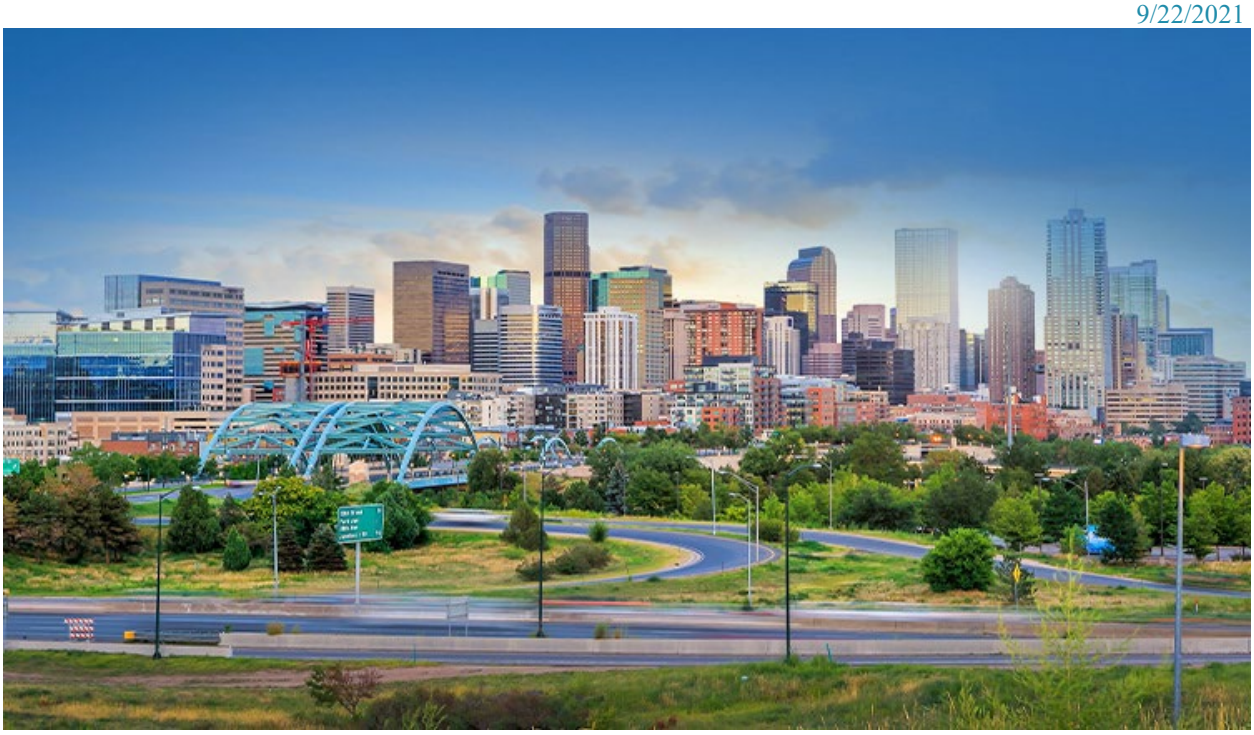

2021 ASHRAE Building Performance Analysis Conference

November 10th - November 12th, 2021

Wednesday, November 10

Wednesday, November 10, 8:10 AM - 9:00 AM

Keynote (Intermediate)

Josh Radoff

Decarbonization at Scale

Room: Marco Polo

The race is on. Decarbonization must take place at a rapid pace across all sectors of our economy. At least 50% reduction by 2030. And zero carbon by 2040. We know the general blueprint for how to get there, but we also need to revisit out basic assumptions of what each building, district, campus, and city is trying to achieve. Is net zero energy still the right goal? Probably not. Do our renewable procurement methods currently deliver the goals we want to see? Again, likely no.

Wednesday, November 10, 9:10 AM - 10:10 AM

Seminar 1 (Intermediate)

Advancements in Controls, Airflow Modeling and Operations

Room: Marco Polo

This session covers a variety of topics including the integration of CFD modeling into the mainstream architectural design process, the development of a continuous improvement process for pandemic resilience focusing on operational strategies, and advanced lighting controls for a factory building using an Artificial Neural Network (ANN) model based on detailed physics.

1. Evaluation of a Framework for the Integration of CFD into the Early Stages of Architectural Design Using Delphi Method

Soo Jeong Jo[1] *and James Jones, Ph.D.*[2]*, (1) Louisiana State University, Baton Rouge, LA, (2) Virginia Tech, Blacksburg, VA*

2. Streamlined Process for Improving Pandemic Resilience in the Built Environment
***Nancy McClellan, MPH, CIH, CHMM**, American Industrial Hygiene Association, Falls Church, VA*

3. Deep Deterministic Policy Gradient-Based Lighting Control for a Factory Building
***Young-Sub Kim** and Cheol-Soo Park, Ph.D., Seoul National University, Seoul, Korea, Republic of (South)*

Wednesday, November 10, 10:30 AM - 12:00 PM

Seminar 2 (Intermediate)

Existing Building and Analysis

Room: Marco Polo

This session covers multiple topics related to analysis of existing buildings. The first presentation discusses challenges with modeling historic existing buildings, providing an overview of the many enclosure-related applications for computer modeling in the renovation of historic buildings. The second presentation talks about using Bayesian inference for parameter identification in building energy modeling for existing buildings. The third presentation discusses the importance of operation data and how the year 2020 was an anomaly and can provide insights that can lead to more accurate holiday and weekend occupancy and equipment profiles.

1. An Overview of Building Energy Modeling Enclosure-Related Applications in Historic Building Renovations
***Abigail Sefah**, Simpson Gumpertz & Heger, Boston, MA*

2. Guideline of Parameter Identifiability Analysis for Bayesian Inference of Building Energy Model
***Dong Hyuk Yi, Ph.D.** and Cheol-Soo Park, Ph.D., Seoul National University, Seoul, Korea, Republic of (South)*

3. 2020 Operational Data Is Gold
***Alex Lowrie**, Little Diversified Architectural Consulting, Charlotte, NC*

Wednesday, November 10, 1:40 PM - 3:10 PM

Seminar 3 (Advanced)

Optimizing Buildings for Zero Carbon Lifetime Operations

Room: Marco Polo

This session is a follow-up to our 2020 ASHRAE BPAC session: 30-yr GHG Forecasts Using Marginal and Average Emissions, where we reviewed office buildings' lifetime emissions using NREL's hourly Cambium data for multiple cities. We will now attempt to minimize the buildings' operational carbon by employing various strategies including electrification, onsite renewables, load shifting and battery storage. Inevitably some regional electrical grids and buildings will have better alignment with 24/7 options for low carbon energy while others will struggle with limited onsite resources and a carbon intensive grid. We will apply NREL's ZEB 2.0 methodology to our zero carbon goals.

1. Optimizing Buildings for Zero Carbon Lifetime Operations: Intro
***Caitlin Anderson, P.E., Member**, ME Engineers, Denver, CO*

2. Optimizing Buildings for Zero Carbon Lifetime Operations: Onsite Renewables
***Sedighehsadat Mirianhosseinabadi, Ph.D.**, ME Engineers, Golden, CO*

3. Optimizing Buildings for Zero Carbon Lifetime Operations: Storage
***Jamy Bacchus, P.E., BEMP, Member**, ME Engineers, Denver, CO*

Wednesday, November 10, 3:30 PM - 5:00 PM

Seminar 4 (Intermediate)

Facilitation of Modeling, Cost Analysis and Behavioral Change

Room: Marco Polo

This session will start with a presentation that analyzes two case studies for two LEED Platinum and Living Building Certified projects by covering aspects among the projects that affect occupant behavior. The second presentation will present lessons learned in the development of analysis tools intended for architects while trying to provide input to design teams in a cost-effective manner. The third presentation introduces new cost evaluation resources compiled by Glumac Inc. to inform the selection of building energy efficiency measures, increasing their chances of inclusion in final designs.

1. Occupant Behavior & Comfort
***Erica McBride**[1] and Shruti Borle, Associate Member[2], (1)Architectural Nexus, Sacramento, CA, (2)Architectural Nexus, Salt Lake City, UT*

2. Lessons from Making Software for Architects
***Andrew Corney**, Trimble, London, United Kingdom*

3. The Cost of Multifamily Energy Efficiency in Oregon
***Katherine Anderson**, Glumac, Portland, OR*

Thursday, November 11

Thursday, November 11, 8:10 AM - 9:00 AM
Keynote (Intermediate)

Sue Reilly
Lessons for the Twenties

Room: Marco Polo
This presentation draws from our experience and highlights our projects, technology and partnerships that are launching us into the 2020's. Projects include zero energy multifamily and offices. On the technology side, we've been working with a multitude of heat pump and energy recovery applications for colder climates. In addition to our traditional clients, we are partnering with jurisdictions and research organization on energy codes and electrification. All this activity bodes well for our industry and our climate.

9:10 AM - 10:10 AM
Seminar 5 (Intermediate)

Modeling Advances I

Room: Marco Polo
This session conveys recent developments that have been made for simulation of novel technology and controls in addition to updates to industry standards that evaluate simulation tool accuracy. The first presentation presents a new DX cooling coil model in EnergyPlus that can provide precise control over temperature and humidity simultaneously. The second presentation discusses updates to the thermal fabric test cases in ASHRAE Standard 140, the gold standard for modeling tool accuracy. The third presentation discusses new CBECC-Res capabilities for simulating load shifting potential of demand response heat pump water heaters.

1. A New DX Coil Model with Subcool and Reheat Modes in EnergyPlus
***Lixing Gu, Ph.D., P.E., Member**, Florida Solar Energy Center, Cocoa, FL*

2. Update of ASHRAE Standard 140/Bestest Thermal Fabric Modeling Test Cases
***Joel Neymark, P.E., Member**, J. Neymark & Associates, Golden, CO*

3. Simulating Demand Response Heat Pump Water Heaters for California Code Compliance
***Aaron Boranian, BEMP, Associate Member**[1] and Ben Larson[2], (1) Big Ladder Software, Denver, CO, (2) Larson Energy Research, Menomonie, WI*

Thursday, November 11, 10:30 AM - 12:00 PM
Seminar 6 (Intermediate)

Unmet Hours --LIVE!

Room: Marco Polo
This session presents attendees with an opportunity to interact with their peers and "crowd source" answers to their burning questions. This is the same intent as unmethours.com -- the question-answer forum for building energy simulations but offered in a live, interactive, and dynamic format for conference attendees. Participants are given time to think of a challenge they are facing before presenting their problem to a group for brainstorming. This allows participants to seek out as well as provide peer-supported advice on solving each other's challenges. What answers will you find (or give) in Unmet Hours -- LIVE?

Thursday, November 11, 1:30 PM - 3:30 PM

LowDown ShowDown (Intermediate)

2021 ASHRAE LowDown Showdown Modeling Competition
Team Presentations

Chair: John Bynum, Ph.D., Member, ARUP, Dublin, Ireland

The 2021 LowDown Showdown model building will be located in Puerto Rico. Participating Teams will design a 75,000 sf, residential care center located at a site on the island to be chosen by each team. The building will contain residences, offices, amenities and clinical spaces.

1.Agua Viviente
***Dustin Lane**, BMA Mechanical Plus*

2.Al-Khwarizmi's Team
***Marwa Alkurdi**, ISG*

3.C +VE (Carbon Positive)
***Aaditya Patel**, Stantec*

4.C.R.E.A.M.
***Emir Pekdemir**, WSP USA*

5.Faro de Luz
***Alfred Uzokwe Jr.**, GSA*

6.MARKEL
***Ashu Gupta, Member**, Design To Occupancy, Jaipur, India*

7.Shunya Power
***Pinaki Acharya**, Apogee Consulting Group, P.A.*

8.The Carbonbusters
***Abbott Price**, BR+A*

9.The Planeteers
***Forest Tanier-Gesner**, PAE*

Thursday, November 11, 4:00 PM - 5:00 PM

LowDown ShowDown (Basic)

2021 LowDown Showdown Judges' Q&A

Chair: John Bynum, Arup

Friday, November 12

Friday, November 12, 8:10 AM - 9:00 AM

Keynote (Intermediate)

Lauren Wallace
The Silver Lining to a World Under Fire: Our IQ Re IAQ is on the Rise

Room: Marco Polo

57,000 wildfires. 2,460,000 global COVID-19-related deaths. The year 2020, a year we all wish to forget, had a lasting, devastating impact worldwide. For us, it was a pivotal year that turned everyone's attention towards indoor air quality. Why did it take a world on fire and a global pandemic for our industry to finally start acknowledging indoor air quality concerns? And furthermore, how do we begin to understand something we can't see, hear, or feel? Confounding and conflicting advice over the entire span of 2020 made our work in indoor air quality that much harder, yet that much more important. The bad news is that SARS-CoV-2 is not the first, nor will it be the last, airborne virus. The good news is our toolkit to understand, measure, improve and maintain indoor air quality has grown rapidly.

Friday, November 12, 9:10 AM - 10:10 AM

Seminar 7 (Intermediate)

Passive Survivability, Resiliency and Modeling for the Future

Room: Marco Polo

Rapidly changing climate and weather patterns are placing new structural and thermal stresses on buildings, and effective responses are needed to maintain building structural integrity, thermal function and community-wide health, safety, and economic resilience. The first presentation evaluates the ability of dynamic glazing to diminish summer solar heat gain in highly glazed office buildings. The second presentation from the National Centers for Environmental Information analyzes whether the changing climate conditions warrant updating climate normals for building performance simulation programs and how they impact a prototype building. The third presentation discusses the intersection of building-level energy resilience and community resilience with respect to continuity in business functions and food access during interruptions to grid power.

1. Improving Thermal Resilience with Dynamic Glazing: A Case Study
***Ranojoy Dutta, BEMP and HBDP, Associate Member**, View Inc, Milpitas, CA*

2. Normal (Climate) Is Changing: How Does That Impact Building Simulation Results?
***Drury Crawley, Ph.D., BEMP, Fellow ASHRAE**[1] and Linda Lawrie, Member[2], (1)Bentley Systems, Inc., Washington, DC, (2)DHL Consulting LLC, Pagosa Springs, CO*

3. A Building Science Approach to Measuring Community Energy Resilience
***Lino Sanchez**[1], Paul Mathew, Ph.D., Member[1], Luis Fernandes, Ph.D.[1] and Sang Hoon Lee, Ph.D.[2], (1)Lawrence Berkeley National Laboratory, Berkeley, CA, (2)Lawrence Berkeley National Laboratory, United States of America*

Friday, November 12, 10:30 AM - 12:00 PM

Seminar 8 (Intermediate)

Urban Scale Modeling I

Room: Marco Polo

This session delves into urban building energy modeling (UBEM). The first presentation describes an approach to assessing the energy resilience of an urban district against various anticipated threat conditions. The second presentation discusses how changes in rooftop solar reflectivity and thermal emissivity affect annual building utility costs across 15 climate zones. The third presentation talks about UBEM for a small city, which was used to establish a tiered building retrofit program.

1. Modeling the Resilience of Interacting Energy Networks at Urban Scale
***Michael O'Keefe**, Big Ladder Software, Denver, CO*

2. The Impact of Optimal Rooftop Radiative Property Combinations on Urban Airshed: Simulations for 15 Climate Zones in the U.S.
***Jyothis Anand, Student Member** and David Sailor, Arizona State University, Tempe, AZ*

3. Using Urban Building Energy Modeling to Meet Emissions Reduction Targets in a Small American City
***Zachary Berzolla, Student Member**, Massachusetts Institute of Technology, Cambridge, MA*

Closing Session