MINUTES

TECHNICAL COMMITTEE

2024 Annual Meeting

June 23, 2024

Note: These draft minutes have been approved by the Technical Committee.

1791 Tullie Circle, N.E./Atlanta, GA 30329
404-636-8400

TC/TG/MTG/TRG MINUTES COVER SHEET

(Minutes of all Meetings are to be distributed to all persons listed below within 60 days following the meeting.)

TC/TG/MTG/TRG No. TC 2.8 DATE 06/23/2024

TC/TG/MTG/TRG TITLE Building Environmental Impacts and Sustainability

DATE OF MEETING 06/23/2024 LOCATION Indianapolis, IN/Virtual

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Alara Apcin	2018	Rafi Karim (Secretary, non-voting)	2023	Natalie MacDonald
Kevin Brown (Chair)	2021	Mike Pascual	2018	Nuria Casquero
Kevin Cross	2002	Ashish Rakheja (non-quorum)		Tom Lawrence
Lisa Ng (Vice-Chair, nonvoting)	2023	Tania Ullah	2023	Lan Chi Nguyen Weekes (SH2)
Janice Means	2005		2017	Kinga Porst Hydras
Sumayyah Theron	2022			Hailey Mick
James Sweeney	2016			Michael Deru
Svein Morner	2023			Costas Balaras
				Laura Brandt

EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE (continued)		
Stephen Duda	Alejandro Nieto	Paul Torcellini
Douglas Fick	Anthony Guerra	Steven Emmerich
Parichehr Salimifard	Stanton Stafford	Frank Mills
Joy Altwies	Mitchell Swann	Martino Fanfani
Ng Yong Kong	Juliana Pellegrini Trigo	

DISTRIBUTION: ***All Members of TC/TG/MTG/TRG plus the following:***	
TAC Section Head: Lan Chi Nguyen Weekes	SH2@ashrae.net
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters (Research, Standards, ALI, etc.)	See ASHRAE email alias list for needed addresses.
Mike Vaughn, Manager Of Research & Technical Services	MORTS@ashrae.net

Note: These draft minutes have not been approved and not the official, approved record until approved by the TC.

Shaping Tomorrow's
Built Environment Today

TC 2.8 Building Environmental Impacts and Sustainability
Sunday June 23, 2024, 3:30 PM – 5:30 PM EDT
Online (TC 2.8 Main Meeting | Microsoft Teams | Meetup-Join), Indy Marriott, Indiana ABC (1)

ASHRAE Value Statement – *In ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, inclusiveness and respect for others, which exemplify our core values of excellence, commitment, integrity, collaboration, volunteerism and diversity, and shall avoid all real or perceived conflicts of interest. Our culture is one of inclusiveness, acknowledging the inherent value and dignity of each individual. We celebrate diverse and inclusive communities, understanding that doing so fuels better, more creative and more thoughtful ideas, solutions and strategies for the Society and the communities our Society serves. We respect and welcome all.*

Action items highlighted in green
Update from posted agenda

Chair: Meeting Called to Order at 3:40 PM EDT

1. **Roll call and Introductions** — Brown / Ng

   In-person and virtual attendees introduced.

   Quorum present (6 out of 11 voting members including Chair).

2. **Review and Accept Agenda** — Brown / Ng

   Agenda reviewed.

3. **Review / Approval of January 2024 Meeting Minutes** — Brown

   Sweeney moved. Cross/Theron second. No discussion. Approved 6-0-0-1 (Y-N-A-CNV).

4. **Standing Committee Liaisons** TAC / RAC / Standards / Programs

   - Beth Tomlinson – Government Affairs is looking for SMEs (application).
   - Carol Marriott – Residential Distinguished Lecturers. Marriott is incoming vice chair of Residential Buildings Committee (RBC), whose charter includes increasing residential content by coordinating activities among ASHRAE and external partners. Marriott has two requests for TC2.8 consideration:
     i. RBC is seeking additional distinguished lecturers (connect Means with Marriott);
     ii. RBC also has content and is looking for people to deliver.

     https://forms.ashrae.org/Forms/dl-nomination

   Technical Activities Committee (TAC) – Lan Chi Nguyen Weekes

   - Roster should be finalized by 6/30.
   - Keep up with succession planning.
   - Chairs to turn in activity form by 6/25.
   - Update webpage – check if scope is correct.
   - Post minutes.
   - When developing management by objectives (MBOs), align with Strategic Plan.

   No update from Standards, Research Administration Committee (RAC) or Programs.

5. **Subcommittee Reports**

   5.1 Green Guide — Lawrence
   - 6th edition published last year.

- Not much interest in 7th edition from ASHRAE.
- Suggest to disband subcommittee.

5.2 International — Mills

- New Region XV formed that includes Middle East, Africa, India; Region-At-Large restructured https://www.ashrae.org/communities/regions.
- Updating sustainability code in England.

5.3 Water-Energy Nexus — Karim

- Meeting held virtually on June 4th.
- New volunteers joined the Water Energy Nexus guide development efforts.
- Chapter authors are planning to make updates on the drafts over the next month before the group working session/workshop is scheduled at the end of summer.

5.4 Research (minutes included below) — Cross

- Met a week ago.
- One funded research funded 1929-TRP[1], Evaluation of building life cycle analysis tools incorporating embodied carbon; meeting with research team next month.
- Co-sponsoring 1885-WS[1] Guideline/Book for Design Installation and Operation of PV (Solar and -Other Renewable) with TC6.7 Solar Energy and Other Renewables; vote to be held by email. (WS: Work Statement)
- Co-sponsoring 1947-WS Climate change driven extreme temperature effects map for efficiency and resilience map of heat pump technology with TC2.5 Global Climate Change; moving to bidding stage;
- Mills working on PTAR[1] on net zero energy hospitals with Morner.
- Need an author for RTAR[1] idea from Task Force on Decarbonization (new name below): expand/update ASHRAE service life table; contact Kevin jkevin87@comcast.net

5.5 Programs (minutes included below) — Apcin

- Met on June 4th.
- Watch today's Seminar 2: LIVESTREAM: Electrifying the Future: Decarbonization Strategies for the Built Environment later https://ashraem.confex.com/ashraem/s24/meetingapp.cgi.
- Seminar 10: Help has Arrived! Decarbonizing Heating Systems for Buildings – also available later https://ashraem.confex.com/ashraem/s24/meetingapp.cgi.
- Fred working on Orlando program for decarbonization project.
- Rafi working on Orlando program for Track 3 Refrigeration and Refrigerants.
- Orlando portal open for submission.
- Need a new Programs Chair → Theron appointed; connect with Mick (hailey.mick@uponor.com) who expressed interested.
- Apcin would like to continue to serve as liaison between TC2.8 and Society of Military Engineers.

5.6 Handbook – Chapters 34 & 35 — Morner

- Ch 35 – Sustainability – approved and working on submitting to Author Portal and completing checklist.
- Ch 34 – Energy Resources – AI generated portion to be removed since against ASHRAE policy (voting closes 6/25); MTG on AI and ASHRAE publications being formed to evaluate AI policy; ASHRAE trying to avoid publishing copyrighted information; Ng to send copy to Mills for review

6. Related Activities Reports

6.1 Standards

- SSPC 189.1 High-Performance Green Buildings — Lawrence
  - Standard has come a long way since its beginnings to address sustainability in design; continues to make progress.
- SSPC 189.3 High-Performance Green Healthcare Facilities — Moser
  - No one present to give update. Fick gave update.
  - Meets tmr morning.
  - Working on last 3 addendum for review to be published later this year.
  - 2 addendum out now for public review – electrification of systems; material resilience.
- SPC 191P Efficient Use of Water in Buildings — Betz

[1] PTAR: Publication Topic Acceptance Request ; RTAR: Research Topic Acceptance Request; TRP: Tentative Research Project; WS: Work Statement (ASHRAE acronyms)

- No one present to give update.

- SPC 228 Standard Method of Evaluating Zero Energy Building Performance Torcellini
  - Published last year.
  - Committee meeting tmr afternoon.
  - Identifying changes for next revision; particularly ensuring ASHRAE standards using same datasets and calculation methods.
  - 228 incorporated into DOE zero energy definition.
- SPC 227P Passive Building Design Standard Torcellini
  - Public review in spring.
  - Probably publishing next year.
- SPC 242P, Standard Method for Calculation of Building Operational Greenhouse Gas Emissions Deru
  - Developing operational greenhouse gas (GHG) factors.
  - Just getting started.
  - First in person meeting in DC recently.
  - Developing standard methods that other ASHRAE standards could reference.
  - A group is forming to coordinate activities across the GHG activities.
- SPC 240P Quantification of Life Cycle GHG Emissions of Buildings Standard Deru
  - Writing a new standard.
  - First public review in February.
  - 700+ comments to respond to.
  - CoBE tool (https://cobe.forhealth.org/) could be helpful in these new standards (Parichehr, Oregon State University); would like to give seminar in Orlando.
- New, approved yesterday → TPS approved to specify process for LCA for product claims of MEP assemblies (from Task Force for Decarbonization presentation)

6.2 ASHRAE Advanced Energy Design Guides Update Torcellini

- No new activity in AEDG.
- Team shifted to decarbonization work, decarbonizing thermal systems (Seminar 10 this morning) like heat pumps and ground source (addressing barriers to adopting heat pumps in your building); part 2 being developed for early 2025 release.

6.3 Task Force for Building Decarbonization Lawrence

- Sunsetting Task Force this weekend; now "Center for Excellence for Building Decarbonization" under purview of ExCom and permanent part of ASHRAE; working with three councils; Special Projects working with TCs; liaison from Councils and TCs to work together at CEBD.

6.4 High-Performance Buildings Simplified book Lawrence

- Created about 5 years ago.
- Simplified *Green Guide* for students, new career folks.
- 1st edition released around pandemic.
- 2nd edition under development – available August 2024.
- Meet the author event today at 3 pm at bookstore.

7. Old Business

7.1 TC 2.8 Basecamp site – available for any level of membership

- Any member of basecamp can add any other members.

7.2 Review Voting Membership roster

- Max voting years is 8.

Position	Name	End Year	Term Years	Voting Status
Chair	Kevin Brown	6/30/2025	2	Voting (2 Yrs.)
Vice Chair	Lisa Ng		2	Non-voting
Secretary	Rafi Karim			Non-voting
Handbook Subcommittee Chair	Svein Morner	6/30/2026	4	Voting (4 Yrs.)

Program Subcommittee Chair	Alara Apcin	6/30/2025	4	Voting (4 Yrs.)
Research Subcommittee Chair	Kevin Cross	6/30/2025	3	Voting (3 Yrs.)
Member Non Quorum	Ashish Rakheja	6/30/2026	4	Voting (4 Yrs.)
Member	Kinga Hydras	6/30/2028	4	Voting (4 Yrs.)
Member	Natalie MacDonald	6/30/2028	4	Voting (4 Yrs.)
Member	Juliana Trigo	6/30/2028	4	Voting (4 Yrs.)
Member	James Sweeney	6/30/2027	4	Voting (4 Yrs.)
Member (to be Programs)	Sumayyah Theron	6/30/2027	4	Voting (4 Yrs.)
Member	Tania Ullah	6/30/2026	4	Voting (4 Yrs.)
Member	Janice Means	6/30/2025	4	Voting (4 Yrs.)

https://tcroster.ashrae.org/rosterReport?cmtKey=518c6007-fd40-49d5-b8d9-0972f75f3155&fiscalYear=2024-2025)

www.ashrae.org/joinatc

7.3 Approved minutes (see vote above)

8. New business

8.1 LoRusso request for review of proposal for DTG (Decarb Task Group) focused on utility planning. Kevin will forward description to members.
8.2 Mills (publications committee): want more co-sponsorship for publications, looking for translators

9. Adjourn
Moved by Means. Second by Theron. Adjourned.

NEXT MEETING: Feb. 9, 2025 – Orlando, FL

ASHRAE Value Statement

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TC 2.8 Web Site
http://tc0208.ashraetcs.org
TC 2.8 Basecamp Site
https://3.basecamp.com/3106353/projects/10832944

Upcoming Conferences:
Winter, February 8-12, 2025 – Orlando
Annual, June 21-25, 2025 – Phoenix
Winter, January 31-February 4, 2026 – Las Vegas
Annual, June 27-July 1, 2026 – Austin
Winter, January 23-27, 2027 – Chicago
Annual, June 12-16, 2027 – New Orleans

TC 2.8 Sponsored Programs in Indianapolis…

Sunday, June 23

8:00 AM – 9:00 AM EDT
Seminar 2: LIVESTREAM: Electrifying the Future: Decarbonization Strategies for the Built Environment
Co-sponsored with 6.7 Solar and Other Renewable Energies

11:00 AM – 12:30 PM EDT
Seminar 10: Help has Arrived! Decarbonizing Heating Systems for Buildings
Co-sponsored with Task Force for Building Decarbonization

TC2.8 Research Subcommittee Notes
Friday, June 14th, 2024
4:00 p.m. to 5:00 p.m. EDT

Attendees: Joy Altwies, Jim Sweeney, Parichehr Salimifard, Janice Means, Svein Morner, Nuria Casquero, Frank Mills, Yukiko Yoshida, Eric Peterson, Summayah Theron, Aldrick Arceo, Doug Fick, Crystal Joiffe, Matt Mullen, Kevin Cross

1. Welcome and announcement(s)
    a. Frank Mills, Eric Peterson, and Yukiko Yoshida attending from the UK and Japan.
    b. No announcements.
2. Potential research collaboration with TC 7.3 (Operation, Maintenance and Cost Management) to update and expand the ASHRAE service life estimate table
    a. Background:
        i. Kevin spoke several months ago with Kent Peterson, Chair of the Decarbonization Task Force, who said that there's a need to expand and update the ASHRAE Service Life Table in he HVAC Applications Handbook in order to better perform life cycle carbon analysis. The data is old, and doesn't include important equipment items used in electrifying buildings (e.g. VRF systems, air-to-water heat pumps, heat pump DHW heaters, and geothermal well field components). Kevin spoke with Matt Mullen of TC 7.3 about this a couple of months ago, and Matt was supportive of us initiating such a research project. TC 7.3 has additional data for equipment items currently in the Table that needs to be "unlocked" and used to update the Table. There may be ways to estimate service lives of new relatively new products without waiting for a significant number of them to begin failing.
    b. Discussion – The next step would be to write an RTAR. Matt is willing to act as a consultant to the RTAR writer. No one stepped up to write the RTAR during the meeting. We'll keep looking.
3. Review current research topic ideas (see following table)

Research Topic Idea	Generated by	Update/Status	Next Steps
ACTIVE: 1929-TRP: Evaluation of building life cycle analysis tools incorporating embodied carbon	Jim Sweeney, Kevin Cross	Montana State University and ZGR Architects selected as contractor; under contract since late March; PMS meetings held on 4/2 and 4/18; next PMS meeting scheduled for 7/25	*The research lead will return from an extended trip to India later this month, and will begin the project in earnest once she's back.*
ACTIVE (Co-Sponsor): 1885-WS Guideline/Book for Design Installation and Operation of PV (Solar and Other Renewable)	TC 6.7: Solar Energy and Other Renewables	In January 2024, Janice said she would reach out to TC 6.7 to find out whether they are planning to proceed with the WS.	*Janice reached out to the TC 6.7 Research Chair recently. She expects they will be voting on this soon. TC 2.8 will need to vote on cosponsoring as well.*
ACTIVE (Co-Sponsor): 1947-WS Climate change driven extreme temperature effects map for efficiency and resilience map of heat pump technology	TC 2.5: Global Climate Change	This project will go out to bid during the next cycle. It currently has three PES members and the TC 2.5 Research Committee Chair is looking for another volunteer or two.	*Parichehr is interested in serving on the PES. Kevin will introduce her to the TC 2.5 Research Chair.*
ACTIVE: Net Zero Energy Hospitals	Frank Mills	Frank prepared a draft RTAR on 6/11/2024 for us to discuss.	*Frank asked for help on this, which he framed as roadmap for transitioning existing hospitals to Net Zero hospitals. Joy pointed out that since the result would be a publication, we would want to develop a "PTAR" next, not an RTAR. Kevin will discuss this with Chris at the Research Chairs breakfast later this month. Svein is interested in acting as a consultant/reviewer on the PTAR.*
PENDING: What are the reasons that municipalities adopt required or optional stretch energy codes? What could ASHRAE do to get these standards adopted?	Joy Altwies	In January 2024, Joy said she would follow up with Doug on his offer to ask the Standards Executive Committee if they have any suggestions on how we might proceed with this.	*Joy spoke with Doug Fick about this recently. Doug doesn't see this as a viable research project, so Joy recommends that we drop this from our list.*
PENDING: Integration of Thermal Energy Storage with	John Willis	In January 2024, John said that he is waiting for feedback from TC	*John was not in attendance at the meeting. Kevin will*

Stirling or ORC Engine for Building Decarbonization		1.10 (Combined Heat and Power Systems), and will let Kevin know when he receives same.	*reach out to John later this month for an update.*
PENDING: Conservation vs. Water Quality from the Design Engineer's Perspective	Water-Energy Nexus Subcommittee (Rafi Karim, Tania Ullah)	In January 2024, Jim said that he would follow up with Rafi on Rafi's suggestion for a potential RTAR author.	*Jim to reach out to Rafi for an update on this effort.*
PENDING: Carbon capture and sequestration in buildings	Janice Means	In January 2024, Janice said that she will see whether TC 2.5 (Global Climate Change) is interested in developing this as an RTAR.	*Janice did bring this up with TC 2.5, and while they expressed some interest, no one stepped up to write an RTAR. Janice will keep looking, though. Jim is interested in helping out with this one.*
PENDING: What is the potential for reducing embodied carbon in distribution systems and building renovations?	Paul Raftery	Paul and Matt Roberts presented a paper on this topic at the January 2024 meeting. Paul said that he may work on putting an RTAR together for this once he's had a chance to gauge interest in this topic within ASHRAE.	*Kevin will reach out to Paul for an update later this month.*
ON HOLD: 1933-RTAR: Water-Energy Nexus: Utility Source Water and Source Energy Dataset	Fred Betz, Jim Sweeney, Rafi Kareem	Submitted in August 2021. Approved with comments. No activity since then. On 6/11/24, Chris said that this will be removed from the research plan due to inactivity. If anyone wishes to pursue this in the future, a new RTAR will need to be submitted.	*Parichehr is interested in working on this. Jim will send the RTAR to her for review. Kevin will ask Chris if it would be possible to move directly to a Work Statement at the Research Chair's breakfast.*
ON HOLD:→ Pending Ground source heat pump technologies in hot climates – international	Ashish Rakheja, Eric Peterson	Eric said that he would work on putting an RTAR together for this in January 2024. Svein offered to serve as an advisor.	*Eric doesn't think there's a viable research project here – he just doesn't think that ground source heat pumps are viable in hot climates. We'll remove this from our list.*

ON HOLD: Effect of Water Quality on HVAC Systems	Fred Betz	In January 2024, Fred said that he would not be able to work on this in 2024. Shall we keep it on the list?	*We'll take this off our list next time.*

4. Discuss new research topic ideas (see following table)

New Research Topic Ideas	Generated by	Update/Key Questions	Next Step
Update and expand ASHRAE Service Life Table	Kevin	We're looking for someone to write the RTAR. See discussion item #2 above.	*All committee members, please consider taking the lead on this RTAR!*

None

5. Other business
    a. None
6. Adjourned at 3:00 MDT/4:00 CDT/5:00 EDT/

Reference Items

For more information, visit ASHRAE's research web site here: ashrae.org/research

Anyone interested in pursuing research topics (including those who generated ideas above) are asked to take a look at the RTAR form to start fleshing out their ideas. The most recent RTAR and Work Statement forms can be downloaded from the link provide above.

The ASHRAE Strategic Research Plan was updated in 2021. The formal roll out took place at the 2022 Las Vegas meeting.

The published information indicates that future research topics should address one of these topics/goals. Details and specifics on each topic area can be found at this link:

https://www.ashrae.org/file%20library/technical%20resources/research/research%20strategic%20plan/research-strategic-plan.pdf

1. Resilience
2. IEQ – Environmental Quality in Occupied Spaces and Impacts on Work and Learning Health and Well Being, and Transmission of Airborne Infectious Viruses
3. Sustainability, Decarbonization, Energy and Resources
4. HVAC&R Equipment, Components, and Materials
5. Tools and Applications

6. Education and Outreach

TC 2.8 Programs Subcommittee Meeting Minutes

2024 ASHRAE Annual Conference Indianapolis
June 4, 2024, 02:00 PM - 03:00 PM ET (Virtual Meeting)

Attendees: Rafi Karim, Fred Betz, Alara Apcin

1) Roll call and introductions

2) Agenda

3) Announcements

Sunday, June 23
8:00 AM – 9:00 AM EDT

Seminar 2: LIVESTREAM: Electrifying the Future: Decarbonization Strategies for the Built Environment

Sponsoring Committee: 6.7 Solar and Other Renewable Energies
Co-Sponsoring Committee: 2.8 Building Environmental Impacts and Sustainability
S. Morner

Sunday, June 23
11:00 AM – 12:30 PM EDT

Seminar 10: Help has Arrived! Decarbonizing Heating Systems for Buildings

Sponsoring Committee: 2.8 Building Environmental Impacts and Sustainability
Other Sponsoring Committee: Task Force for Building Decarbonization

4) Old Business

- Hospital decarbonization program for Orlando by Fred.

5) New Business

- Track 3 Refrigeration and Refrigerants: Rafi

Review Timeline for Future Meetings

2025 ASHRAE WINTER CONFERENCE
FEBRUARY 8-12, 2025 | ORLANDO, FL
https://www.ashrae.org/conferences/2025-winter-conference-orlando

Upcoming Deadlines:

- Wednesday, May 29, 2024 | Conference Paper Abstracts and Paper Session Requests Due
- Monday, June 17, 2024 | Conference Paper Abstract Accept/Reject Notifications
- Wednesday, June 19, 2024 | Website Opens for Extended Abstracts and Seminar, Workshop, Forum, Debate and Panel Proposals
- **Friday, August 2, 2024 | Debate, Panel, Seminar, Forum, Workshop, and Debate Proposals Due**
- Wednesday, September 4, 2024 | Conference Papers Due
- Friday, September 27, 2024 | Conference Paper Accept/Revise/Reject Notifications
- Friday, October 4, 2024 | Debate, Panel, Seminar, Forum, Workshop Scheduling Notifications
- Wednesday, October 9, 2024 | Revised Conference Papers Due
- Monday, October 28, 2024 | Conference Paper Final Accept/Reject Notifications

2025 Winter Conference Tracks and Track Chairs:

Technical Program Chair: Som Shrestha | shresthass@ornl.gov

1. Fundamentals are the foundation for understanding applications in engineering. Key components of ASHRAE fundamentals include thermodynamics, psychrometrics, 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.

Track Chair: Erik Sanchez | esanchez@prmech.com

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, improvements to existing systems and equipment and the proper application and operation of systems and equipment.

Track Chair: **Li Song** | lsong@ou.edu

3. Refrigeration is a critical element of modern life, from preserving food and medicine to maintaining comfort. With significant changes on the horizon for refrigerant regulations, along with new applications for refrigeration systems, understanding both the fundamental and advanced concepts and issues related to refrigeration is more important than ever before. Papers and programs in this track focus on refrigerants and their regulations, refrigeration cycles and applications.

Track Chair: **Jon Cohen** | jonjcohen1@gmail.com

4. Thermal and electrical energy storage can alleviate the mismatch between renewable energy availability and peak building energy demands, enabling the incorporation of more renewable energy into the grid. Integration of thermal energy storage (TES) with residential and commercial building envelopes or HVAC systems would reduce buildings' heating and cooling loads, level out peak energy demand, reduce HVAC size, increase energy savings, improve occupants' thermal comfort and allow flexibility for shedding and shifting building loads. These benefits will improve grid resiliency, thereby enabling more cost-effective electrification of buildings. Papers and programs in this track focus on advances in cost-effective TES materials and systems, integration of thermal TES in building envelopes or HVAC systems and grid resiliency.

Track Chair: **Robin Bryant** | **RBryant@bandiflorida.com**

5. Decarbonization is urgently needed to slow climate change that is affecting the planet. Approximately 10% of global CO2 emissions is attributable to embodied carbon in building materials and construction processes. Energy use in buildings accounts for about 40% of energy-related carbon emissions. Therefore, to accomplish building decarbonization goals, accounting for embodied carbon and carbon emissions from operational energy use is essential. ASHRAE and its members are leading the advancement of carbon neutral, net zero energy and decarbonization strategies in new construction, renovation and HVAC&R design for residential and commercial buildings.

This track highlights case studies and research across the globe on the methods being developed and policies being evolved to reduce carbon impacts on the global environment; tools and resources to make zero energy design and operation more easily achievable; innovative low-carbon materials and state-of-the-art technologies and strategies to achieve zero energy communities and campuses; and policies, regulations, codes, standards and utility and government programs for adoption and scale up of net zero (or net positive) energy building and community initiatives.

Track Chair: **Joe Chow** | joe.ashrae@gmail.com

6. Artificial intelligence (AI) is being adopted by many aspects in our life. As sensor systems, internet connectivity, building management software and data collection become more sophisticated and ubiquitous, substantial opportunities exist to make buildings and HVAC systems and equipment "smarter." Implementation of AI in building automation and control systems enables using data from Internet of Things devices and occupant behavior to improve operational energy efficiency, occupant comfort, security and maintenance, and to enhance utilization of renewable energy resources (e.g., wind, solar) and energy storage. Submissions in this track focus on applications for AI and machine learning technology in building automation and controls to enhance energy efficiency and comfort, cyber security, fault detection and diagnosis, operation of HVAC systems and equipment for load flexibility, and benefit from time-of-day energy prices.

Track Chair: **Suzanne LeViseur** | sleviseur@haddadeng.com

7. Development and adoption of industrialized technologies and methodologies can accelerate construction speed, scale, and quality. Whereas most other industries have capitalized on digitization and process improvements, building construction practices have experienced slow, incremental changes. Industrialized construction can address shortages in skilled labor while increasing throughput, safety, quality and affordability. Examples include prefabricated mechanical pods, prefab panelized components for building envelopes and modular construction, although more innovation is needed to increase the cost-effectiveness of these approaches. This track disseminates advancements in building construction practices and workforce development and discusses opportunities and challenges associated with conventional and industrialized construction.

Track Chair: **Stephanie Mages** | s_mages@yahoo.com

8. Indoor environmental quality (IEQ) is a vital consideration during all phases of a building's life because the indoor environment is closely linked to occupant comfort, satisfaction, productivity and health. Proper fire and smoke control design is also crucial for protecting building occupants. This track explores the design, operation and studies of ventilation, air distribution systems, and all IEQ aspects, including noise, vibration and lighting in residential and commercial buildings. Topics include aspects of ventilation and IEQ, such as filtration, changeovers, best practices for maintainability, fire ratings/dampers, detection and ventilation for toxic gases, operator safety in equipment rooms, OSHA

requirements, industrial and hazardous spaces, additional occupant health and safety considerations and new building materials.

Track Chair: **Ehab Mamdouh** | **ehab.mamdouh@ipec-eg.net**

9. In the face of climate change, weather extremes and energy supply disruptions and shortages, methods for designing, constructing and operating buildings and HVAC&R systems must be resilient and sustainable. In fact, resilience is a highlighted aspect of the current ASHRAE strategic plan. This track highlights innovative technologies and strategies that are evolving across the globe that reimagine our relationship with the built environment now and into the future, including design strategies for extreme climates and weather, appropriate responses to energy supply disruptions, and how all these factors are tied to resilience and energy conservation efforts.

Track Chair: **Joshua Vasudevan** | **joshuavasudevan2011@gmail.com**

In addition to the tracks above, papers and programs that address Cold Climates are appropriate and encouraged.

6) Adjourn.

Future Winter Conferences

Feb. 8-12, 2025 – Orlando, FL

Jan. 31-Feb. 4, 2026 – Las Vegas, NV

Future AHR Expos

Feb. 10-12, 2025 – Orlando, FL

Feb. 2-4, 2026 – Las Vegas, NV

Future Annual Conferences

June 22-26, 2024 – Indianapolis, IN

June 21-25, 2025 – Phoenix, AZ

June 27-July 1, 2026 – Austin, TX

For any questions, comments, suggestions please contact:
alara.l.apcin@gmail.com mobile: 907-330-9220