



2024 ASHRAE Conference for Integrated Design, Construction & Operations

June 24-26, 2024

 Indianapolis, IN

Monday, June 24

Monday, June 24, 8:00 AM - 9:00 AM

Keynote 1 (Intermediate)

Kent Peterson, P2S Inc.

Technology's Evolving Role in Advancing Decarbonization in Building Design, Construction and Operation

This keynote unravels a vital discourse on combatting climate change by propelling decarbonization within the spheres of building design, construction and operation. It introduces a paradigm shift from carbon-intensive methodologies to innovative digital instruments that emerge as dynamic agents of change. The talk crescendos into a persuasive call to action, advocating for the adoption of these technologies to cultivate a decarbonized built environment.

Monday, June 24, 9:45 AM - 10:45 AM

Panel 1 (Intermediate)

Beating the MacLeamy Curve

Chair: Richard Walter Fenrich, PhD, xStar Research, Blacksburg, VA, Amanda E Bogner, PE, Full Member, Energy Studio Inc, Omaha, NE and Daniel Overbey, Browning Day, Indianapolis, IN

The MacLeamy curve illustrates the increasing costs of design modifications during the design process and is often used to advocate for smarter approaches to building design. Building information modeling tools and integrated process delivery strategies are two complementary approaches for navigating design complexities while achieving cost-effective designs. BIM and IPD rely heavily on architectural and engineering design software to enable design exploration, analysis, optimization, and collaboration. This panel brings industry experts together to explore recent advances in software tools and workflows which address the challenge of minimizing late-stage design changes while continuing to meet building cost and performance requirements.

9:45 AM - 10:45 AM
Seminar 1 (Advanced)

AI-Integrated Energy Modelling Frameworks: Potentials, Challenges, and Future Directions

Chair: Justin S Shultz, PhD, Associate, Page/EYP, Washington DC, DC

This seminar explores integrating artificial intelligence (AI) into building energy modeling. The approach automates energy modeling tasks, aligning with ASHRAE Appendix G guidelines. The methodology demonstrates AI's potential in early-phase energy modeling, allowing untrained users to perform advanced tasks through simple prompts. For professionals, it automates manual tasks, saving time and reducing errors. Challenges like data quality and interpretability are discussed with mitigation strategies. The presentation also envisions future directions for ASHRAE, emphasizing AI's role in enhancing energy modeling for global efficiency and carbon reduction. The proposed workflow showcases AI's impact on energy efficiency analyses and simplifies complex modeling procedures.

1. AI-Integrated Energy Modelling Frameworks: Potentials, Challenges, and Future Directions

Mo S Elsayed, PhD, Affiliate, Page/EYP, Washington DC, DC

11:00 AM - 12:00 PM
Seminar 3 (Intermediate)

Energy and Carbon Reduction Modelling & Analysis

This session explores energy and carbon reduction through several different analysis methods including using digital twin technology to model a chilled water plant to optimize energy, data analysis of case studies to understand embodied and operational carbon in multifamily house comparing retrofits, passive design and adaptive reuse, and a look at available data tools for designers wondering how the greening grid will play into their net zero calculations and projections.

1. Energy Optimization of a Chilled Water Plant through Intelligent Agents, Application Case: Design, Simulation and Implementation

Jean Pierre Correa, Universidad Nacional de Colombia, Floridablanca, Colombia

2. Investments in Low-Carbon Living Focused on Operational and Embodied Carbon

Jonghwa Na, Gensler, New York, NY

3. Cambium, Crrem, and Egrid, Oh, My!

Alexandra Lowrie Love, Affiliate, JLL, Charlotte, NC

Monday, June 24, 2:15 PM - 3:15 PM
Seminar 4 (Intermediate)

Integrated Design Session

Chair: Hywel Davies, BSc PhD CChem MRSC CSci MASHRAE, Member, CIBSE, Bedford, United Kingdom

1. Integration of Design, Construction and Operation to Enhance Building Safety Outcomes

Hywel Davies, BSc PhD CChem MRSC CSci MASHRAE, Member, CIBSE, Bedford, United Kingdom

2. The Effect of Integrated Design on Building Operations and Energy Consumption

Mahroo Eftekhari, CEng, Loughborough University, Loughborough, United Kingdom

3. Delivering Improved Building Performance through Integrated Design, Construction and Operation

Fiona Cousins, Arup, New York, NY

2:15 PM - 3:15 PM
Seminar 5 (Intermediate)

Real Time Monitoring and Predictive Analysis

This session discusses CEVAC, Clemson University's Center for Energy Visualization and Analytics. The new technology and innovative predictive analysis that is driving significant successes in consumption reduction and fault detection is covered. This session also asks, "how much data is too much data"? "Are we asking the right questions"? The speaker focuses on data analytics starting with "what happened and why".

1. How Big Data and AI Optimize Campus Energy

Snowil Lopes, Clemson University, Clemson, SC

2. Tackling Inefficiencies: The Power of Using Your Data

Hannah Thomazin, U.S. Engineering Company Construction, MO

Monday, June 24, 3:30 PM - 5:00 PM

Panel 2 (Intermediate)

ASHRAE HQ Project: Lessons Learned

Moderator: Ginger Scoggins, Engineered Designs Inc, Cary, NC

Panelists: Stephanie Reiniche, ASHRAE, Peachtree Corners, GA, Stanton Stafford, PE, LEED Fellow, Member, Buro Happold, Atlanta, GA and Darren Draper, PE, LEED AP, Epsten Group, Atlanta, GA

ASHRAE renovated a 66,700 sq. ft. building, originally built in 1978 in metro Atlanta to be the Society's new net-zero energy-efficient global headquarters. The building incorporated the Society's energy and indoor air quality standards, while being cost effective, restorative, livable and resilient. Features like water efficient plumbing and landscape, energy efficient HVAC and lighting systems, as well as the ability to harness on-site energy production and be net-zero-energy-efficient were outlined as project goals. In this panel, former building committee chair and 2023-24 ASHRAE President Ginger Scoggins will moderate a discussion among project contributors as they examine lessons learned.

3:30 PM - 5:00 PM

Seminar 6 (Intermediate)

A Better Future Weather File for Energy Simulation

Chair: Elyse M Malherek, Associate, Willdan, ANAHEIM, CA

Predicting the future is a very difficult business indeed. Future weather files such as fTMY and XMY attempt to estimate future energy use via energy modeling, but through cooperative research with climatologists and energy modelers, five areas for improvement were identified, new future weather files were created, and the methodology published. The weather files were put to the test and used to evaluate a suite of buildings and the results of different conservation measures based on energy efficiency and resiliency will be discussed.

1. Future Weather Modeling Methodology Review

Richard Graves, Center for Sustainable Building Research, Minneapolis, MN

2. Improved Future Weather Methodology for Energy Simulations

Alexander B Harris, CEM - Certified Energy Manager, Associate, HGA, Minneapolis, MN, United States

3. Modeling Savings and Resiliency with Future Weather Files

Christopher B Baker, AIA, Full Member, Willdan, Anaheim, CA

Tuesday, June 25

Tuesday, June 25, 8:00 AM - 9:00 AM

Keynote 2 (Intermediate)

Rajnish B. Setty

Data Driven Future for Integrated Design, Construction and Operations

This talk presents a vision for a Data-Driven Future in Design, Construction, and Operations. Digital twins, serving as digital replicas of buildings, combined with AI, promise predictive optimization across a building's lifecycle. This innovative approach enables anticipatory adjustments to improve energy efficiency and occupant comfort, marking a shift to proactive building management. Essential to realizing this vision are advancements in digital twins for predictive analytics, dynamic ontologies for knowledge integration, and AI algorithms for learning from data. Despite challenges, this paradigm offers unparalleled opportunities for sustainability, operational efficiency, and occupant satisfaction, steering the built environment towards autonomy and intelligence.

Tuesday, June 25, 9:45 AM - 10:45 AM

Panel 3 (Intermediate)

Generative AI Impact on Design and Construction

Moderator: Krishnan Gowri, PhD, Fellow Member, Intertek Inc., Bothell, WA

Panelists: Bilal Sher, Building Diagnostic Robotics, New York, NY, Ben Bartling, Slipstream, Madison, WI and Nathaniel Louis Jones, PhD, Arup, Boston, MA

Generative AI applications have potential impact on all aspects of engineering consulting, design, operation, maintenance and general productivity improvements. This panel discussion will feature three industry experts highlighting the potential of using

generative AI technologies for building diagnostics, HVAC system operation and maintenance and future directions for technology adoption.

9:45 AM - 10:45 AM

Seminar 7 (Intermediate)

Digital Twin Methodologies and Case Studies

This session explores real life case studies about setting up and using Digital Twin technology to improve the predictive analysis and performance of operating the built environment.

1. From Deployment to Utility: Harnessing Your Digital Twin

David Solano, Georgia Institute of Technology, Atlanta, GA

2. A Digital Twin Case Study: How to Structure Your Data to Get Started

Rajnish B Setty, Full Member, Setty, Atlanta, GA

3. A Digital Twin Approach for District Energy Systems

Jung-Ho Lewe, Ph.D., EMP, Full Member, Georgia Institute of Technology, Atlanta, GA

Tuesday, June 25, 11:00 AM - 12:00 PM

Panel 4 (Intermediate)

President's Roundtable on Workforce Development

Moderator: Dennis Knight, P.E., Fellow ASHRAE, Whole Building Systems, LLC, Mt. Pleasant, SC

Panelists: Darryl Boyce, Carleton University, Kemptville, Canada, Luke C H Leung, PE, Fellow Member, Skidmore Owings & Merrill, CHICAGO, IL, Martin Dieryckx, Fellow Member, Daikin Europe N.V., Torhout, Belgium and Jim Dahlin, Pipefitters Local Union No. 533

Join newly appointed ASHRAE president Dennis Knight and a panel of industry executives as they discuss the very real problem of Workforce Development for HVAC&R. Meeting the challenge of building and renovating high performance buildings that are carbon neutral and energy efficient will require skilled engineers, designers, contractors and facility managers. How will HVAC&R compete with other tech savvy industries to attract new workers and engage and upskill the existing workforce to face the world's most significant challenge – climate change?

11:00 AM - 12:00 PM

Seminar 8 (Intermediate)

BIM Standards and Guidelines for Integrated Building Design and Construction

Chair: Stephen B Roth, PE, Full Member, Carmel Software Corp, SAN RAFAEL, CA

Currently, there are many Building Information Modeling (BIM) standards and guidelines available in the marketplace. This seminar focuses on explaining 2 specific BIM standards including ASHRAE SPC-224 (an ANSI standard) and National Institute of Building Sciences' NBIMS 4.0. In addition, it focuses on how these standards are used in practice by owners, engineers, and architects. Speakers discuss the similarities and differences between them and how they could work together to provide a comprehensive set of BIM standards.

1. How Building Owners, Architects, and Engineers Can Use These Standards in the BIM Workflows

Kimberly Pierson, Moseley Architects, Raleigh, NC

2. Overview of ASHRAE SPC-224: Standard for the Application of Building Information Modeling

Stephen B Roth, PE, Full Member, Carmel Software Corp, SAN RAFAEL, CA

3. Overview of the Next Generation BIM Standard at NIBS – National BIM Standard 4.0

Carrie Dossick, University of Washington, Seattle, WA

Tuesday, June 25, 1:30 PM - 3:00 PM

CIDCO Showdown 1 (Basic)

CIDCO Showdown

Chair: Weili Xu, Ph.D., Associate, PNNL, Richland, WA, United States

This year's Proposed Model Building is a mixed use, multilevel medium-sized office building located at 8710 Hague Road, Indianapolis, Indiana, 46256 (the conference city!). Teams will compete to design all major building systems including the building enclosure, HVAC, refrigeration, lighting, water heating, plug loads, and any on-site renewable or other energy systems

Teams:

1. Good & Green

Stephanie Taylor, MD, M Arch, Building 4 Health, Inc., Austin, TX

2. Carbon Crunchers

Rajat Wadhwa, HED, Omaha, NE

1:30 PM - 3:00 PM

Seminar 9 (Intermediate)

Resilience and Modelling Future Weather

Designing the built environment to be resilient to impacts of adverse weather conditions is both an old and a new challenge. Some design considerations are familiar for mission critical facilities, but present and expected future conditions are making resilience more relevant for the built environment writ large. This seminar includes presentations discussing resilient design of systems in extreme heat and cold conditions at the building level, design guidance for resilience under expected future conditions at the community level, housing retrofits for resilience to overheating and air quality issues, and a resilience assessment methodology using key simulations with relevant case studies.

1. Temperature Projections: How Climate Change Impacts on Current and Future Extreme Heat Can Affect Heating and Cooling System Design

Jaelyn R Kinson, Associate, CDM Smith, Boston, MA

2. Creating Climate Resilient Communities (CRC) By a Multi-Scale Designing Framework

Lili Ji, National Research Council, Ottawa, ON, Canada

3. Retrofits to Improve Resilience of Residential Buildings to Overheating Stress and Wildfire Smoke Exposures

Chang Shu, Rea, National Research Council Canada, Ottawa, ON, Canada

4. 5 Resilience Simulations to Make Better Buildings

Alexandra Lowrie Love, Affiliate, JLL, Charlotte, NC

Tuesday, June 25, 3:15 PM - 4:45 PM

Panel 5 (Basic)

ASHRAE Fishbowl

Chair: Mitchell Swann, P.E., Life Member, Resolution Management Consultants, Philadelphia, PA

A fishbowl panel discussion comes from a popular open fishbowl conversation format. Members of the audience sit on stage or in the center of the room to discuss a topic introduced by the panel moderator. At any time, any member of the audience can join the fishbowl panel by replacing an existing participant. The discussion continues with participants frequently entering and leaving the panel until the time is up. The moderator then summarizes the discussion.

3:15 PM - 4:45 PM

Seminar 10 (Intermediate)

Energy Master Planning of a Geothermal Community

Sponsor: 7.3 Operation, Maintenance and Cost Management, 7.6 Building Energy Performance, 6.8

Chair: Jill Kurtz, Page Southerland Page, Inc., Weston Lakes, TX

Yampa Valley Housing Authority's master plan for workforce housing needed a complementary energy framework to inform the community horizontal and vertical energy infrastructure. The team developed a strategy to compare multiple systems including community geothermal and analyzing lifecycle costs, carbon, net zero potential, peak modeling, and community impact benefits. The team worked closely with the Yampa Valley Sustainability Council's, coordinated load calculations with Yampa Valley Electric Cooperative, and connected analysis to potential grants and funding streams. Presenters will discuss the complexity of community scale modeling, stakeholder engagement, early feasibility for geothermal master planning, and a triple bottom line analysis.

1. Introduction to YVHA, the workforce housing crisis, and the Brown Ranch Solution

Jill Kurtz, Page Southerland Page, Inc., Weston Lakes, TX

2. Coordinating the Plan: The Influence of Partners

Greg Tinkler, CGD, Full Member, Page/, Fulshear, TX

3. Calculating for the Plan: Modeling to Reveal the Right Approach

James Principe, Associate, Page, Weston Lakes, TX

4. Community Engagement and Costs of the Plan: Stakeholder Education, Triple Bottom Line Analysis, and Board Adoption

Catherine A Tinkler, EBCP, PMP, LEED AP O+M, Associate, Page Southerland Page, Inc., Weston Lakes, TX

Wednesday, June 26

Wednesday, June 26, 9:45 AM - 10:45 AM

Debate 1 (Intermediate)

ASHRAE Corner Debate

Chair: John D Bynum, PhD, Associate, Arup Ireland

The tools utilized for design, communication, and documentation in the construction industry have evolved significantly from the days of hand drafting, blueprints, and slide rules. While there are many different tools with varying capabilities available to construction professionals, are they what is needed in the industry today?

9:45 AM - 10:45 AM

Panel 6 (Intermediate)

The Importance of Optimizing Distributed Energy Resources in Grid Interactive Buildings for Carbon Neutrality

Moderator: Snowil Lopes¹

Chair: Snowil Lopes¹, Ramtin Hadidi¹, Wayne Johnson² and Gregory Hudson³, (1)Clemson University, Clemson, SC(2)Duke Energy(3)RMF Engineering, Inc.

For commercial and institutional buildings, decarbonization efforts like solar have slowed due to larger demand, rooftop complexities and cost benefit considerations. Yet, commercial and institutional buildings would benefit from newer technologies in distributed energy resources such as small hydro/wind turbines, solar PV, batteries, and on-premises recovery systems. These systems enable larger buildings to distribute energy resources which can use and create energy behind the utility meter, store it for demand flexibility and feed energy into the grid when net positive. DER's can be connected for generation and distribution both locally and externally.

Wednesday, June 26, 11:00 AM - 12:00 PM

Panel 7 (Basic)

Looking to the Future: Weather Data Opportunities and Challenges

This panel discussion provides a comprehensive view of considerations, including opportunities and challenges, for the use of future weather data in design and analysis. This session showcases three different perspectives and highlights that not all future weather data is the same, and the many applications. Following the presentations, there will be time for discussion to align or find gaps, and questions including a call to action.

1. Machine Learning for the Creation of Future Weather Files in Building Physics Simulations

Barbara Gao¹, Parag Rastogi, PhD, CEng, MCIBSE, MASHRAE² and Elyse M Malherek, Associate³, (1) Thornton Tomasetti, New York, NY, (2)GRESB, Glasgow, United Kingdom, (3)Willdan, ANAHEIM, CA

11:00 AM - 12:00 PM

Seminar 11 (Intermediate)

Solving Complex Design Challenges Using Computational Models and BIM Collaboration

This session focuses on approaches to solving complex design challenges with respect to safety and comfort. Using computational models, design teams are improving fire protection safety for first responders. Occupants, are improving occupant comfort experiences in musical performance centers. Using a common data environment to collaborate on the expansion of a mass transit system serving millions of riders daily is also examined.

1. Moving Toward Smart Fire Protection: Develop a Protocol for Fire Protection Decision-Making Based on Building Information Model & Fire Dynamic Model

Xiaolei Chen¹ and Frank Wang, Senior Fire Protection Engineer², (1) California State University, Los Angeles, LOS ANGELES, CA, (2) Jensen Hughes, Los Angeles, CA

2. Computational Fluid Dynamics for Thermal Comfort Analysis - Brown University Case Study

Christopher Ethan Nazareno, Mechanical Engineer, Associate, Arup, New York, NY

3. Delhi Metro's Digital Transformation with BIM Solutions

Sekh Samim, Deputy Chief Architect, Affiliate, Delhi Metro Rail Corp, New Delhi, India