2017 Building Performance Analysis Conference

Atlanta Marriott Buckhead Hotel & Conference Center
September 27th - September 29th, 2017
ashrae.org/BuildPerform2017

Download the event app by clicking the icon below:

Gold Sponsors

AUTODESK

Silver Sponsors

Carrier
turn to the experts

TRANE

DesignBuilder
SOFTWARE

Bronze Sponsors

sefaira

Friends

cype

Tuesday, September 26

Tuesday, September 26, 5:30 PM - 7:00 PM

Welcome Reception

Welcome Reception
Room: Buckhead A

Wednesday, September 27

Wednesday, September 27, 7:30 AM - 8:00 AM

Vendor Demonstrations

Vendor Demo: Carrier
Room: Heritage C

Wednesday, September 27, 8:15 AM - 9:00 AM

Keynote

Keynote
Room: Heritage B
Jim Vallort, Fellow ASHRAE, is executive vice president, Environmental Systems Design, Denver, Colorado. A 300 person full service Mechanical, Electrical, Plumbing and Technology consulting firm that provides design, commissioning and consulting services worldwide. He coordinates the commissioning, energy, automation, certification and technology efforts for ESD across all markets. Jim Vallort's experience within ASHRAE includes serving on the Finance Committee, various TCs, Society Planning Committee as well as having the honor to serve on the ASHRAE Society Board of Directors as a vice president (2014 to 2016), Director at Large (2005-2008) and as Region VI director and regional chair (2001-2004). He is a past president of the Illinois Chapter in 1999-2000. He currently is a member of the Rocky Mountain Chapter and the Illinois Chapter of ASHRAE. Vallort is the recipient of an ASHRAE Exceptional Service Award and ASHRAE Fellow. He holds a Bachelor of Science in Mechanical Engineering from Bradley University.

Intelligent Buildings – Technology Is Changing What Is Possible in the Built Environment
James Vallort, Fellow ASHRAE*, Environmental Systems Design, Inc., Chicago, IL*

There is a lot of buzz around Intelligent, or Smart, Buildings, but what is an Intelligent Building? This presentation will examine the answers to this question and how you can put your building on its path to a "higher education".
Advancements in technology have given the engineer the ability to aggregate and share data across disparate systems thereby creating opportunities to increase energy and operational efficiencies, improve occupant comfort, safety, productivity, and enrich the visualization capabilities for the organization's numerous internal and external stakeholders. The intelligent building platform will result in a more efficient, secure and productive asset that has the capacity to continuously improve over its lifetime.

Wednesday, September 27, 9:15 AM - 10:45 AM

Steering Committee Session 1

Performance Modeling and Design: How Analysis can Influence the Design Process

Room: Buckhead A
Chair: Vikram Sami, Olson Kundig, Seattle, WA
This session discusses how LMN does some in-house simulation and works with 3rd parties to help make decisions on cost-effective passive and active systems. The session also discusses a process used to perform early modeling for climate, daylight and thermal performance, looking at aspects of heat flow through the building envelope.

1. Modeling for and During the Design Phase, Part 1
Kjell Anderson, AIA*, LMN Architects, Seattle, WA*

Kjell Anderson author of 'Design Energy Simulation for Architects' discusses how LMN does some in-house simulation and works with 3rd parties to help make decisions on cost-effective passive and active systems.

2. Modeling for and During the Design Phase, Part 2
***Jim Hanford**, The Miller Hull Partnership, Seattle, WA*

Jim Hanford of Miller Hull talks about using early energy modeling for developing project performance targets and confirming project scope and budget related to energy performance and systems design.

3. Modeling for and During the Design Phase, Part 3
***Vikram Sami**, Olson Kundig, Seattle, WA*

Vikram Sami discusses the process that Olson Kundig is using to perform early modeling for climate, daylight and thermal performance, looking at aspects of heat flow through the building envelope.

Wednesday, September 27, 9:15 AM - 10:45 AM

Seminar 1

Making the Case for Energy Models in the Integrated Design Process and Retrofits

NY PDH G

Room: Heritage B
Chair: Mariah Schwartz, Whole Building Systems, LLC, Charleston, SC

This session explores the cost and performance benefits of using energy modeling in an integrated design process and methods for effective communication and data transfer among design team members. The session also focuses on the importance of calibrated energy models as effective tools to demonstrate historical performance and the ability to forecast future savings.

1. The Value of Energy Modeling to Architects and Owners
***Anica Landreneau**, HOK, Washington, DC*

Energy Modeling is often seen as a costly add-on service that is only necessary for projects pursuing LEED. This presentation demonstrates how energy modeling can identify first cost savings and protect high performance systems in the value engineering process, in addition to paying for itself within 1-3 months of operational savings.

2. Why Calibrate? The Building's Next Step
***Edward Gillett, P.E., Member**, exp Global, Orlando, FL*

Why is calibration of an energy model needed? What can be obtained from it? Why do we pay these guys? This presentation covers everything from the basics to the advanced of what it means to calibrate and validate a building model and why it should be looked at as an investment to be efficient on every building.

Wednesday, September 27, 11:15 AM - 12:15 PM

Steering Committee Session 2

Building Performance Analysis for Policymaking, Part 1

Room: Buckhead A

Chair: Drury Crawley, Ph.D., Fellow ASHRAE, Bentley Systems, Inc., Washington, DC

Building performance simulation is regularly used to support decision making in the design or retrofit of individual buildings. Yet, one of its most powerful uses lies beyond the performance of individual buildings in supporting building policy setting and decision making: to develop minimum standard regulations, assess the value of improved building performance for utilities or governments, or support high-level, public decision-making.

1. Energy Modeling Tools and Methods for Developing Zero Carbon Buildings Policy

***Christian Cianfrone, P.Eng., BEMP, Member**, Morrison Hershfield Corporation, Vancouver, BC, Canada*

Significant strides have been made in Canada with regards to the development of net-zero / zero carbon building policies and programs, ranging from provincial legislation to municipal policy to voluntary green building programs. These policies and programs have been primarily influenced using data-driven guidance, generated from a multitude of simulation exercises and tools, which include: an urban scale environmental impact calculator to understand the impacts of land-use planning decisions; whole building energy simulations with parametric analysis and data visualization to develop energy use intensity, heating demand and greenhouse gas emissions targets for building types and climates; 3D thermal modeling to understand thermal bridging impacts and associated achievable envelope solutions for robust energy outcomes and resiliency co-benefits. This presentation outlines some of the technical aspects of each tool, the methodology and the achieved outcomes.

2. Statewide Electricity and Demand Capacity Savings from the International Energy Conservation Code Adoption for Single-Family Residences in Texas

***Juan-Carlos Baltazar, Ph.D., P.E., BEMP, Member**, Texas A&M University, College Station, TX*

In September 2001, Texas adopted the 2000 International Energy Conservation Code (IECC), including the 2001 Supplement as the first statewide energy code. Since then several improved versions of IECC have been published and adopted by individual jurisdictions. Since then the building energy code have substantially improved the energy efficiency of housing in Texas, resulting in reduced annual heating/cooling, which is reflected in the reduced utility bills for residential customers and significant reductions of emissions. This presentation covers the statewide electricity and electric demand savings achieved from the adoption of the different International Energy Conservation Code (IECC) versions for single-family residences in Texas and the corresponding construction cost increases over the fourteen-year period from 2002 through 2015.

3. Building Simulation for Policy Support

***Drury Crawley, Ph.D., BEMP, Fellow ASHRAE**, Bentley Systems, Inc., Washington, DC*

This presentation provides an overview of a number of areas where building simulation has been used to set policy. This includes developing minimum standards, utility incentives and public decision-making.

11:15 AM - 12:15 PM

Seminar 2

Best Practices in HVAC Load Analysis

Room: Heritage B

Chair: Carrie Brown, Ph.D., Member, Resource Refocus, LLC, Oakland, CA

Accurate HVAC modeling is key to designing appropriately sized systems that have the potential to decrease annual energy use, while maintaining occupant comfort. This session covers three examples of detailed HVAC modeling methodologies, the variability of their results and recommended best practices. The first presentation compares the results of TRACE 700 cooling load methodologies and provides an explanation of differences and discrepancies uncovered. The second discusses the impact of VRF curve-fitting methods and proposes a way to create performance curves in EnergyPlus. The third presentation explores ground source variable refrigerant flow heat recovery (VRF-HR) system design in net-zero building design.

1. Reproducing Off-Rated Performance of Variable Refrigerant Flow Heat Pumps in Energyplus
***Bárbara Torregrosa-Jaime, Ph.D.**, Gaspar Payá-Ballester, P.Eng. and Benjamin Gonzalez, P.Eng., Associate Member, CYPE Software, Alicante, Spain*

The simulation of the HVAC systems performance under off-rated working conditions is key to obtain reliable predictions about their energy consumption throughout the year. Variable refrigerant flow (VRF) heat pump systems can be accurately simulated by means of performance curves fitted to manufacturers' data. However, the curve-fitting method can have an impact on the simulation results. This presentation proposes a method to create performance curves for VRF heat pumps in EnergyPlus that minimizes the differences between manufacturer and simulated data in global terms. The results show the influence of low part-load performance in the yearly power consumption of these systems.

2. Performance Evaluation of a Net-Zero Energy Building Design with a Ground Source Variable Refrigerant Flow Heat Recovery System
***Dongsu Kim, Student Member**[1], Sam J. Cox, Student Member[2], Heejin Cho, Ph.D., Associate Member[1], Jaeyoon Koh, Ph.D., Member[3] and Piljae Im, Ph.D., Member[4], (1)Mississippi State University, Mississippi State, MS, (2)Mississippi State Univeristy, Mississippi State, MS, (3)LG Electronics U.S.A., Inc., Alpharetta, GA, (4)Oak Ridge National Laboratory, Oak Ridge, TN*

This presentation evaluates the performance of a net-zero energy building design with a ground source variable refrigerant flow heat recovery (VRF-HR) system and onsite renewable generations systems to minimize heating and cooling energy usage as well as achieve a net-zero energy building. The prototype medium office building model, developed by the U.S. Department of Energy, are used to assess the performance of the ground source VRF-HR system using a whole building energy simulation, EnergyPlus. The results indicate that the system design and operation need to be properly determined and optimized to effectively achieve net-zero energy building in various climate locations.

Wednesday, September 27, 1:00 PM - 1:30 PM
Vendor Demonstrations

Vendor Demo: DesignBuilder
Room: Heritage C

Wednesday, September 27, 1:45 PM - 3:15 PM
Steering Committee Session 3

Persistence of Performance: Lessons Learned from Modeled ZNE Projects with Post-Occupancy Data

NY PDH G

Room: Buckhead A
Chair: Carrie Brown, Ph.D., Member, Resource Refocus, LLC, Oakland, CA

This session explores ZNE modeling and monitoring best practices to encourage persistence of performance. Expert speakers highlight common hurdles encountered, frequent performance issues uncovered and lessons learned for future projects.

1. Retrofitting California Schools for ZNE Performance
***Hillary Weitze**, Integral Group, Oakland, CA*

Lessons learned from the California Investor Owned Utilities' Proposition 39 ZNE Pilot to design and monitor ZNE school retrofits.

2. Perspectives on Target Setting and Ongoing Performance Tracking on Public Campuses
***Porus Sam Antia**, Stantec, San Francisco, CA*

Best practices for goal setting and performance tracking in public campus settings.

3. ZNE Building Performance and Design Verification Methodologies
***Abhijeet Pande**, TRC, Oakland, CA*

Methodologies to validate predicted energy performance and enhance ongoing performance in ZNE buildings.

Wednesday, September 27, 1:45 PM - 3:15 PM

Seminar 3

Early Design Modeling and Performance Assessment

Room: Heritage B

Chair: Krishnan Gowri, Ph.D., Fellow ASHRAE, Autodesk, Bothell, WA

This session brings together industry experts on fenestration rating, generative design and environmental performance to provide new perspectives on designing high performance building envelope using early design modeling and performance assessment. Attendees gain new insight into interpreting the NFRC label information for energy modeling, learn about automatic form generation using advanced optimization techniques and the impact of embodied energy in the envelope materials on reducing carbon emissions.

1. Limitations of NFRC Product Ratings: A Case Study

***Monica N Maragos**, The Facade Group, LLC, Portland, OR*

NFRC ratings are a useful tool for comparing and selecting between a wide range of fenestration products. It is important, however, to understand that these ratings do not necessarily reflect project-specific product performance. Following a case study, this presentation sheds some light on the NFRC rating process and the deviation that can occur between ratings and actual product performance, while identifying the reasons behind this deviation. Understanding the potential divergence between NFRC rated performance and project-specific performance is essential in the process of calculating and evaluating energy efficiency, both on a fenestration product level and also concerning whole building performance.

2. The Automated Facade

***Dustin Altschul**, Lawrence Technological University, Grand Rapids, MI*

Climate responsive architecture requires a multifaceted response to a range of temporal human comfort and weather conditions. Conditions that need to be explored with high degrees of design iterations in a relative quick period of time. This presentation uses the brise-soleil as a case study example of how a generative algorithm can be designed to fully utilize hourly data for optimized performance of façade design geometry. Using multi-variable optimization for automated form finding of façade geometry, lessons learned and considerations noted when designing and employing a multi-criteria optimization automated algorithmic script is presented.

3. Building Life-Cycle Carbon Neutrality

***Natalia Quintanilla**, Adrian Smith + Gordon Gill Architecture, Chicago, IL*

As building operations carbon emissions are continuously decreased, greater focus is placed on the embodied carbon of the construction materials. This presentation identifies strategies to achieve operational and embodied life-cycle carbon neutrality for a commercial building in Canada. Exterior wall designs and mechanical systems improvements were studied for reducing the operational carbon emissions. Embodied carbon emissions were calculated for structural and exterior wall elements of the building. The study shows that using a high-performance façade, all-electrical mechanical systems, and low embodied carbon materials, including wood-concrete composite floor slabs, the life-cycle carbon emissions of the building could be reduced by 80%.

Wednesday, September 27, 3:45 PM - 5:15 PM

Steering Committee Session 4

Integrating the HVAC Engineering Workflow into the BIM Work Environment

Room: Buckhead A

Chair: Dennis Knight, P.E., Fellow ASHRAE, Whole Building Systems, LLC, Charleston, SC

The presenters in this session have extensive experience designing the mechanical systems for large and small high performance building projects throughout the world. The session focuses on sharing how they have leveraged the power of BIM and its ability to create data once and use it many times to improve the way they analyze, design, coordinate and integrate HVAC systems into high performance building design and construction.

1. Engineering Workflow with BIM

***Eddie Ortiz**, P2S Engineering Inc., Long Beach, CA*

Design Engineers must use an exhausting amount of software platforms to complete new construction projects. There is repetitive information that must be re-entered across the platforms adding more design time resulting in tighter deadlines. The results are then taken across the platforms from one software to the next. It is critical that information is not lost during this process as the information affects the entire system and often other disciplines. However, it is often seen that mistakes are made due to human error. This presentation introduces the audience to the workflow that has been developed at P2S that speeds up production by eliminating repetition of data input and how Revit is leveraged to provide useful QA/QC visuals.

2. Influencing Design: Analytical Energy Modeling in Early Design Phases
Kenneth A. Griffin, Affiliate*, Environmental Systems Design, Chicago, IL*

The value of energy modeling in early design phases can be highlighted with taking unique building forms and performing analytical energy simulations to inform and enhance the design. Conceptual and schematic design have a bit of freedom where energy analytics can be applied to optimize orientation, massing, the envelope, internal gains, daylighting, HVAC strategies and renewable technology. This presentation reviews case studies of energy modeling techniques for complex facades and how the energy analysis of these buildings can be applied in the early design phases and the associated impact the analysis can have on the future of the project.

Wednesday, September 27, 3:45 PM - 5:15 PM

Seminar 4

Existing Building Modeling to Validate Building Performance Improvement

Room: Heritage B
Chair: Mariah Schwartz, Whole Building Systems, LLC, Charleston, SC

These case studies demonstrate how calibrated energy models are used to help improve building performance. The presenters discuss their real-world processes for model calibration, benchmarking, monitoring and the use of databases to validate opportunities for EEMs.

1. Improving the Modeling and Analysis Dialogue between Architects and Engineers
Vanessa Hostick, AIA, Associate Member*, HOK, Washington, DC*

It is a continual challenge for practices to efficiently transfer data between disciplines for integrated design analysis. More clients are expecting reliable analysis earlier in design while many firms are committing to larger sustainable aspirations. It can be challenging to communicate everything from U values to system assumptions throughout each design phase. This presentation uses HOK case studies to demonstrate successful data transfer, improved communication with owners and designers and timing of the most useful information transfers. Also highlighted are team developed tracking tools that have assisted in the efficient transfer of information and data incorporation for high performing buildings.

2. How to Use Energy Modeling to Enhance Existing Buildings' Performance (case study of a GSA office building)
Ladan Ghobad, Ph.D., Associate Member*, Glumac, Sacramento, CA*

Frank Hagel Federal Building is a six-story office building located in Richmond, CA with approximately 546,000 SF. This presentation explains an investigation process that helped define how the building is currently performing and how it will perform after applying new energy efficiency measures (EEMs). It explains how the energy team overcame a number of obstacles during the energy modeling and calibration process. The energy modeling revealed the proposed EEMs in this building, optimization of the Cogeneration and maximizing PV would save around half of the operational cost in this building.

Wednesday, September 27, 5:00 PM - 5:30 PM

Vendor Demonstrations

Vendor Demo: Trane

Room: Heritage C

Thursday, September 28

Thursday, September 28, 7:30 AM - 8:00 AM

Vendor Demonstrations

Vendor Demo: AutoDesk

Room: Heritage C

Thursday, September 28, 8:15 AM - 9:45 AM

Panel

Architect (AIA), Engineer (ASHRAE), Contractor (MCAA) Panel

Room: Heritage B

Chair: Tim Wentz, Ph.D., Member, University of Nebraska - Lincoln, Lincoln, NE

Our industry is evolving rapidly, driven by technology to produce ever-higher performing buildings. This focus on performance requires an integrated approach to design, construction, operation and maintenance. The building industry and ultimately, society will benefit from a discussion that brings together architects, consulting engineers and contractors to address the issues that revolve around high performance buildings. This panel addresses ways to improve the business working relationships among architects, engineers and contractors and the organizations that serve these professionals and to provide a venue in which the disciplines share information and discuss perspectives on building design, construction, operation and maintenance.

The Architect Perspective
***Rand Ekmon**, HKS, Chicago, IL*

The Engineer Perspective
***Dennis Knight**, Whole Building Systems, LLC, Charleston, SC*

The Contractor Perspective
***Bob Snyder,** Binsky &Snyder, Piscataway Township, NJ*

8:15 AM - 9:45 AM

Steering Committee Session 5

Leading the Market Transformation in Energy and Environmental Design in the Built Environment through Integrated Design

NY PDH G

Room: Buckhead A

Chair: Drury Crawley, Ph.D., Fellow ASHRAE, Bentley Systems, Inc., Washington, DC

Since its inception the USGBC LEED Building Rating System has helped transform the way we approach the design, construction and operation of high performing buildings. This session provides a focus on the current LEED rating systems approach to integrated design, early phase design analysis and documenting the decisions that analysis informed. The three presenters will have been part of an integrated design team highlighting a case study where each stakeholder (presenter) shares their roles, responsibilities, work flows and best practices and how that process resulted in better outcomes for the buildings' owners, users and the community.

1. Net-Positive Energy Performance in the Southeast through an Integrative Design Process

***Ramana Koti**[1], Alissa Kingsley[1] and Todd Mowinski II, P.E., Associate Member[2], (1)Lord Aeck Sargent, Atlanta, GA, (2)Newcomb & Boyd, Atlanta, GA*

The 40,000 sf Living Building project at Georgia Tech is a partnership between The Kendeda Fund and Georgia Tech to create an exemplary education and research building. Beginning with a very inclusive 2-day super-charrette in fall 2016, the project is being designed for Net-Positive (105%) energy performance. Energy and daylight modeling have been an integral part of the design decision-making process. Measures include decoupled sensible and latent cooling, operable windows, triple pane glazing, daylighting, efficient LED lighting with controls, and a hybrid geothermal HVAC system. The in-progress predicted EUI is at 32 kBtu/sf/year, translating to a 17,000 sf photovoltaic array.

2. A Promise to the Public: Integrative Process and the Commitment to Sustainability
Lauren Wallace[1]*, Belinda Morrow*[2] *and Ellis Kirby*[3]*, (1)The Epsten Group, Atlanta, GA, (2)2M Design Consultants, Inc., Johns Creek, GA, (3)Fulton County Gov., Atlanta, GA*

In November of 2008, the citizens of Fulton County voted to approve a $275 million bond referendum that would allow the Atlanta-Fulton County Public Library System to move forward with a plan that includes 8 new library branches and necessary renovations for 24 existing branches. Through stakeholder engagement, it was clear from the beginning that both the public and the County wanted sustainability to be a focus for these projects. This session discusses the process, the successes, the obstacles and the importance behind the integrative process that has become a focus for the latest version of the LEED rating system.

Thursday, September 28, 10:15 AM - 11:45 AM
Seminar 5

Advanced Tools and Strategies for Performance-Based Design Exploration

NY PDH G

Room: Buckhead A
Chair: Krishnan Gowri, Ph.D., Fellow ASHRAE, Autodesk, Bothell, WA

This session introduces innovative new tools and techniques that can be readily adapted in practice for high performance building design using genetic algorithms, on-line comfort analysis tools and reinvented energy modeling workflows. The session focuses on exploring design options during early design stages with a specific performance objective covering thermal comfort, energy and total building performance.

1. Genetic Algorithms for Balancing Multiple Variables in Design Practice
Bomin Kim, AIA *and Younjin Lee, AIA, Sasaki Associates, Watertown, MA*

High-performance architecture can be a complicated and costly endeavor when you try to marry elements with a client's spatial values and needs. This session offers solutions. It's time to supplement rules of thumb and ubiquitously accepted practices with emerging software tools and analytics. Though they may sound intimidating, these tools can eliminate much of the guesswork and inconsistencies that often plague our projects.

2. Exposing Architectural Landmines with Online Thermal Comfort Tools
Robert Bean, P.L.(Eng.), Member*, Indoor Climate Consultants Inc., Calgary, AB, Canada*

Thermal discomfort risk assessment tools are simple to use and free of charge. What’s not to like about that? Want to show architects and building owners the consequences of their decisions when selecting excessive window to wall ratios, minimum insulation requirements and poor performance windows? With these new comfort utensils, designers can have an immediate and positive influence on the performance of building enclosures and choices in HVAC systems.

10:15 AM - 11:45 AM
Seminar 6

Effective Use of Energy Modeling Tools

NY PDH G

Room: Heritage B
Chair: James Dirkes II, P.E., Member, The Building Performance Team Inc, Grand Rapids, MI

This session explores differences between several daylighting software tools, innovative ground-coupled VRF and the effectiveness of various energy strategies for a county jail.

1. Comparison of Daylighting Capability in Performance-Based Building Simulation Tools
Ladan Ghobad, Ph.D., Associate Member*, Glumac, Sacramento, CA*

This presentation aims to helps design teams distinguish differences between performance-based tools: DIVA, Honeybee, Insight360 and DesignBuilder, and let them choose the right program based on their intention. This study offers observations on current functionality and limitations of simulation tools and compares their capability to generate accurate illuminance maps, generate annual climate-based daylighting results, perform advanced energy simulation and integrate accurate daylighting results to energy simulation. In addition, this study also includes information about cost, their interoperability with 3D modelling tools and their capability to generate LEED v.4 results.

2. Greening Jails: Variabilities That Impact the Building Energy Analysis
Bahareh Shirkhanloo, Student Member*, Ok-Youn Yu, Ph.D., P.E. and Andrew Windham, Ph.D., Associate Member, Appalachian State University, Boone, NC*

Energy modeling is a tool that can offer insight into where inefficiencies exist and also can help predict the savings and costs of different design and operational options. For this presentation, a county jail has been simulated at three different levels of resolution. The purpose is to assess what information can be obtained from the different levels of effort required for the models. The results of this work can aid decision makers by helping them understand the detail and effort needed in an energy model in order to obtain the information they seek.

Thursday, September 28, 1:30 PM - 3:30 PM
Special Session

ASHRAE LowDown Showdown
Room: Heritage B
Chair: Annie Marston, Ph.D., SIM2 Inc., London, United Kingdom
This year's competition showcases the work of nine teams and over 50 participants. The teams will retrofit an existing 43,942 sf office and warehouse building located in northern Virginia near Washington, DC.

Nothin but Net Zero
***Christian Taber, Member**, Big Ass Fans, Lexington, KY*

Sandstorm Stoppers
***Junaid Bin Naseer**, AECOM, Abu Dhabi, United Arab Emirates*

Sustainability Savants
***James R. Cullin**, PAE, Portland, OR*

Re+Ro
***Matthew Tokarik, Student Member**, Morrison Hershfield, Toronto, ON, Canada*

Thursday, September 28, 4:00 PM - 5:00 PM
Special Session

ASHRAE LowDown Showdown Q&A Session
Room: Heritage B
Chair: Annie Marston, Ph.D., SIM2 Inc., London, United Kingdom
Participants will field questions from the audience about their presentations. Following the Q&A session, the audience will vote to recognize a fan favorite team.

Thursday, September 28, 6:00 PM - 8:00 PM
Social Events

Reception/LowDown Showdown Winners
Room: Buckhead B
Winners of the LowDown Showdown will be announced.

Friday, September 29

Friday, September 29, 8:15 AM - 10:00 AM

Seminar 7

Passive Housing

Room: Buckhead A

Chair: James Dirkes II, P.E., Member, The Building Performance Team Inc, Grand Rapids, MI

Passive house design principles are gaining momentum in North America. This session compares modeled vs actual performance for multiple multi-family projects and the Passive House Institute's methodology for optimizing buildings for a fully renewable energy supply.

1. ASHRAE Standard 90.1 Appendix G, Phius+, and PHI Comparative Evaluation Study

Maria Karpman, BEMP, Member[1]*, Shelley Beaulieu, BEMP, Member*[2]*, Jessica Grove-Smith*[3] *and James Ortega*[4]*, (1)Karpman Consulting, Glastonbury, CT, (2)TRC Energy Services, Morton, IL, (3)Passive House Institute, Darmstadt, Germany, (4)PHIUS, Chicago, IL*

This presentation discusses the study undertaken by NYSERDA to compare the predicted energy performance of representative high performance designs of a multifamily new construction project following ASHRAE 90.1 Appendix G, PHIUS+ and PHI modeling protocols. The modeling was performed by independent teams with expert knowledge of the protocols and associated simulation tools. The presentation compares the energy use predicted through each of the three protocols and describe the sources of the differences including but not limited to modeling assumptions and defaults, the capabilities of simulation tools, and the metrics used to express building performance in each protocol.

2. Multifamily Passive Buildings: Evaluation of Measured Performance

John Semmelhack*, Think Little, Charlottesville, VA*

As the market for passive building projects grows, the need to validate modeling protocols and techniques is becoming more important. The best method to validate energy models is through the direct comparison of monitored energy use to predicted (modeled) energy use. This presentation outlines the analysis of three multifamily passive building projects that compares the two current passive house standards to the monitored energy use of the three projects. In addition to comparing the modeled to monitored results, an ASHRAE Standard 90.1 Appendix G (App G) project was modeled for all three projects to establish a reference to standard construction.

3. Optimizing Passive Houses for Efficient Use of Renewable Energy Sources

Jessica Grove-Smith *and Zeno Bastian, Passive House Institute, Darmstadt, Germany*

The international Passive House Standard, developed in Germany in the early nineties, is currently gaining increasing momentum in North America. Starting off in 2010 with the first single family homes, there is now a shift to large residential developments as well as non-residential buildings and Passive House high-rises. Passive House Institute has developed an innovative methodology for optimizing buildings for a fully renewable energy supply. Integrated into the Passive House Planning Package (PHPP) it takes into account the regional renewable energy harvesting potential as well as short term and seasonal storage losses.

8:15 AM - 10:00 AM

Seminar 8

Using Case Studies to Demonstrate the Challenges of Modeling Infiltration and Natural Ventilation and the Potential Value and Liability of Modeling for Contractors

Room: Heritage B

Chair: Susan Collins, Whole Building Systems, Charleston, SC

This session looks at the challenges of modeling natural ventilation and infiltration and the value of energy modeling during the construction phase of a project. Using case studies from cities around the word and eight different climate zones, the session addresses topics such as thermal comfort compliance, air speed in naturally ventilated spaces, deciding on what inputs to use for ventilation and the uses and potential liabilities when models don't match the built structure.

1. Evaluating Occupant Comfort in Naturally Ventilated Spaces

Peter Simmonds, Ph.D., Fellow ASHRAE*, Buildings and Systems Analytics, Marina Del Rey, CA*

This presentation highlights several case studies of simulating and evaluating natural ventilation in buildings, in several cities around the world. The results are evaluated for thermal comfort compliance with International thermal comfort standards. Analysis of the results show "true" space conditions and will highlight improvements that can be made to the compliance method which presently only includes operative temperature, a single metabolic rate and two clothing values. But how is the operative temperature calculated and what is the air speed in the naturally ventilated spaces? What will be the "true" comfort conditions in these spaces?

2. Weather-Correlated Infiltration Inputs for Prototype Commercial Buildings
***Lisa Ng, Ph.D., Member**, W. Stuart Dols, Member and Steven J. Emmerich, Member, National Institute of Standards and Technology, Gaithersburg, MD*

Infiltration is important, but it can be difficult to model. What inputs should be used? How does it vary when the heating/cooling system is on or off? A strategy to incorporate infiltration rate calculations into building energy calculations has been developed using building characteristics, weather conditions, and HVAC system operation for use in EnergyPlus simulations. The weather-correlated infiltration inputs are presented for the ASHRAE 90.1-2013 versions of the prototype commercial building models, in eight climate zones, and at two levels of building envelope airtightness.

3. Modeling Matters to Everyone, Especially the General Contractor
***Vanessa Hostick, AIA, Associate Member**, HOK, Washington, DC*

There is a predominant belief that energy analysis has no value during construction. However, modeling can be valuable to contractors and commissioning agents alike in understanding the integrity and performance of a project while reinforcing the value of design elements. In addition, many jurisdictions require energy model submissions for permit and site inspection. It is important to be aware of the potential liability and financial penalty if the model does not match the built structure. This presentation uses a series of case studies to outline the value of analysis in construction and value engineering to communicate performance criteria.

Friday, September 29, 10:30 AM - 12:00 PM

Seminar 9

Building Performance Analysis for Policymaking, Part 2

NY PDH G

Room: Buckhead A
Chair: Drury Crawley, Ph.D., Fellow ASHRAE, Bentley Systems, Inc., Washington, DC

Building performance simulation is regularly used to support decision making in the design or retrofit of individual buildings. Yet, one of its most powerful uses lies beyond the performance of individual buildings in supporting building policy setting and decision making: to develop minimum standard regulations, assess the value of improved building performance for utilities or governments, or support high-level, public decision-making.

1. The Convergence of Daylight Design and Modeling
***Scott West, P.E., BEAP and BEMP, Member**, HFA, Fort Worth, TX*

This session will cover the evolving art and science of daylighting design for commercial buildings. Daylighting in buildings involves the intersection of multiple building professionals: architects, interior designers, lighting designers, electrical engineers, energy modelers, commissioning agents and equipment and controls vendors. The presentation will include a discussion of daylighting metrics and the application of IES (Illuminating Engineers Society) LM-83, the energy use impacts of daylighting in buildings and how lighting design interacts with passive architectural design.

2. Impact of Process Load on Commercial Office Energy Performance
***Roger Chang, P.E., BEMP, Member**, DLR Group, Washington, DC*

The release of ASHRAE 90.1-2016 embeds the building performance factor approach, first introduced as Addendum BM to 90.1-2013. This session provides an overview of the BPF approach within the context of changes in the level of stringency of 90.1 since 2004. Whole building energy simulation results for a prototype commercial office building are presented based on 5 climate zones, ASHRAE 90.1-2004, ASHRAE 90.1-2016, and process load density from 0.25 W/sf to 5 W/sf. An approach for developing realistic performance targets, without any building simulation, is also presented and compared to the building simulation results.

3. Institutional Transformation: Using Detailed Building Energy Models for Site-Wide Energy Conservation Strategies
***Daniel Villa, P.E., Member**, Sandia National Laboratories, Albuquerque, NM*

Sandia National Laboratories has created 120 building energy models for a software called Institutional Transformation (IX). IX enables site-wide energy efficiency scenarios. This produces a wealth of data for energy efficiency decisions. Analysis shows that Sandia's efforts can be profitable but many of the parameters involved are immeasurable. Regardless, valuable information to other areas such as energy analytics, building predictive control, energy asset score assessments, and energy audits is appealing. If deep integration between data and modeling can be achieved, then it will be possible to use models as a central standard for building use policies.

Friday, September 29, 10:30 AM - 12:00 PM

Seminar 10

How Optimization and Performance Based Modeling Techniques Lead to Success

Room: Heritage B
Chair: Chris Balbach, P.E., Associate Member, Performance Systems Development, Ithaca, NY

Substantial reductions of energy usage of existing buildings remains elusive, with innovative practitioners applying and testing many different techniques and workflows. This session explores three different approaches, one examining how to effectively identify load reduction measures, another discusses lessons learned from operating a large scale incentive program based on the use of calibrated simulation models, and a third combines the use of model predictive controls and thermal storage systems.

1. A Comparison of Regression, Neural Network and Physical Models of District Cooling Ice Storage Systems for Optimal Operation

Sam J. Cox, Student Member*, Dongsu Kim, Student Member and Heejin Cho, Ph.D., Associate Member, Mississippi State University, Mississippi State, MS*

A comparison of different methods for modeling ice storage integrated with district cooling systems for the purpose of model predictive control is presented in this study. A biquadratic curve, neural network, and physical model are presented and compared. In addition, the ease and speed of optimization of each of the models and the integration into a control system are discussed. Real data from an already existing ice storage system located at Mississippi State University located in Starkville, MS is used for the case study and comparison of the different models.

2. Comparison of Projected to Realized Savings on Projects That Participated in a Modeling-Based Incentive Program

Christopher DeAlmagro, BEMP, Member*[1], Maria Karpman, BEMP, Member[2] and Valentina Rozanova, P.E.[1], (1)TRC Energy Services, Woodbridge, NJ, (2)Karpman Consulting, Glastonbury, CT*

This presentation discusses the Pay for Performance incentive program for existing buildings that requires projects to develop a calibrated energy simulation and install packages of improvements projected to reduce energy use by at least 15%. The incentive is based on the realized savings determined using IPM&VP Option C: Whole Building Comparison. Since 2009, 162 projects reached the savings verification stage, collected 12 months of post-retrofit utility bills, and evaluated realized savings. This presentation compares actual versus projected savings of these projects, describe identified patterns and the evolution of the program's technical policies aimed to improve accuracy of simulated projections.

Friday, September 29, 12:10 PM - 12:20 PM

Closing Remarks

Room: Heritage B
Chair: Dennis Knight, P.E., Fellow ASHRAE, Whole Building Systems, LLC, Charleston, SC

**Updated September 26, 2017*