away from ACR part 2
3. Seminar: Emissions from people and gowning.

## Important dates

### **Monday February 26<sup>th</sup>, 2024 | Debate, Panel, Seminar, Forum, Workshop, and Debate Proposals Due**

- **Friday, January 5, 2024** | Website Opens for Extended Abstracts and Seminar, Workshop, Forum, Debate and Panel Proposals
- **Monday, February 26, 2024** | Debate, Panel, Seminar, Forum, Workshop, and Debate Proposals Due
- **Friday, March 15, 2024** | Extended Abstract Paper Due
- **Friday, March 15, 2024** | Full Conference Papers Due; Request for Conference Paper Sessions Due
- **Monday, April 1, 2024** | Conference Paper Accept/Revise/Reject Notifications
- **Monday, April 1, 2024** | Extended Abstract Accept/Reject Notifications
- **Wednesday, April 10, 2024** | Revised Conference Papers Due
- **Friday, April 12, 2024** | Debate, Panel, Seminar, Forum, Workshop Scheduling Notifications
- **Wednesday, April 24, 2024** | Conference Paper Final Accept/Reject Notifications
- **Wednesday, November 8, 2023** | **Conference Paper Accept/Revise/Reject Notifications**
- **Friday, November 24, 2023** | **Revised Conference Papers Due**
- **Wednesday, December 6, 2023** | **Conference Paper Final Accept/Reject Notifications**

## The following are the program tracks for Indianapolis:

**1. Fundamentals and Applications.** Fundamentals are the foundation for understanding applications in engineering. Key components of ASHRAE fundamentals include thermodynamics, psychrometrics, fluid flow and heat and mass transfer. 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.

**Track Chair: Atilla Biyikoglu** | [abiyik@gazi.edu.tr](mailto:abiyik@gazi.edu.tr)

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**2. HVAC&R Systems and Equipment** are constantly evolving to address the changing requirements of the built environment. Papers and programs in this track focus on the

development of new systems and equipment, novel applications of existing systems and equipment, improvements to existing systems and equipment and the proper application and operation of systems and equipment.

**Track Chair: Ng Yong Kong** | [nyk@nyk.com.my](mailto:nyk@nyk.com.my)

**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 11th 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*.

**Track Chair: Kristin Cetin** | [cetinkri@msu.edu](mailto:cetinkri@msu.edu)

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**4. Professional development.** As members of a professional organization, we participate not only 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. The Professional Development Track covers all aspects of business outside of engineering/technical applications and lends itself to interactive session types such as workshops and forums.

**Track Chair: Ahmed Abdelsalam** | [ahmed.abdel-salam@usask.ca](mailto:ahmed.abdel-salam@usask.ca)

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**5. Electrification: Possibilities and pitfalls.** Global legislative efforts are pushing for full electrification of the building sector. This track features programs that explore the required technology to meet legislative targets and the seen and unforeseen challenges and consequences of rapidly electrifying the built environment in parallel with other sectors. Submissions are encouraged in the areas of relationships between electrification and decarbonization, electrification of space and water heating, building/grid interactions in a highly electrified environment, onsite energy generation and storage, district energy systems and all other areas related to the electrification of building systems.

**Track Chair: Kevin Brown** | [kevin@kbsquared.net](mailto:kevin@kbsquared.net)

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**6. Artificial intelligence and the built environment.** Artificial Intelligence and Machine Learning have the potential to transform how we design, optimize and operate buildings and equipment. From the automated design of heat exchangers to adaptive controls to the development of new working fluids, the possibilities are vast. This track highlights papers, case studies, and programs that separate the hype from reality and explore the possibilities of AI and ML tools for advancing technology for the built environment.

**Track Chair: Vinod Venugopal** | [vinodpvgopal@gmail.com](mailto:vinodpvgopal@gmail.com)

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**7. Building life cycle assessment.** The explosion of computational capacity and data collection capability is rapidly expanding the scope, complexity, and practical applications of modeling and performance characterization both during design, construction, end-of-life, but even more so for fault detection, diagnostics, and operational optimization. These data can provide better insights on the whole life cycle impact of building construction and operation on efficiency and decarbonization goals. This track welcomes programs related to all aspects of building life cycle assessment, with a particular interest in successful applications that have extended modeling into operational phases of the building life cycle.

**Track Chair: Money Khanna** | [khannamoney@gmail.com](mailto:khannamoney@gmail.com)

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**8. Legislation, Standards, Codes and Guidelines.** Legislation such as the US Inflation Reduction Act (IRA) of 2022 and global F-Gas regulations can dramatically impact the building sector by incentivizing different technologies and approaches to managing building energy systems. In addition, ASHRAE is well known for its standards and design guidelines and their continuous evolution to improve the built environment and its systems in terms of IEQ, resource efficiency and energy consumption. ASHRAE members must be able to keep up with the rapidly evolving legislative environment and prepare to inform future legislation, standards and codes. The programs in this track highlight recent changes and opportunities to inform new legislation, standards and guidelines and their impact on the buildings sector.

**Track Chair: Cindy Callaway** | [cindy.callaway@p2sinc.com](mailto:cindy.callaway@p2sinc.com)