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

CIDCO Keynote 1 (Intermediate)

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

Room: Grand Ballroom 5 & 6

Kent Peterson, P2S Inc.

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

CIDCO Panel 1 (Intermediate)

Beating the MacLeamy Curve

Room: Grand Ballroom 1

Chair: Richard Walter Fenrich, PhD, xStar Research, Blacksburg, VA

Panelists: Amanda E Bogner, PE, Full Member, Energy Studio Inc, Omaha, NE, Daniel Overbey, Browning Day, Indianapolis, IN and Kevin Hutton, IU Health

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

CIDCO Seminar 1 (Advanced)

AI and Building Performance: An Overview and Practical Application

Room: Grand Ballroom 2
Chair: Justin S Shultz, PhD, Associate, Page, Washington, 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.An Overview of AI for Building Performance Analysts: Opportunities and Challenges
***Justin S Shultz, PhD, BEMP, Associate**, Page, Washington, DC*

2. AI-Integrated Energy Modelling Frameworks: Applications and Future Direction
***Mo S Elsayed, PhD**, Page, Washington, DC*

Monday, June 24, 11:00 AM - 12:00 PM

CIDCO Panel 2 (Intermediate)

Improving Productivity: Tools, Techniques and Policies

Room: Grand Ballroom 1
Chair: Drew Champlin, ASHRAE

Representatives from the conference sponsors discuss tools, techniques and policies that are available now to help improve productivity in design, construction and operations.

11:00 AM - 12:00 PM

CIDCO Seminar 2 (Intermediate)

Energy and Carbon Reduction Modelling & Analysis

Room: Grand Ballroom 2
Chair: John D Bynum, PhD, Associate, Arup Ireland

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
***Gina Correa** and Jean Pierre Correa, Eng., 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

CIDCO Seminar 3 (Intermediate)

Integrated Design Session

Room: Grand Ballroom 1
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

CIDCO Seminar 4 (Intermediate)

Real Time Monitoring and Predictive Analysis

Room: Grand Ballroom 2

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

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, Affiliate**, U.S. Engineering Company Construction, Kansas City, MO*

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

CIDCO Panel 3 (Intermediate)

ASHRAE HQ Project: Lessons Learned

Room: Grand Ballroom 1

Chair: Ginger Scoggins, PE, CEM, CxA, FASHRAE, Presidential Fellow Member, Engineered Designs Inc, CARY, NC, Panelists: Stephanie Reiniche, ASHRAE, Peachtree Corners, GA and Stanton Stafford, PE, LEED Fellow, Member, Buro Happold, 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

CIDCO Seminar 5 (Intermediate)

A Better Future Weather File for Energy Simulation

Room: Grand Ballroom 2

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, FAIA**[1] and Amanda Farris[2], (1)Center for Sustainable Building Research, Minneapolis, MN, (2)University of Minnesota Climate Adaptation Partnership (MCAP)*

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

***Elyse M Malherek, Associate**, Willdan, ANAHEIM, CA*

Tuesday, June 25

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

CIDCO Keynote 2 (Intermediate)

Data Driven Future for Integrated Design, Construction and Operations

Room: Grand Ballroom 5 & 6

Rajnish B Setty, Full Member, Setty & Associates International, PLLC, Washington, DC

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

CIDCO Panel 4 (Intermediate)

Generative AI Impact on Design and Construction

Room: Grand Ballroom 1

Chair: 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, Associate, 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

CIDCO Seminar 6 (Intermediate)

Digital Twin Methodologies and Case Studies

Room: Grand Ballroom 2

Chair: Susan Collins, COO, Whole Building Systems, Mt Pleasant, SC

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

CIDCO Panel 5 (Intermediate)

President's Roundtable on Workforce Development

Room: Grand Ballroom 2

Chair: 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

CIDCO Seminar 7 (Intermediate)

BIM Standards and Guidelines for Integrated Building Design and Construction

Room: Grand Ballroom 1

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. 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*

2. Overview of the Next Generation BIM Standard at NIBS – National BIM Standard 4.0
***Carrie Sturts Dossick, P.E.**, University of Washington, Seattle, WA*

3. How Building Owners, Architects, and Engineers Can Use These Standards in the BIM Workflows
***Kimberly Pierson, PE, CEM, GBE, PMP, LC, LEED GA, BEAP, Full Member**, Moseley Architects, Raleigh, NC*

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

CIDCO Seminar 8 (Intermediate)

Resilience and Modelling Future Weather

Room: Grand Ballroom 2

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

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
***Jaclyn R Kinson, Associate**, CDM Smith, Boston, MA*

2. 5 Resilience Simulations to Make Better Buildings
***Alexandra Lowrie Love, Affiliate**, JLL, Charlotte, NC*

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

CIDCO Panel 6 (Basic)

ASHRAE Fishbowl

Room: Grand Ballroom 1

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

CIDCO Seminar 9 (Intermediate)

Energy Master Planning of a Geothermal Community

Room: Grand Ballroom 2

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
Sheila Henderson[1] *and Jason Peasley*[2]*, (1)Brown Ranch, (2)Yampa Valley Housing Authority*

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, 8:00 AM - 9:00 AM

CIDCO Keynote 3 (Intermediate)

The Role of Integrated Design for Advancing Near-Zero Industrial Campuses

Room: Grand Ballroom 5 & 6
Marianna Vallejo, PhD, Full Member, Jacobs, Athens, Greece
As integrated technology demands continue to grow across the globe, we've seen an increased demand for large-scale manufacturing and high-capacity data center campuses. Whether these campuses are greenfield construction or tackling the challenges of renovating and repurposing existing building stock, urban or rural, these projects represent some of the largest carbon and energy consumers in the built environment. This keynote considers the unique challenges and opportunities of implementing an integrated design approach for large-scale industrial campus projects. The presentation will explore the benefits of this approach in capturing and actualizing opportunities which allow these facilities to approach near-zero impact goals.

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

CIDCO Panel 7 (Intermediate)

Mandated Energy Performance: A Reasonable Step For Local Authorities to Take

Room: Grand Ballroom 1
Chair: Annelise Smith, Full Member, Introba, Florissant, MO
Panelists: Mitchell Swann, P.E., Life Member, Resolution Management Consultants, Philadelphia, PA, Elizabeth K Tomlinson, P.E., Member, Stantec, Minneapolis, MN and Michael P Deru, PhD, Full Member, NREL (National Renewable Energy Lab), Lakewood, CO
Many jurisdictions are setting hard targets for energy use in commercial buildings - either as EUI or CO2e limits. Benchmark reporting is one thing, but hard limits set a nigher bar for performance, especially if there are financial penalties attached. Who is best able to ensure that targets are met or achieved? Should engineers be held responsible for the performance of their designs? Contractors for the quality of their construction? Owners for the quality of their operations? Who gets compensated if the targets aren't met? What would that look like? Come hear our panelists discuss the pros and cons.

9:45 AM - 10:45 AM

CIDCO Panel 8 (Intermediate)

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

Room: Grand Ballroom 2
Chair: Snowil Lopes, Clemson University, CLEMSON, SC,
Panelists: Ramtin Hadidi, Clemson University, Clemson, SC, Wayne Johnson, Duke Energy, Gregory Hudson, RMF Engineering, Inc. and Ian Colten, Davis and Plaumin Inc., Lexington, KY

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

CIDCO Panel 9 (Basic)

Looking to the Future: Weather Data Opportunities and Challenges

Room: Grand Ballroom 1

Chair: Parag Rastogi, PhD, CEng, MCIBSE, MASHRAE, GRESB, Glasgow, United Kingdom

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

Parag Rastogi, PhD, CEng, MCIBSE, MASHRAE[1]*, Barbara Gao*[2] *and Elyse M Malherek, Associate*[3]*, (1)GRESB, Glasgow, United Kingdom, (2)Thornton Tomasetti, New York, NY, (3)Willdan, ANAHEIM, CA*

11:00 AM - 12:00 PM

CIDCO Seminar 10 (Intermediate)

Solving Complex Design Challenges Using Computational Models and BIM Collaboration

Room: Grand Ballroom 2

Chair: Susan Collins, COO, Whole Building Systems, Mt Pleasant, SC

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 Chen[1] *and Frank Wang, Senior Fire Protection Engineer*[2]*, (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*