ASHRAE Rochester

VOLUME 8, ISSUE 9 MAY 2014

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MONDAY, MAY 12, 2014

ASHRAE Picnic / Golf Tournament

To be held at

Ravenwood Golf Course

RAVENWOOD GOLF CLUB

Ravenwood
Golf Course
929 Lynaugh Road
Victor, NY 14564
Golf Registration 9:30 – 10:45
Juice, Scones and Coffee Served
11:00 am - Shotgun Start

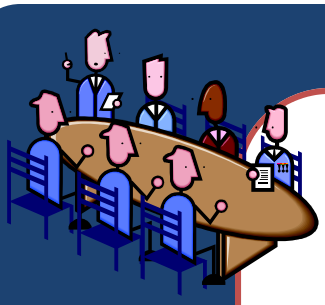
Picnic: 4:30 PM-8:00 PM
4:30 PM - 6:00 PM
Cocktails and Hors d'oeuvres
6:00 PM - 8:00 PM
Dinner Catered By:
Dinosaur Barbeque
at Ravenwood Golf Club

DINOSAUR BAR B QUE

Four Man Scramble and Optional Skins Game.

Golf includes:
- Golf
- Cart
- Driving Range
- Prizes
- On course beverages and food at the turn

(refer to page 8)



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SAVE THE DATE

ASHRAE 2013-2014 Meeting Schedule				
Date	Event	pdh / Theme	Location	Schedule
09/09/13	"Geothermal Heating & Cooling advancement in technologies Mr. Tom Piekunka, PE - Piekunka Systems, Inc.	Available	Burgundy Basin	5:00 PM
10/09/13	Renewable Energy in Hydronic Heating Ten Trends in Modern Hydronic Heating Mr. John Siegenthaler, PE Joint Meeting with ACCA	Available	Burgundy Basin	6:00 PM
11/11/13	Mr. Nick Gangemi Current State of Data Center Industry and Overview of TC 9.9 ASHRAE Technical Committee for Datacom Facilities	Available	Mario's	12:00 PM
12/09/13	VRF "ASHRAE 15" Variable Refrigerant Flow Systems & ASHRAE 15 Mr.Marty Brinton, LG Commercial Air Conditioning	Available	Mario's	12:00 PM
01/13/14	NYS Building Department NYS Code Updates and Changes NYS Energy Conservation Code/ NYS Mechanical Code		Mario's	12:00 PM
02/07/14	Annual ASHRAE Valentines Dinner Dance	---	Colgate Rochester Crozer Divinity School	7:00 PM
02/10/14	Electronically Commutated Motor (ECM) technology Joint Meeting with AEE	Available	Mario's	12:00 PM
03/10/14	Jerry M. Sipes, Ph.D., P.E. Fundamentals of Displacement Ventilation	Available	Mario's	12:00 PM
04/07/14	Refrigeration Tour Wegmans East Ave. - CO2 Refrigeration System		1750 East Avenue	6pm Dinner and Presentation 7pm Tour
05/12/14	Annual ASHRAE Golf Outing and Picnic	---	Ravenwood Golf Club	9:30 AM Golf 4:30 - 8:00 Picnic

Mission Statement

ASHRAE will advance the arts and sciences of heating, ventilation, air conditioning, refrigeration and related human factors to serve the evolving needs of the public and ASHRAE members.

Shaping Tomorrow's Built Environment Today

Vision Statement

- will be the global leader in the arts and sciences of heating, ventilation, air conditioning and refrigeration.
- will be the foremost, authoritative, timely and responsive source of technical and educational information, standards and guidelines.
- will be the primary provider of opportunity for professional growth, recognizing and adapting to changing demographics, and embracing diversity.

President's Message

The Rochester Engineering Symposium was a great success again this year. I want to mention that the HVAC track of three courses was put together by Michelle Sommerman. This is a long process that requires a considerable amount of work to pull off.

This month is our annual golf tournament and picnic. This event is being planned by Jim Browe and I am sure it is going to be a hit again this year. We are back at Ravenwood Golf Course this year. I hope you will be joining us on a beautiful golf course followed up by a great dinner and good company.

As the ASHRAE season comes to a close for the fiscal year 2013-2014. I want to take a moment to thank the entire Board of Governors, Officers and Committee Chairs. Although too many to name individually here, these are the people that volunteer their time to make sure that our chapter operates smoothly. Often, the majority of work goes unnoticed by the general membership. This is a good thing because it means everything is getting accomplished. We tend to notice when things are not getting done.

I really appreciate the support everyone has given to the Board and me this year. I wish you a wonderful summer and look forward to seeing you again in the fall.

Rob Wind, PE, 2013-2014 President

Rochester ASHRAE's April Meeting

The ASHRAE Rochester Chapter's monthly meeting took place on Monday April 7th at the Wegman's East Avenue facility. Dinner was at 6pm, which included a technical presentation. A tour of the facility followed immediately after.

The East Avenue store has a new technology, low temperature, CO2 secondary coolant system along with the medium temperature glycol secondary coolant system that Wegman's has incorporated in their stores for several years now. This system is described as a Modular CO2 Secondary and Second Nature Glycol Secondary System manufactured by Hill Phoenix. The systems utilize CO2 and glycol as secondary fluids and each system has a HFC refrigerant on the high side of the system. The CO2 is pumped to low temperature Reach-in cases and low temperature walk-in boxes and the Glycol is pumped to medium temperature case and walk in cooler boxes.

There will not be a May meeting due to the yearly ASHRAE picnic, which will be held on Monday May 12th at Ravenwood.

Rochester Chapter

Committee Chairs Updates

Young Engineers in ASHRAE

There will be a tech session on VFD's 6pm Thursday May 29th at Modular Comfort's Office.

Please send recommendations for group learning topics to Matt Kremers at mkremers@mcsmms.com.

Student Activities

STUDENT ACTIVITIES

Do you know the benefits of being an ASHRAE Student Member?

- **Monthly *ASHRAE Journal*** exploring issues such as indoor air quality, energy management, solar developments, and more.
- ***ASHRAE Insights*** monthly newspaper devoted to news and information about the Society at every level including news of special interest to students.
- ***The HVAC&R Industry eNewsletter*** for weekly industry news and information.
- **SmartStart Program** to ease into full membership dues over a three year period after graduation.
- **Opportunities** to participate in the Student Design Project Competition, Grants-in-Aid, Society and Local Scholarships, and Student Branch Activities.
- Access to **The Student Zone** web page which offers valuable career and educational resources.
- **ASHRAE Publication Discounts** at the ASHRAE Student Store including ASHRAE books, standards, reports, charts, and more.

Do you know anyone that could benefit from being an ASHRAE Student Member?

- Join over 5,000 other students taking advantage of ASHRAE benefits today at https://ashrae.org/membership--conferences/join-now.

Visit the Student Zone at https://ashrae.org/membership--conferences/student-zone to learn about:

- Design Competition
- Scholarships and Grants
- New Faces of Engineering – College Edition
- K-12 Activities
- Membership Benefits and Meetings
- Educational Resources
- Student Activities
- Student News
- Student Branches
- ASHRAE's SmartStart Program

Job Postings & Help Wanted

Although there are no job posting for this month's newsletter, this section of the newsletter is reserved for those firms wishing to advertise their desires to hire from the Chapters Membership.

If you are interested in utilizing this FREE service provided by the Rochester Chapter, please contact our Chapter President, Rob Wind (585.341.3172) or by email rwind@ibceng.com.

This service is available to ASHRAE members for any local firm in our industry looking for knowledgeable persons in the HVAC&R industry.

2013-2014 Presidential Award of Excellence Summary

Chapter #	Chapter Name	Chapter Members	Member Promotion	Student Activities	Research Promotion	Chapter Technology Transfer	History	Chapter Operations	Chapter PAOE Totals
11	Rochester	239	275	0	375	0	100	0	750

Like us on Facebook!

Visit our new Facebook page by searching for "ASHARE Rochester" on Facebook. Any ideas for additions or improvements email to Mark Kukla at mark@airsystemsbalancing.com. Keep up to date with current events and photos from recent meetings.

2014 ASHRAE PICNIC SPONSORSHIP FORM

Monday, May 12, 2014

RAVENWOOD GOLF CLUB

Ravenwood
Golf Course
929 Lynaugh Road
Victor, NY 14564
11:00 AM – 4:30 PM - Golf
4:30 PM - 8:00 PM - Picnic

Picnic: 4:30 PM-8:00 PM
4:30 PM - 6:00 PM
Cocktails and Hors d'oeuvres
6:00 PM - 8:00 PM
Dinner Catered By:
Dinosaur Barbeque
at Ravenwood Golf Club

DINOSAUR BAR B QUE

Thank you in advanced for supporting this long standing Rochester ASHRAE Chapter tradition.

Please include check (on notes put what sponsorship you made) and make payable to:
ASHRAE Rochester Chapter
and mail to:
Attention: Kacie Hoffman
RF Peck Company, Inc.
889 Atlantic Ave.
Rochester, NY 14609
Any questions, call Kacie at (585) 697-0836 ext. 105
Email: khoffman@rfpeck.com

Please fill out so we can correctly recognize you or your company:

Company Name: _____
OR
Individual Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: (Work) _____ (Home) _____

Sponsorship Form		
Sponsorship Name	***X here for Sponsorship***	***Sponsorship Amt.***
Major Door Prize Sponsor – Gift/Item or Cash Donation- $200 or more.		
Gold - $250.00 - Hole Sponsorship and Recognition at Picnic		$250.00
Silver - $150.00 - Hole Sponsorship		$150.00
Bronze - $100.00 - Recognition at Picnic		$100.00
Prize Sponsor - $175.00 - Longest Drive		$175.00
Prize Sponsor - $175.00 - Closest to Pin		$175.00
Total Check Amount:		

MONDAY, MAY 12, 2014

ASHRAE Picnic / Golf Tournament

To be held at

Ravenwood Golf Course

Reservation Deadline is... May 2nd, 2014

(There is a limited amount of tickets this year on a first come basis)

RAVENWOOD GOLF CLUB

Ravenwood
Golf Course
929 Lynaugh Road
Victor, NY 14564

Golf Registration 9:30 – 10:45
Juice, Scones and Coffee Served
11:00 am - Shotgun Start

Picnic: 4:30 PM-8:00 PM
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DINOSAUR BAR B QUE

Four Man Scramble and Optional Skins Game.

Golf includes:
- Golf
- Cart
- Driving Range
- Prizes
- On course beverages and food at the turn

NO TICKETS WILL BE SOLD OR DISTRIBUTED AT THE DOOR!
TICKETS WILL BE MAILED TO YOU OR CAN BE PICKED UP AT THE R.F. PECK CO., INC.

Please include check and make payable to: "ASHRAE – Rochester Chapter"

Return this form....
Mail prior to May 2, 2014 to:
Attention: Kacie Hoffman
R.F. Peck Co., Inc.
889 Atlantic Avenue
Rochester, New York 14609
Any questions, call (585) 697-0839 ext. 105
Email: khoffman@rfpeck.com

Address where you would like your picnic tickets sent to:

Company: _____

Contact Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: (Work) _____ (Home) _____

Entry Form			
Ticket Request Form			
Event	***Fee Amount***	***No. Attending***	***Total***
Golf	$90.00		$
Picnic	$50.00		$
OR:			
Golf and Picnic **(SAVE $10.00)**	$130.00		$

2014 ASHRAE Annual Conference June 29–July 2 | Seattle

Technical Program

Tracks:

Ground Source Heat Pumps
HVAC&R Fundamentals and Applications
HVAC&R Systems and Equipment
Indoor Environment
Installation, Commissioning, Operations and Maintenance
Professional Skills
Refrigeration
Research Summit
Standards, Guidelines and Codes

Sunday, June 29, 8 a.m.–9 a.m.

SEMINAR (INTERMEDIATE)

I've Met All the Standards and People are Still Complaining: Now What Do I Do?

Track: Indoor Environment

Sponsor: SGPC 10, Environmental Health Committee

Chair: Eric W. Adams, Ph.D., Member, Carrier, Syracuse, NY

It may not be enough to meet environmental standards individually. The quality of the environment is driven by interactions among the factors that are often considered unrelated. Understanding the interactions of indoor air quality, thermal environment, noise, and light within the built environment is critical for achieving occupant satisfaction within a building. For example, humidity has IAQ perception, contaminant control and thermal comfort effects that are covered discretely in standards 62 and 55, but in very different ways. Materials and systems used to address one problem may cause or may help another. This seminar provides examples of interactions and IEQ concerns that arise even when the basic environmental acceptability standards are met.

Saving Too Much Energy?
Mark Jackson, University of Texas, Austin, TX

My Building is So Cold in Summer and So Hot in Winter - What's Going On?
Chandra Sekhar, Ph.D., Fellow ASHRAE, National University of Singapore, Singapore, Singapore

SEMINAR (BASIC)

Step 1: Assessing a Project Site for Geothermal Heat Pump Applications

Track: Ground Source Heat Pumps

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications, NGWA

Chair: Lisa Meline, P.E., Member, Meline Engineering Corporation, Sacramento, CA

The first step on every geothermal heat pump project is assessing the project site for ground heat exchanger viability. This includes understanding the local regulatory requirements, permitting and hydrogeology. It also requires the design engineer to estimate through calculation or testing the local formation properties and the size and type of ground heat exchanger. The speakers in this session discuss both the science and engineering for selecting and developing site data application for designing a ground heat exchanger on a commercial project.

Site Characterization for Geothermal Heat Pump Systems
John Rhyner, PW Grosser Consulting, Bohemia, NY

Ground Heat Exchanger Design Considerations for Proper Integration with the Building System
Warren (Trey) Austin III, P.E., Member, Geo Energy Services, Littleton, CO

SEMINAR (BASIC)

Sustainable Career Design: A Holistic Approach

Track: Professional Skills

Chair: Richard King, P.E., Member, Peninsula Engineering, Orlando, FL

Just as sustainable buildings require a holistic approach for success, so do sustainable careers. An overall vision and specific goals need to be well defined. All systems—personal life, professional life, family life—interact and maintaining proper balance requires careful planning as well as continual maintenance. Technical competency as well as soft skills must be considered. This seminar evaluates how to define a sustainable career and how to maintain work-life balance as challenges are encountered. Motivation, natural abilities, personality types and interpersonal relationship are discussed as they impact individual careers.

Design and Construction: Defining Your Sustainable Career
Megan M Tosh, P.E., Member, Integrated Environmental Solutions, Atlanta, GA

Operation and Maintenance: Career Awareness and Adaptation
Nathan Kegel, Member, Integrated Environmental Solutions, Plymouth, MN

WORKSHOP (INTERMEDIATE)

Development of an ASHRAE Energy Guideline for Historical Buildings

Track: Standards, Guidelines and Codes

Sponsor: 04.04 Building Materials and Building Envelope Performance, Historical Committee, GPC 34, 01.12 Moisture Management in Buildings

Chair: David Arnold, Ph.D., Fellow Life Member, London South Bank University, London, United Kingdom

ASHRAE is preparing a guideline for use by architects, engineers, and building owners for the energy efficient preservation or rehabilitation of historic buildings. The guideline will focus on design, operation, and maintenance of energy-using systems that do not compromise historical preservation. The guidance includes advice, recommendations and sources of further information for: envelope rehabilitation and restoration; energy efficient HVAC systems that provide acceptable indoor environmental quality, and energy-efficient lighting.

Refurbishment of 100-Year-Old Neo Classic Office Building, Athens, Greece
Constantinos A. Balaras, Ph.D., P.E., Member, Institute of Environmental Research and Sustainable Development, Athens, Greece

Wayne Aspinall Federal Courthouse: GSA's First NZEB is Also a Historic Building
Martin Weiland, P.E., Member, General Services Administration, Washington, DC

WORKSHOP (INTERMEDIATE)

Effects of Contaminants on Refrigeration System Performance

Track: Refrigeration

Sponsor: 03.03 Refrigerant Contaminant Control

Chair: Warren Clough, Member, Carrier Corp., Syracuse, NY

Contaminants in a HVAC&R system can be very detrimental and can at some point impact the performance, reliability, or eventually lead to a catastrophic failure. There are standards in place to minimize the level of contaminants that enter into a system. For example, AHRI 700 is an industry standard that controls the level of refrigerant impurities. Should a system become contaminated there are products designed to remove and control the levels allowed. Some contaminants introduced cannot be system controlled and have resulted in fatalities. Therefore, steps have to be taken to avoid such contaminants from being introduced.

Various System Contaminants, their Sources, and Tools to Eliminate Them
Christopher Reeves, Associate Member, Parker Hannifin Corporation, Washington, MO

Updates to AHRI 700 Specification for Refrigerants and the Level of Acceptable Impurities
Robert W. Yost, Member, National Refrigerants, Rosenhayen, NJ

WORKSHOP (INTERMEDIATE)

Exergy: Exposing the Flaw in Energy Conservation as an Exclusive Solution to Sustainability

Track: HVAC&R Fundamentals and Applications

Sponsor: 07.04 Exergy Analysis for Sustainable Buildings, 06.05 Radiant Heating and Cooling

Chair: Robert Bean PL(Eng.) R.E.T., Member, Indoor Climate Consultants Inc., Calgary, AB, Canada

This workshop is an introduction to exergy and an exergy management model-based CO_2 emissions calculation that may be instrumental in expanding the CO_2 analysis view in Standard 189.1. Discussion follows to expand upon basic fundamentals and applications.

The ABC's of Exergy
Robert Bean PL(Eng.) R.E.T., Member, Indoor Climate Consultants Inc., Calgary, AB, Canada

Exergy Dimension of CO_2 Analysis and Standard 189.1
Birol Kilkis, Ph.D., Fellow ASHRAE, Baskent University, Ankara, Turkey

WORKSHOP (INTERMEDIATE)

Optimizing VRF Content in the Systems Handbook

Track: HVAC&R Systems & Equipment

Sponsor: 08.07 Variable Refrigerant Flow

Chair: Douglas A. Tucker, Member and Andrew Moore, Associate Member, Mitsubishi Electric, Duluth, GA

VRF remains a very "hot" topic with very high interest levels. The session is intended to review the current VRF chapter in the ASHRAE Systems Handbook with the attendees to define areas that need clarification and/or improvement. The current chapter represents the first time that VRF was officially presented to the engineering community in the Handbook. The various sections of the VRF chapter are represented in a PowerPoint presentation to facilitate the discussion about the key areas of system type, system operation, and system design and installation. Also, the current state of VRF in the industry is presented.

Optimizing VRF Content in the Systems Handbook
Paul L. Doppel, Mitsubishi Electric, Suwanee, GA

Optimizing VRF Content in the Systems Handbook
Brian Bogdan, LG Electronics, Alpharetta, GA

WORKSHOP (BASIC)

You've Got it Under Control: Understanding Sequences of Operation

Track: Installation, Commissioning, Operation and Maintenance

Sponsor: 01.04 Control Theory and Application, 07.03 Operation and Maintenance Management

Chair: Angela Lewis, Ph.D., P.E., Associate Member, Facility Engineering Associates, Fairfax, VA and Michael Bobker, Member, CUNY Institute for Urban Systems, New York, NY

Controls are integral to building design, commissioning and operations and maintenance. This workshop provides an interactive opportunity to learn about using owner project requirements to develop control sequences from experienced controls professionals. After a brief overview of why controls are important and control sequences, participants work in small groups to develop parts of control sequences for different building system scenarios, such as a basic fan, variable air volume and air cooled chiller with constant flow. This workshop is geared towards Young Engineers in ASHRAE (YEA) and those looking to gain basic knowledge of controls.

Why Controls Are Important
Gaylon Atkinson, Member, Atkinson Electronics, Salt Lake City, UT

An Overview of Sequences of Operation
Barry B. Bridges, P.E., Life Member, Sabasta Blomberg, Roseville, MN

Sunday, June 29, 9:45 a.m.–10:45 a.m.

Technical Plenary

Bullitt Center: A Net Positive Building That Functions Like A Tree

Denis Hayes, President and CEO, Bullitt Center

This Technical Plenary discusses discusses the problems and opportunities associated with "net positive" commercial construction, using the Bullitt Center as an illustration of what is currently possible. Hayes is probably best known for having been national coordinator of the first Earth Day when he was 26. Internationally, he is recognized for having expanded Earth Day to more than 180 nations. During the administration of former U.S. President Carter, Hayes directed the federal National Renewable Energy Laboratory. At the Bullitt Foundation, Hayes leads an effort to mold the American Pacific Northwest into a global model of sustainability.

Sunday, June 29, 11 a.m.–12:30 p.m.

TECHNICAL PAPER SESSION (INTERMEDIATE)

Theoretical Approaches to Air Quality for Specific Locations and Two Phase Flow Through Pipe

Track: HVAC&R Fundamentals and Applications

Air quality issues can vary greatly depending on the requirements for a given location. This session presents theoretical methods for determining the effects on air quality by various contaminants and theoretical methods of assessment. This session also presents a theoretical method for determining two phase media through pipe.

Incident Response Monitoring Technologies for Aircraft Cabin
John B. Havermans, Ph.D., TNO Applied Environmental Chemistry, Delft, Netherlands

Methods for Calculation of Evaporation from Swimming Pools and Other Water Surfaces
Mirza Shah, Consultant, Redding, CT

Phase Splitting Algorithm for Ice Slurry Flow Pressure Drop in Straight Pipe Flow
Tangfei Zhang, Ph.D., Member, Dalian University of Technology, Dalian, China

Determination of the Effect of Humidity on the Probability of ESD Failure or Upset in Data Centers
Mahdi Moradian, Missouri University of Science and Technology, Rolla, MO

CONFERENCE PAPER SESSION (INTERMEDIATE)

Indoor Environmental Quality Analysis of Healthcare, Clean Room, Residence and Vehicular Applications

Track: Indoor Environment

Sponsor: 09.11 Clean Spaces, 09.06 Healthcare Facilities

Visit **www.ashrae.org/seattle** for updated conference information.

The exhaled air of infected people can be one of the sources of pollutants and respiratory viruses. The exhaled air comes from respiratory events such as the breathing, coughing, sneezing, and talking. One new ventilation concept was developed to protect people from epidemic respiratory diseases, namely protected occupied zone ventilation (POV). This session also challenges the requirements of current ventilations codes with performance based demand control ventilation alternates for healthcare and mini-environment and clean rooms. The session presents new approach with periodic reversible supply and exhaust air for vehicular spaces.

A Simultaneous Consideration of Energy and Ventilation in Healthcare
Travis R. English, P.E., Member, Kaiser Permanente, Oakland, CA

Analysis of Air Change Rates and System Configuration on the Performance of a Mini-Environment Cleanroom
Kishor Khankari, Ph.D., Member, AnSight LLC, Ann Arbor, MI

Field Study on Effectiveness of Periodic Reversible Supply Exhaust Ventilation Strategy
Essam E. Khalil, Ph.D., Fellow ASHRAE[1], Ahmad Fahim, Ph.D., P.E., Member[2], Ahmad Osama, P.E.[1] and Esmail ElBialy, Ph.D., P.E.[1], (1)Cairo University, Cairo, Egypt, (2) HBRC, Cairo, Egypt

Feasibility Study of an Innovative and Compact Residential HRV/ERV/Economizer Based Ventilation System
Agustin Cit, Student Member, Jun Zhang and Alan Fung, Ryerson University, Toronto, ON, Canada

Experimental Study of the Cross Infection Risk due to the Cross-flow of Exhaled Airflows and a Plane Jet with the Protected Occupied Zone Ventilation
Guangyu Cao, Ph.D., Associate Member[1], Peter V. Nielsen, Ph.D.[2], Chunwen Xu[2] and Rasmus L. Jensen, Ph.D.[3], (1)VTT Technical Research Centre of Finland, Espoo, Finland, (2)Aalborg University, Aalborg, Denmark, (3)Hunan University, Changsha, China

CONFERENCE PAPER SESSION (INTERMEDIATE)

Ground Source Heat Pump System Performance Case Studies in Different Climates Around the World

Track: Ground Source Heat Pumps ance
Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications

Presentations include a description of a novel residential hybrid GSHP system, studies of system performance for a range of climates and system designs, and new experimental measurements of a system in an arctic environment.

Ground Source Heat Pump Efficiency in Cold Climates
Robbin L. Garber Slaght, P.E., Associate Member[1], Ronald Lannen, Ph.D.[2] and Andrew Rae[2], (1)Cold Climate Housing Research Center, Fairbanks, AK, (2) Alaska Department of Natural Resources, Fairbanks, AK, (3)Alaska Geothermal LLC, Fairbanks, AK

Development of a Renewable Ground Loop System
Toshiyuki Hino, Dr.Ing., Affiliate and Ryozo Ooka, Dr.Ing., Associate Member, The University of Tokyo, Tokyo, Japan

Evaluation of the Applicability of Heat Pump Systems in Residential Buildings with Different Insulation Standard Located in Different Climate Regions in the US
Lars P. Junghans, Dr.Ing., Associate Member, University of Michigan, Ann Arbor, MI

Economic Analysis of Ground Source Heat Pumps in North Carolina
Miriam Makhyoun, Hamad Honari, Student Member, Vikram Sridhar and Kacey Hoover, North Carolina Sustainable Energy Association, Raleigh, NC

Effect of Residential Ground Source Heat Pump System Design on Emissions in Sweden
Jeffrey Spitler, Ph.D., P.E.[1], Amy Wong[1] and Signhild E. A. Gehlin, Ph.D., Member[2], (1)Oklahoma State University, Stillwater, OK, (2)Swedish Centre for Shallow Geothermal Energy, Lund, Sweden

SEMINAR (INTERMEDIATE)

IT Equipment Power and Cooling Trends and Deployment Best Practices

Track: HVAC&R Systems & Equipment
Sponsor: 09.09 Mission Critical Facilities, Technology Spaces and Electronic Equipment
Chair: Nick Gangemi, Member, Facility Gateway Corp, Penfield, NY

IT equipment power and cooling trends continue to push the limits in the industry, primarily due to packaging density, high performance computing, and mass scale out deployment. This seminar highlights the latest power and cooling trends, and then focuses on associated deployment best practices at the server level, while evaluating the existing and emerging room level cooling solutions and technologies.

IT Equipment Power and Cooling Trends and Deployment Best Practices
Jason Matteson, IBM, New York, NY

IT Equipment Power and Cooling Trends and Deployment Best Practices
Robin Steinbrecher, Intel, New York, NY

IT Equipment Power and Cooling Trends and Deployment Best Practices
David Moss, Dell, Inc., Austin, TX

SEMINAR (INTERMEDIATE)

Vivarium Environment: Objectives, Requirements, and Possibilities

Track: Indoor Environment
Sponsor: 02.02 Plant and Animal Environment, 09.10 Laboratory Systems
Chair: James Coogan, P.E., Member, Siemens, Buffalo Grove, IL

Indoor environmental requirements for an animal research facility are driven by a complex of special objectives. In addition to the health and comfort of the workers, designers must address the living environment of the animals. This includes all thermal comfort variables, air contamination, and daily lighting patterns. Improper animal environment can undermine research and destroy productivity. The seminar discusses basic objectives, current standards, traditional design approaches and new technical solutions.

Laboratory Animal Facility Guidelines and Effective Air Change Rates
Carol Donovan, Associate Member, Sebesta Blomberg & Associates, Woburn, MA

Slashing Vivarium Energy Use by Up to 50%
Gordon Sharp, Member, Airquity, Inc., Newton, MA

Assuring Environmental Conditions for Animal Research
Paul Fuson, Member, Siemens Industry, Buffalo Grove, IL

SEMINAR (ADVANCED)

Simulation Model Development for Building Control and Operation

Track: Research Summit
Sponsor: 01.04 Control Theory and Application, 07.05 Smart Building Systems
Chair: Jin Wen, Ph.D., Member, Drexel University, Philadelphia, PA

Four conference papers focusing on the development, validation, and calibration of building energy and dynamic system simulation models are presented in this session. The presented simulation models include 1) new testbeds used to study and develop building control, operation, and fault diagnosis strategies; and 2) new energy forecasting models. Real building measurements are used in most of the studies to validate or calibrate the models. How to utilize such testbeds and models for building control and operation is discussed.

Development of a Probabilistic Graphical Energy Performance Model for an Office Building
Zheng O'Neill, Ph.D., PE., Member, The University of Alabama, Tuscaloosa, AL

Net-zero Energy Impact Building Clusters Emulator for Operation Strategy Development
Xiwang Li, Student Member, Drexel University, Philadelphia, PA

A Tool for Evaluating Fault Detection and Diagnostic Methods for Fan Coil Units
Shokouh Pourarian, Ph.D., Drexel University, Philadelphia, PA

Comparison of Simulated and Measured Energy Use using Energy Audits
Joshua D. Rhodes, Student Member, The University of Texas at Austin, Austin, TX

SEMINAR (INTERMEDIATE)

Update on ASHRAE's Expanded and Enriched Green Building Tools

Track: Standards, Guidelines and Codes
Sponsor: 02.08 Building Environmental Impacts and Sustainability
Chair: Janice K. Means, P.E., Member, Lawrence Technological University, Southfield, MI

Seminar attendees are alerted to the latest revisions to noteworthy ASHRAE publications recognized as significant tools in the design and operation of high performance buildings. All chapters of the 4th edition of ASHRAE's GreenGuide have been revised and the chapters on indoor environmental quality and Architecture have been totally rewritten. A new chapter on Sustainable Sites was also added to the fourth edition. ANSI/ASHRAE/USGBC Standard 189.1 has been fine tuned to specify greater energy savings and other changes as green building technologies evolve. The newest set of the Advance Energy Design Guides now boasts saving 50% energy improvement over that specified by ANSI/ASHRAE/IESNA Standard 90.1-2004 Energy Standard for Buildings Except Low-Rise Residential Buildings.

Changes to Standard 189.1: Standard for the Design of High Performance Green Buildings
T.M. Lawrence, Ph.D., P.E., Member, University of Georgia, Athens, GA

Advanced Energy Design Guides: Leading the Way for Energy Savings
Paul A. Torcellini, Ph.D., Member, National Renewable Energy Laboratory, Golden, CO

What's New in the 4th Edition of the ASHRAE GreenGuide?
T.M. Lawrence, Ph.D., P.E., Member, University of Georgia, Athens, GA

SEMINAR (ADVANCED)

Cooling Potential with Increased Night Ventilation in Low Energy Buildings

Track: Installation, Commissioning, Operation and Maintenance
Sponsor: 06.03 Central Forced Air Heating and Cooling Systems, 02.01 Physiology and Human Environment, TC4.3
Chair: Max Sherman, Lawrence Berkeley National Laboratory, Berkeley, CA

In post-occupancy studies of low energy buildings elevated temperature levels is a commonly reported problem. Ventilative cooling can be an attractive and energy efficient solution to reduce peak load and energy use in new and existing residential buildings. Equipment required for ventilative cooling in residential buildings is available and has been shown to be cost-effective in many climates. The seminar presents the concept of ventilative cooling together with studies of the potential impact on energy consumption and indoor environment in different climatic regions.

Ventilative Cooling Needs and Outdoor Night Cooling Potential
Per Heiselberg, Aalborg University, Aalborg, Denmark

Evaluation of Different Concepts for Ventilative Night Cooling by Building Simulations
Angela Simone, Ph.D., Member, Denmark Technical University, Kgs. Lyngby, Denmark

Residential Ventilative Cooling Technology Status and Applications
David Springer, Member, Davis Energy Group, Davis, CA

Sunday, June 29, 1:30 p.m.–3 p.m.

TECHNICAL PAPER SESSION (INTERMEDIATE)

Super Insulated Retrofit Strategies, Climatic Design Conditions and Convection Enhancements

Track: Research Summit
Sponsor: 04.04 Building Materials and Building Envelope Performance, 04.01 Load Calculation Data and Procedures

This session begins with analysis of the climatic data utilized to determine building HVAC loads. The next two papers explore insulation strategies needed to keep occupants comfortable. The last paper presents formation to enhance surface convection.

Thermal Design of Window-Wall Interface in Wall Energy Retrofits Using High Performance Vacuum Insulation
Jan Kosny, Ph.D., Member, Sustainable Energy Systems, Cambridge, MA

Experimental and Numerical Investigation of Surface Convection Enhancement by a V-Formation Delta-Winglet Array in a Developing Channel Flow
Jing He, Ph.D., Heatcraft Worldwide Refrigeration, Lawrenceville, GA

Energy Codes and the Evolution of Fenestration: 20 Years of NFRC Ratings in Seattle
John Hogan, P.E., Member, Consultant, Seattle, WA

Temperature Trends for Locations Listed in the Tables of Climatic Design Conditions in the 2013 Handbook – Fundamentals
Didier Thevenard, Ph.D., P.E., Member, Numerical Logics Inc., Waterloo, ON, Canada

TECHNICAL PAPER SESSION (INTERMEDIATE)

Analysis and Modeling of Unitary and Room Air Conditioners and Heat Pumps

Track: Refrigeration
Sponsor: 08.11 Unitary and Room Air Conditioners and Heat Pumps

This session evaluates energy savings and economic potential for unitary and room air conditioners and heat pumps.

Generalized Performance Maps for Single and Dual Speed Residential Heat Pumps
Simbarashe Nyika, Student Member, Purdue University, West Lafayette, IN

Generalized Performance Maps for Variable Speed Ducted Residential Heat Pumps
Simbarashe Nyika, Student Member, Purdue University, West Lafayette, IN

Staging Packaged Air Conditioning Units to Improve Energy Efficiency and Humidity Control by Reducing Cycling Losses
Seth Parker, University of Dayton, Dayton, OH

Engineering and Economic Analysis of Air Conditioners in the Kingdom of Saudi Arabia: Upgrading the Minimum Energy Performance Standards
John Proctor, P.E., Proctor Engineering, San Rafael, CA

CONFERENCE PAPER SESSION (INTERMEDIATE)

Evaluation and Optimization of Variable Refrigerant Flow Systems, Fan Coil Units, Packaged Terminal AC Unit Fan Blowers, Variable Speed Comprssor Heat Pumps and Chiller Plant Components

Track: HVAC&R Systems & Equipment
Sponsor: 08.11 Unitary and Room Air Conditioners and Heat Pumps, 06.01 Hydronic and Steam Equipment and Systems, 08.07 Variable Refrigerant Flow

Space temperature adjustment of a VRF system is evaluated with respect to thermal comfort and energy conservation. Fan coil fault detection and diagnostic method modeling results is described. Improvement in system energy performance as a result of using a blower at a lower speed to deliver the designed airflow is reported. The energy conservation benefits of variable speed compressors in heat pumps are introduced. Optimization of chiller plant components including single-stage centrifugal compressor, shell-and-tube evaporator and condenser, cooling tower with variable-speed fan and cooling water pump are described.

Effect of the Set-Point Temperature on Indoor Thermal Comfort and Energy Demand in Office Building
Taeju Park, M.D., Student Member[1], Doosam Song, Ph.D., Member[1], Kinam Kang, Dr.Ing., Student Member[1], Gyumin Kang, Dr.Ing., Student Member[1], Brain S. Kim, Dr.Ing., Member[2] and Hyejung Cho, Ph.D.[3], (1) Sungkyunkwan University, Suwon, South Korea, (2) Samsung Electronics Co. Ltd., Suwon, South Korea

Tools for Evaluating Fault Detection and Diagnostic Methods for Fan Coil Unit
Shokouh Pourarian, Ph.D.[1], Jin Wen, Ph.D.[1], Daniel Veronica, Member[2], Xiaohui (Joe) Zhou[2] and Ran Liu, Ph.D., Student Member[1], (1)Drexel University, Philadelphia, PA, (2)National Institute of Standards and Technology, Gaithersburg, MD, (3)Iowa Energy Center, Ames, IA, (4)Iowa Energy Center, Ankeny, IA

Impact of the Blower on the System Performance of a 5-Ton Air Conditioner
Peng Yin, Student Member, James F. Sweeney, Associate Member and Michael Pate, Ph.D., P.E., Member, Texas A&M University, College Station, TX

Field Study of Performance, Comfort, and Sizing of Two Variable-Speed Heat Pumps Installed in a Single 2-Story Residence
Jeffrey D. Munk[1], Adewale O. Odukomaiya[2], Anthony C. Gehl[2] and Roderick K. Jackson[1], (1)Oak Ridge National Laboratory, Oak Ridge, TN, (2)Georgia Institute of Technology, Atlanta, GA

Optimal Model-based Control of Chiller Tower Fan and Cooling Water Pump
Omar A. Qureshi, Student Member, Hassan Javed, Affiliate, P.R. Armstrong, Ph.D., Member and Afshin Afshari, Ph.D., Masdar Institute of Science and Technology, Abu Dhabi, United Arab Emirates

CONFERENCE PAPER SESSION (INTERMEDIATE)

Refrigeration Research Advancements and the Application to Heat Pump and Transport Systems

Track: Refrigeration

This session presents a number of studies in refrigeration research including low GWP refrigerants on heat pump systems, CO_2 compatibility as a refrigerant and the measurement of nanoparticle concentration in binary liquids. The session will also address the life-cycle performance for transport refrigeration and the system damages that occur from spike pressures and shock waves.

Refrigeration Systems Failures Due to Sudden Evaporation and Condensation Processes
Amir Jokar, Ph.D., P.E., Member, Erik W. Christiansen, Ph.D., P.E. and Ali Reza, P.E., Exponent Inc. Thermal Sciences Practice, Los Angeles, CA

Life Cycle Climate Performance Model for Transport Refrigeration/Air-Conditioning Systems
Dennis M. Nasuta, Associate Member[1], Robert Sinchal, Member[2], Ming Zhang, Ph.D., Member[2], Cara Martin, Associate Member[2] and Jan Muehlbauer, Member[1], (1) Optimized Thermal Systems, LLC, College Park, MD, (2) Ingersoll Rand, Minneapolis, MN

Stability of Candidate Lubricants for CO_2 Refrigeration
Ngoc Dung (Rosina) Rohatgi, Ph.D., Member, Spauschus Associates Inc., Sylva, NC

Concentration Measurement Technique of Binary Liquids Containing Colloidal Suspension of Nanoparticles
Maryam Fahar, Student Member and Todd Chanlcar, Ph.D., Member, The University of Tulsa, Tulsa, OK

The Influence of Climate Conditions on Life Cycle Climate Performance of Low GWP Refrigerant Based Heat Pumps
Pavel Makhnatch and Rahmatollah Khodabandeh, KTH Royal Institute of Technology, Stockholm, Sweden

SEMINAR (ADVANCED)

Advances in Simulation Research for the Design and Operation of Natural and Mixed Ventilation Systems

Track: Research Summit

Sponsor: 04.10 Indoor Environmental Modeling, 04.07 Energy Calculations

Chair: Wangda Zuo, Ph.D., Member, University of Miami, Coral Gables, FL

Natural and mixed mode ventilations are considered to be an energy efficient way to provide building cooling. However, it is difficult to estimate and achieve the desired performance due to the complexity of the system. This seminar introduces the advance in simulation research to enable the optimized design and operation of buildings with natural and mixed mode ventilation.

Design and Advanced Air Flow Simulation of Naturally Ventilated Theatres
Malcolm J. Cook, Ph.D., Member, Loughborough University, Loughborough, United Kingdom

Natural and Mixed Ventilation Energy Efficiency Optimization Via Integrated CFD and Building Performance Simulation
Marija S. Todorovic, VEA INVI Ltd., Zug, Switzerland

Considering Wind Effects when Designing for Natural Ventilation
James Lo, Ph.D., Student Member, National Institute of Standards and Technology/University of Texas at Austin, Gaithersburg, MD

Energy Modeling and Predictive Control Strategies for Efficient Mixed-mode Cooling using Natural Ventilation
Panagiota Karava, Ph.D., Member, Purdue University, West Lafayette, IN

SEMINAR (INTERMEDIATE)

Demand Control Ventilation (DCV) for Multiple-Zone VAV Systems: Problem Solved

Track: Indoor Environment

Sponsor: 04.03 Ventilation Requirements and Infiltration

Chair: John J. Carter, Member, CPP, Inc., Fort Collins, CO

ASHRAE RP 1547 was an extensive project to develop and test DCV strategies. This seminar provides the background for the project and describes three control strategies that were developed. Energy and airflow mass balance simulations were conducted to test the performance of the three theoretical strategies.

The Background and Methodology for Simulating the Proposed CO_2-Based Demand Control Ventilation Strategies (RP 1547)
Josephine Lau, Ph.D., Associate Member, University of Nebraska - Lincoln, Omaha, NE

The Proposed Control Strategies and their Corresponding Energy Performance (RP 1547)
Xingbin Lin, Ph.D., Associate Member, Nexant Inc., Wheaton, IL

A First Step: Resetting Outdoor-air Intake Flow Based on Zone DCV and System Ventilation Efficiency
Dennis Stanke, Life Member, Trane (Retired), LaCrosse, WI

DCV in Multiple Space Systems: Implementation in System Design and Controls
Steve Taylor, P.E., Fellow ASHRAE, Taylor Engineering, Alameda, CA

SEMINAR (INTERMEDIATE)

GEO 2.0: From the Ground Up, an Overview of the Updated ASHRAE GSHP 'Blue Book'

Track: Ground Source Heat Pumps

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications

Chair: David Dinse, P.E., Member, Tennessee Valley Authority, Chattanooga, TN

The ASHRAE book, Ground Source Heat Pumps: Design of Geothermal Systems for Commercial and Institutional Buildings, was published in 1997. Much has changed since 1997. ASHRAE RP-1674 provided new information not previously available to designers. Two new chapters include: 1) a hydro-geological primer and overview of drilling methods 2) a summary of recent field studies and listing of notable installations. New appendices cover topics of well testing, analysis, performance, drilling methods and problems. The book authors present overview of the updated book and include example design procedures and demonstrations of spreadsheet software included with the book purchase.

HVAC Equipment and Closed Loop System Design
Steve Kavanaugh, Ph.D., Fellow ASHRAE, University of Alabama, Tuscaloosa, AL

Groundwater Systems, Hydrology and Wells
Kevin Rafferty, P.E., Member, Modoc Point Engineering, Klamath Falls, OR

SEMINAR (INTERMEDIATE)

Operating and Maintaining Oil-Free Centrifugal Chillers

Track: Installation, Commissioning, Operation and Maintenance

Sponsor: 08.02 Centrifugal Machines

Chair: Philip Johnson, P.E., Member, Daikin Applied, Staunton, VA

Oil-free centrifugal chillers have been on the market for more than a decade. Some chilled water plants have these chillers installed beside other conventional oil-lubricated centrifugal chillers, while other installations use only oil-free centrifugal chillers. During that time, manufacturers, owners, and operators have accumulated experience regarding maintenance practices, performance trend logs, service records, and reliability. This session shares those lessons learned and best practices by comparing and contrasting operating and maintenance issues of conventional and oil-free centrifugal chillers.

Comparative Application and Maintenance Aspects of Oil-Free Chillers
Paul Kozlov, Smardt, Victoria, Australia

State of the Industry in Oil-Free Compressors: What's Oil Really Got To Do With It?
W. Ryan Galstar, Member, Trane, La Crosse, WI

Operating and Maintaining Oil-Free Centrifugal Chillers
Gabriel Peters, Bullock, Logan & Associates, Inc., Elk Grove Village, IL

Sunday, June 29, 3:15 p.m.–4:45 p.m.

SEMINAR (INTERMEDIATE)

Ground Source Heat Pump System Case Studies

Track: Ground Source Heat Pumps

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications

Chair: Keith Swilley, Member, Gulf Power Company, Pensacola, FL

University science buildings are typically the highest net energy users on a campus. This project combined a centralized geothermal heating/cooling plant, a dedicated outside air system, active chilled beams, thermally-massive radiant heating/cooling and self-learning adaptive controls. The system is designed to use geothermal loop water directly for sensible cooling without needing a chiller. A magnetic-bearing chiller provides chilled water for the DOAS unit and hot water for heating. Net on-site energy consumption for the first year of operation was 64 kBtu per square foot.

Geothermal HVAC Case Study: Davis Building, University of Findlay
Stephen A. Hamstra, P.E., Member, Greensleeves LLC, Zeeland, MI

Geothermal HVAC Case Study: Success in K-12 Schools and Nation's Largest Net Zero School
Don Penn, P.E., Member, Imaga Engineering Group, Ltd., Grapevine, TX

Geothermal HVAC Case Study: Fast Food Restaurant, Pensacola, FL
Greg Tinkler, P.E., Member, Redding Linden Burr Consulting Engineers, Houston, TX

Monday, June 30, 8 a.m.–9:30 a.m.

TECHNICAL PAPER SESSION (INTERMEDIATE)

Boreholes: Vertical Ground Heat Exchangers

Track: Research Summit

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications

This session explores vertical ground heat exchanger spacing, configuration, depth, quality control and effects of weather.

Evaluation of the Thermal Performance of Two Non-standard Borehole Configurations
Michel Bernier, Ph.D., Member, Ecole Polytechnique De Montreal, Montreal, QC, Canada

Effects of Unequal Borehole Spacing on the Required Borehole Length
Massimo Cimmino, Student Member and Michel Bernier, Ph.D., Member, Polytechnique Montreal, Montreal, QC, Canada

Quality Control Assessment of Vertical Ground Heat Exchangers
Jasmin Raymond, Student Member, Universite Laval, Laval, QC, Canada

Effects of Weather Parameters on Vertical Ground Heat Exchanger Design
Farzin Rad, PEng., Member, Ryerson University, Toronto, ON, Canada

TECHNICAL PAPER SESSION (INTERMEDIATE)

Theoretical and Real-World Application of Energy Saving Techniques

Track: HVAC&R Systems & Equipment

Sponsor: 06.02 District Energy, 06.05 Radiant Heating and Cooling

Chair: Chuck Curlin, P.E., Member, Shultz Engineering Group, Charlotte, NC

Energy conservation starts with theoretical calculations and then test cases for energy conserving technologies. This session will describe some analytical methods for future technologies and a case study for a new technology designed for energy conservation.

Design, Installation, and Results of Variable Frequency Drives at a Mid-Sized Power Generation Facility
James Mathias, Ph.D., P.E., Associate Member, Southern Illinois University, Carbondale, IL

Virtual Flow Meter to Estimate the Water Flow Rates in Chillers
Eric McDonald, Concordia University, Montreal, QC, Canada

Analytical Expression for Transient Heat Transfer in Concrete Core Activation
Maarten G. Sourbron, Dr.Ing., KU Leuven (University of Leuven), Campus De Nayer, Sint Katelijne Waver, Belgium

An Absorption Chiller System Using Lithium Bromide and Water as Working Fluids: Exergy Analysis
Sanjeev Anand, Sudhir Tyagi, Yatnesh Anand, and Ankush Gupta

CONFERENCE PAPER SESSION (INTERMEDIATE)

Occupant Diversity Profiles, Particulate and VOC Measurement, Climate Data and BCHP

Track: Research Summit

This session explores control system knowledgebase using the self-configuration method. A new method for predicting building combined cooling, heating and power application potential is presented. Sound climate data is a critical component of HVAC design, system sizing and energy consumption estimates. This study evaluated the effects of future climate conditions on existing HVAC systems and facility infrastructure. This session ends with a study that will allow workers to monitor in real time the energy consumed by their PC, printer, heating and lighting.

Self-Configuration of Building Control System Using Knowledgebase
Yan Chen, Student Member and Stephen Treado, Ph.D., P.E., Member, The Pennsylvania State University, University Park, PA

Principal Component Analysis for BCHP Application Potential
Bo Lin, Student Member[1], Chan Zhao, Ph.D.[2] and James Freihaut, Ph.D.[3], (1)The Pennsylvania State University, State College, PA, (2)Princeton University, NJ, (3)The Pennsylvania State University, University Park, PA

Impacts of Climate Variability on Energy at a NASA Space Center
Lee DeBaillie, P.E., Member, Scott Schuetter, P.E., Member and Doug Ahl, Ph.D., Energy Center of Wisconsin, Madison, WI

Multizone Particulate and VOC Measurements in Two Lab Houses Under Operation of Different Whole-Building Ventilation Systems
Armin Rudd, Member, ABT Systems LLC, Annville, PA

Development of Empirical Occupancy Diversity Profiles for Office Environments Using Information Communication Technology Systems
Hu Huafen, Ph.D., Associate Member, Chad Miller, Student Member and Phan Stephan, Student Member, Portland State University, Portland, OR

SEMINAR (INTERMEDIATE)

Documentation and Contract Administration in Tendered and Design/Build Ground-Coupled Heat Pump Projects

Track: Ground Source Heat Pumps

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications

Chair: Ed Lohrenz, Associate Member, GEOptimize Inc, Winnipeg, MB, Canada

Construction documentation and contract administration for tendered projects need to be clear and concise to ensure the design intent of a ground-coupled heat pump (GCHP) system is met. This is also true of design/build GCHP projects, but there is more leeway to work with the client and contractors to meet the design intent as cost-effectively as possible. This seminar considers the documentation and contract administration requirements of a tendered project and how that can differ from a design/build project.

Construction Docs for Closed-Loop Ground Heat Exchangers: System Installation, Meet Design Intent
Ryan Carda, P.E., Geoconnections Inc, Elkton, SD

Closed Loop Ground Heat Exchanger (GHX) Contract Administration
Terry Proffer, Major Geothermal, Wheatridge, CO

Design-Bid Documentation Requirements for Specifications and Drawings of GCHP Systems
Warren (Tiny) Austin III, P.E., Member, Geo Energy Services, Littleton, CO

SEMINAR (INTERMEDIATE)

Indoor Air Quality in Retail Stores: Research and Applications

Track: Indoor Environment—Health, Comfort and Productivity

Sponsor: Environmental Health Committee, 04.03 Ventilation Requirements and Infiltration

Chair: David Grimsrud, Ph.D., Fellow Life Member, University of Minnesota, Minneapolis, MN

This session presents the results of recent contaminant and ventilation rate research in several types of retail stores. This is new and late-breaking information since up to now, most air quality research has been conducted in homes, offices and special research chambers. Common themes among the papers in this session are that most spaces meet the Standard 62.1 rates, yet some contaminant levels are relatively high, in particular where cooking takes place.

Indoor Air Quality in Retail Stores: Implications for Ventilation Exposure, and Energy Use (RP-1696)
Jeffrey Siegel, Ph.D., University of Toronto, Toronto, ON, Canada

Characterization of Air Exchange Rates (AER) and Associated Occupant Survey Outcomes in Retail Stores (RP-1696)
Yang Seon Kim, Student Member, The Pennsylvania State University, University Park, PA

Contaminant Levels and Source Strengths in California Retail Stores
Wanyu R. Chan, Ph.D., Lawrence Berkeley National Laboratory, Berkeley, CA

SEMINAR (INTERMEDIATE)

Occupant Behavior in Buildings

Track: Indoor Environment

Sponsor: 04.07 Energy Calculations, 02.01 Physiology and Human Environment

Chair: Tianzhen Hong, Ph.D., P.E., Member, Lawrence Berkeley National Laboratory, Berkeley, CA

Technologies alone do not necessarily guarantee low energy buildings. Occupant behavior plays an essential role in the design and operation of buildings, but it is quite often oversimplified. Occupant behavior refers to an occupant's movement and responses to discomfort, when his/her comfort needs are not met. Occupant behavior varies with time, space, individual, and is influenced by social context. It is stochastic, complex, and multidisciplinary. Having a better understanding and modeling of occupant behavior in buildings can improve the accuracy of building simulations and guide the design and operation of buildings. This seminar highlights related behavior research at various institutes.

The New IEA EBC Annex 66 on Occupant Behavior
Da Yan, Tsinghua University, Beijing, China

Agent-based Modeling of Occupant Behavior
Clinton J. Andrews, Ph.D., P.E., Member, Rutgers, The State University of New Jersey, New Brunswick, NJ

Overview of Occupant Behavior Research at DTU
Bjarne W. Olesen, Ph.D., Technical University of Denmark, Kgs. Lyngby, Denmark

A Technical Framework to Describe Occupant Behavior in Buildings
Tianzhen Hong, Ph.D., P.E., Member, Lawrence Berkeley National Laboratory, Berkeley, CA

SEMINAR (INTERMEDIATE)

Using ASHRAE Standard 105-2014 for Determining, Expressing, and Comparing Building Energy Performance and Greenhouse Gas Emissions

Track: Standards, Guidelines and Codes

Sponsor: 07.06 Building Energy Performance, 02.08 Building Environmental Impacts and Sustainability

Chair: Keith I. Emerson, P.E., Member, Tri State Generation and Transmission Association, Westminster, CO

ASHRAE Standard 105-2014 provides a common basis for reporting and expressing building energy performance, for comparing design options, and for comparing energy

Early-bird conference registration deadline is April 27.

performance in terms of energy resources used and greenhouse gas emissions created, both across buildings and for energy efficiency measures within buildings. This seminar provides an overview and discusses new provisions related to primary energy performance and greenhouse gas emissions.

Standard 105 Overview and New Provisions
Adam W. Hinge, P.E., Member, Sustainable Energy Partnerships, Tarrytown, NY

Options For Determining Primary Energy Performance
Neil P. Leslie, P.E., Member, Gas Technology Institute, Des Plaines, IL

Evaluating Greenhouse Gas Emissions Using Standard 105
Michael Deru, Ph.D., Member, National Renewable Energy Laboratory, Golden, CO

WORKSHOP (BASIC)

Debate: The HVAC Procurement Process Contravenes the ASHRAE Code of Ethics

Track: Professional Skills

Sponsor: College of Fellows, 01.07 Business, Management & General Legal Education

Chair: Victor Goldschmidt, Fellow ASHRAE, Consultant, Northport, MI

College of Fellows series of debates. The complex procurement method for buildings holds conflicts among the technical, program and commercial objectives of designers, contractors, manufacturers, owners and tenants. These dynamic conflicts often result in processes which are expedient rather than professionally correct. The resulting buildings often fail to meet owners' expectations. Is this expectation of failure normal, and is it the way things have to be? Is the ASHRAE Code of Ethics relevant and honored more in the breach than in fact?

Team 1
Larry Spielvogel, P.E., Fellow/Life Member[1], Don Beaty, P.E., Fellow ASHRAE[2], and Richard Rooley, Presidential Fellow Life Member[3], (1)Consulting Engineer, Bala Cynwyd, PA, (2) DLB Associates, Eatontown, NJ, (3) Rooley Consultants, Bucks, United Kingdom

Team 2
E. Mitchell Swann, P.E., Member[1], Ross Montgomery, Fellow ASHRAE[2], and Bill Coad, P.E., Presidential Fellow Life Member[3], (1) MDC Systems, Paoli, PA, (2)Quality Systems and Technology Inc., Parish, FL, (3)Coad Engineering Enterprises, St Louis, MO

Monday, June 30, 9:45 a.m.–10:45 a.m.

SPECIAL SESSION (BASIC)

Geothermal Heat Pump Track Keynote Presentation

Track: Ground Source Heat Pumps

Chair: Gary Phetteplace, Ph.D., P.E., Member, GWA Research LLC, Lyme, NH

The Keynote Address kicks off the Track on Geothermal Heat Pumps (GHPs, aka Ground-Source Heat Pumps) to be presented at this conference. While this session focuses on market conditions for GHP sessions that follow will range from the basics of site selection and system design to operational experience and topics of current research in the field.

The Geothermal Heat Pump Industry: Market Barriers and Market Drivers
Douglas Dougherty, Geothermal Exchange Organization, Washington, DC

SPECIAL SESSION (BASIC)

Research Summit Keynote Address

Track: Research Summit

Chair: David E. Claridge, Ph.D., P.E., Fellow ASHRAE, Texas A & M University, College Station, TX

Featured presentation for the Research Summit Track.

Big Data, Bigger Challenges and Greater Opportunities
Krishnan Gowri, Ph.D., Member, Pacific Northwest National Laboratory, Seattle, WA

SPECIAL SESSION (BASIC)

Are We Putting Enough Energy into Making Buildings Healthy?

Track: Indoor Environment

Chair: Thomas H. Kuehn, Ph.D., Fellow ASHRAE, University of Minnesota, Minneapolis, MN

Keynote presentation for the Indoor Environment Track by ASHRAE President Bill Bahnfleth.

Are We Putting Enough Energy into Making Buildings Healthy?
William P. Bahnfleth, Ph.D., P.E., Fellow ASHRAE, Pennsylvania State University, University Park, PA

Monday, June 30, 11 a.m.–12 p.m.

TECHNICAL PAPER SESSION (INTERMEDIATE)

New Energy-Efficient Technologies for Hydronic Heating & Cooling Systems

Track: Research Summit

Sponsor: 06.01 Hydronic and Steam Equipment and Systems

Escalating electrical costs and increased pressures to reduce consumption are driving research to provide new technologies for HVAC systems. These studies show new approaches to increase energy efficiency for hydronic heating and cooling systems.

VAV System Integrated with Thermal Storage System: Application to Residential Buildings
Ahmad Charif Magri, University of Wyoming, Laramie, WY

Deluge Evaporative Cooling Performance of Wavy Fin and Tube Inclined Heat Exchangers
Yunho Hwang, Ph.D., Member, University of Maryland, College Park, MD

Condensing Boiler and Vapor Vacuum Heating System Combo
Igor Zhadanovsky, Ph.D., Applied Engineering Consulting, Newton, MA

SEMINAR (BASIC)

Ground Source Heat Pumps: Historical Perspective and Track Overview

Track: Ground Source Heat Pumps

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications

Chair: Gary Phetteplace, Ph.D., P.E., Member, GWA Research LLC, Lyme, NH

This session has two overall objectives and a separate speaker addressing each. The first speaker addresses the history of Ground Source Heat Pumps (GSHP) providing an overview of the many ways the technology has been applied and some of the approaches that have been tried, including many that have failed or were eclipsed by others. The second speaker provides an overview of the contents of the many sessions within the GSHP/Geothermal Track which has been assembled by TC6.8 for this conference.

History of Geothermal Heating and Cooling Systems
Steve Smith, Enertech Global, LLC, Greenville, IL

Overview of the Geothermal Track at This Meeting
Gary Phetteplace, Ph.D., P.E., Member, GWA Research LLC, Lyme, NH

SEMINAR (INTERMEDIATE)

New EPA Guidance for Moisture and Humidity Control in Buildings

Track: Indoor Environment

Sponsor: 01.12 Moisture Management in Buildings

Chair: Ray Patenaude, P.E., Member, The Holmes Engineering Group, Tierra Verde, FL

Persistent and excessive dampness from rainwater and plumbing leaks and from shortcomings in HVAC design can create severe indoor air quality problems and sometimes health risks for building owners and occupants. To reduce such risks, the US EPA has published guidance for architects, engineers and building operators with respect to managing moisture and humidity. These presentations provide practical, actionable suggestions for each of the professional disciplines. The information will also prove useful to any building occupant or homeowner who has had the unfortunate experience of living or working in a building that has a dampness or high humidity problem.

The New EPA Guidance for Moisture Control: Its Background, Process and Purpose
Laura Kolb, US Environmental Protection Agency, Washington, DC

Top 10 Tips and Traps from New EPA Guidance for Managing Moisture in Building Design, Construction and Operation
Terry Brennan, Camroden Associate, Westmoreland, NY

Top 10 Tips and Traps from New EPA Guidance for Managing Moisture and Humidity in HVAC System Design, Installation and Operation
Lew Harriman III, Fellow ASHRAE, Mason Grant, Portsmouth, NH

SEMINAR (INTERMEDIATE)

Optimizing Operating Staff Capabilities and Energy Efficiency with Commissioning

Track: Installation, Commissioning, Operation and Maintenance

Sponsor: 07.09 Building Commissioning

Chair: Mike Eardley, P.E., Member, Cannon Design, Boston, MA

A comprehensive commissioning process provides a facility's staff with information necessary to efficiently operate building systems. A formal monitoring based commissioning (MBCx) effort is also useful in investigating operational issues, troubleshooting, determining actions required to permanently correct the problem, reducing the frequency of issue reoccurrence, and improving equipment maintenance due to wear and tear on equipment. This session provides a case study where the commissioning process optimized the efficient facility that was delivered, and reviews the benefits of MBCx in achieving peak building system performance throughout a facility's lifetime.

Using Monitoring Based Commissioning to Improve the Capabilities of O&M Staff
H. Jay Enck, Member, Commissioning & Green Build Solutions Inc., Buford, GA

Chiller Plant Optimization through Proper Commissioning
Norman Nelson, P.E., Member, CH2M Hill, Portland, OR

SEMINAR (INTERMEDIATE)

Pressure Independent Control Valves and Balance

Track: HVAC&R Systems & Equipment

Sponsor: 07.07 Testing and Balancing

Chair: Gaylon Richardson, Fellow ASHRAE, Engineered Air Balance, Houston, TX

Pressure Independent Control Valves (PICV) exist in the "in-between world" of flow control valves. In some forms they are considered as replacements to balancing devices. In other forms they do not perform as balance devices are supposed to perform. This seminar addresses PICV valves and balance and proper applications of this type of control and achieving balance.

The PICV: A Discussion on the History, Theory, and Application
James Hoctor, Member, Danfoss Heating, Baltimore, MD

Field Testing Pressure Independent Control Valves: The Balancer's Perspective
Justin Garner, Member, Engineered Air Balance, Houston, TX

PICV Valves and Balancing: System Level Discussion of Valve Application and Alternatives to PICV Application
Mark C Hegberg, Member, Mechanical Equipment Inc, Chicago, IL

FORUM (INTERMEDIATE)

Building Energy Policies Around the World

Track: Standards, Guidelines and Codes

Sponsor: ASHRAE Associate Society Alliance, 02.08 Building Environmental Impacts and Sustainability

Chair: Ashish Rakheja, P.E., Member, Regional Managing Director, AECOM India Pvt. Ltd., New Delhi, India; Thomas E. Watson, P.E., Presidential Fellow Life Member, Daikin Applied, Staunton, VA

Energy use in buildings is responsible for more than 30% of global CO_2 Emissions and has significant role in climate change mitigation, given the large potential savings in both new and existing buildings. For new buildings, energy policies are central element in achieving these potential savings. Such policies need to be dynamic and ambitious and they need to be supported by a policy package with long-term targets of achieving zero or positive energy for all new construction. This forum aims to discuss on the dynamic and ambitious building Energy Policies around the world. AASA member speakers from different countries are invited to discuss on the Energy Efficiency policies.

WORKSHOP (INTERMEDIATE)

The Impact of Change Orders and the Damages That They Can Cause

Track: Professional Skills

Sponsor: 07.02 HVAC&R Contractors and Design Build Firms, 01.07 Business, Management & General Legal Education

Chair: Michael Connor, P.E., Member, Connor Engineering Solutions, Alpharetta, GA; Michael McLaughlin, P.E., Associate Member, Southland Industries, Dulles, VA

This workshop is an interactive session where three real-life change order examples are given from three different contract perspectives: design/bid/build, design/build, and integrated project delivery. The audience is presented the scenarios and then broken up into smaller groups to discuss the merits of the change order proposal and what if anything should be awarded to the contractor including monetary compensation and/or extensions of time. After the individual group discussions, the audience comments are compared and contrasted to the actual result and reasoning behind the real outcome.

Destroying the Myth 'Contractors Do Not Like Changes'
James Fields, Member, Superior Mechanical Services, Inc., Greensboro, NC

So Happy Together: Scope Change, Design Refinement, or Field Condition
E. Mitchell Swann, P.E., Member, MDC Systems, Paoli, PA

WORKSHOP (INTERMEDIATE)

VAV Reheat Verses Active Chilled Beams and DOAS Workshop

Track: HVAC&R Fundamentals and Applications

Sponsor: 06.01 Hydronic and Steam Equipment and Systems, 06.05 Radiant Heating and Cooling

Chair: Mike McDermott, Member, Grumman Butkus Associates, Evanston, IL

Several recent articles claim that dedicated outdoor air systems plus active chilled beam systems are superior to variable air volume reheat systems on energy efficiency, first cost and air quality. Other articles paint a different picture and have found that a well-designed VAV system with reheat (including dual maximum zone controls, supply air temperature reset, duct static pressure reset and CO_2 controls in high intensity spaces) is hard to beat. This workshop explores both HVAC systems as they relate to first cost, thermal comfort, indoor air quality, energy use, floor to floor height, maintenance, and flexibility.

Comparing Performance: Active Chilled Beam + DOAS or VAV Reheat
Steve Taylor, P.E., Fellow ASHRAE[1] and Peter Simmonds, Ph.D., Fellow ASHRAE[2], (1)Taylor Engineering, Alameda, CA, (2)Stantec, Sherman Oaks, CA

To Beam or Not to Beam?
Peter Simmonds, Ph.D., Fellow ASHRAE, Stantec, Sherman Oaks, CA

Monday, June 30, 2:15 p.m.–3:45 p.m.

SEMINAR (BASIC)

'I Know That I Should Be Doing BIM, But ...': How BIM is Practically Being Introduced and Used by People like YOU to Move Their Projects and Businesses forward Towards a Connected and Collaborative BIM World

Track: HVAC&R Fundamentals and Applications

Sponsor: 01.05 Computer Applications, MTG. BIM Building Information Modeling

Chair: Tim Dwyer, Fellow ASHRAE, University College London, London, United Kingdom

This seminar includes presentations from a range of practicing engineering consultants where they show how they have taken hold of the BIM way of working, explaining some of the challenges and the current (and potential) benefits to their business, profession, end user, and environment.

Are You Ready to Take the BIM Plunge? The Top Ten Things You Need to Know
Raj Setty, P.Eng., Member, Setty and Associates, Washington, DC

Taking the First Step Toward Realizing the Value of the 'Information' in BIM: Moving Beyond 3D Drafting
Dennis Knight, P.E., Member, Whole Building Systems, LLC, Charleston, SC

What Keeps Some Consultants Away from BIM? Should It?
David Branson, P.E., Member, Compliance Services Group, Lubbock, TX

Monday, June 30, 4 p.m.–5:30 p.m.

SEMINAR (BASIC)

BIM in Action: Beyond CAD

Track: Professional Skills

Sponsor: 07.01 Integrated Building Design, BIM-MTG, 01.05 Computer Applications

Chair: Krishnan Gowri, Ph.D., Member, Pacific Northwest National Laboratory, Seattle, WA

Building Information Modeling (BIM) has gained wide acceptance by the building industry as a productivity enhancement vehicle by creating a single electronic repository of building data. This BIM model can be used from the earliest design stages of architectural modeling to commissioning and construction completion. In several instances, the BIM model is seen as a living digital representation of the building that is updated and maintained throughout the life of the building. This session features BIM industry experts that have implemented BIM

requirements in real-life projects and provide tips and tricks for ASHRAE members to work with BIM models.

BIM for Constructibility and Clash Detection
Michael Smith, PEng., Intergraph Corporation, Houston, TX

The Evolution of BIM from Design to Construction: Case Studies
Raj Setty, PEng., Member, Setty and Associates, Washington, DC

BIM Workflow for Energy Modeling
Chian Si Harriman, Carmel Software Corporation, San Rafael, CA

Tuesday, July 1, 8 a.m.–9:30 a.m.

CONFERENCE PAPER SESSION (INTERMEDIATE)

Energy Use and Technologies of High Performance Buildings

Track: Research Summit

Sponsor: 04.10 Indoor Environmental Modeling, 05.03 Room Air Distribution

It is evident that none of the influencing factors alone, including region, climate, technologies and building size, is determinant of the EUI. Achieving high energy performance calls for a holistic approach of integrated design and operation by considering climate, technology, operation and maintenance as well as human behavior.

Revisit of Energy Use and Technologies of High Performance Buildings
Cheng Li, Ph.D. and Tianzhen Hong, Ph.D., Member, Lawrence Berkeley National Laboratory, Berkeley, CA

Energy Performance of Major Types of Building Envelope in the Hot Summer and Cold Winter Zone of China
Yun Zheng, Guoqing He, Ph.D. and Sanming Zhang, Zhejiang University, Hangzhou, China

Performance Based Building System Evaluation for DOE Energy Asset Score
Supriya Goel, Nora Wang, Michael Rosenberg and Vrushali Mendon, Member, Pacific Northwest National Laboratory, Richland, WA

Development of a Probabilistic Graphical Energy Performance Model for an Office Building
Zheng O'Neill, Ph.D., P.E., Member, The University of Alabama, Tuscaloosa, AL

Advanced Lighting Controls: A New Frontier in BMS
Edwin Poland, DNV KEMA, Wheaton, IL

CONFERENCE PAPER SESSION (INTERMEDIATE)

Monitoring of Ground Source Heat Pump Systems

Track: Ground Source Heat Pumps

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications

Careful monitoring of ground source heat pump systems can provide a wealth of information—providing guidance for future designs as well as allowing performance of the monitored system to be optimized. Presentations in this session describe monitoring of four real world systems.

Eight Years of Operation of 616-Ton Geothermal Nursing Home in Northern Tier
Carl D. Orio, Member, Water Energy Distributors, Inc., Hampstead, NH

Real-World Geothermal: Measured Performance AND New Approaches
Stephen A. Hamstra, PE., Member, Greensleeves LLC, Zeeland, MI

Case Study of a Central GSHP System in a Warehouse
Xiaobing Liu, Ph.D., Member and Mini Malhotra, Oak Ridge National Laboratory, Oak Ridge, TN

Importance of Monitoring GSHP System Operation
Ed Lohrenz, Member, Geo Xergy Systems, Inc., Winnipeg, MB, Canada

SEMINAR (INTERMEDIATE)

Airborne Particle and Bacteria Control Technologies and Flow Demand Control for Energy Conservation in Critical and Controlled Environments

Track: Indoor Environment

Sponsor: 09.11 Clean Spaces, 09.06 Healthcare Facilities

Chair: Peter B. Gardner, P.E., Member, Torcon, Inc., Red Bank, NJ

Reduction of airborne particle and microbial contaminations has been one of the main focuses in design and operation of critical and controlled environments such as cleanrooms, labs, operating rooms and isolation rooms, etc., while these environments typically consume much higher energy than office spaces. The speakers present recent developments and innovative practices: Particle generation and dispersion by human coughing, its indoor migration paths, and investigation on HVAC systems' effectiveness in particle removal; how to use continuous particle or microbial sensing to ensure the real-time IAQ and cleanliness; and how to achieve the required air cleanliness automatically in health-care operating rooms and industrial cleanrooms with even decreased energy consumption by reducing unnecessary airflow over-supply during unoccupied periods, etc.

The Effects of Patient Movement on Particles Dispersed By Coughing in a Calm Indoor Environment
Yanzheng (Don) Guan, Ph.D., P.E., Member, Alamelu Ramesh, P.E., Member and Farhad Memarzadeh, Ph.D., P.E., Member, National Institutes of Health, Bethesda, MD

Infection Control in Hospitals by Real-time Bacteria Control
Rupert Mack, P.E., Member, Weiss Klimatechnik GmbH, Reiskirchen-Lindenstruth, Germany

Clean Environment Energy Conservation by Flow Demand Control Based on Particle Sensing
Wei Sun, P.E., Member, Engsysco Inc., Ann Arbor, MI

SEMINAR (INTERMEDIATE)

Chiller Efficiency and 90.1: Where Do We Go From Here?

Track: Standards, Guidelines and Codes

Sponsor: 08.02 Centrifugal Machines

Chair: Susanne Hanson, Member, Trane, LaCrosse, WI

90.1-2013 raised chiller efficiency for most equipment types and sizes, and the Standard is now believed to be approaching technological or cost-justification limits. This seminar explains the 90.1-2013 changes and identifies the constraints of present technology, including the impact of past and future refrigerant transitions. Where are the remaining opportunities for advancing chiller efficiency, in a cost-justified Standard? Regional requirements, system efficiency, operational requirements, enforcement and certification, and in situ monitoring will be discussed.

90.1 Chiller Efficiency: Today and Future
Richard Lord, Member, Carrier Corp., Murfreesboro, TN

90.1 Chiller Efficiency and the Real World
Paul Kozlov, Smardt, Victoria, Australia

SEMINAR (ADVANCED)

Energy Efficiency in Commercial Foodservice: Experiences with LEED and Energy Modeling

Track: Professional Skills

Sponsor: 05.10 Kitchen Ventilation

Chair: Don Fisher, P.Eng., Associate Member, PG&E Food Service Technology Center, San Ramon, CA

A motivating force for "sustainability" in the restaurant business is the energy and water savings. The foodservice industry has embraced the LEED building labeling program with tempered enthusiasm. But designing a LEED restaurant or commercial kitchen is not without its challenges. Up to 75% of the energy consumed in a foodservice facility is driven by the process loads. A modeler needs a comprehensive understanding of the process loads if one is to derive accurate predictions for energy use in a restaurant. This seminar presents real-world experiences with foodservice LEED projects and energy modeling.

Estimating Food Process Loads: Loaded with Uncertainty
Vernon A Smith, P.E., Associate Member, Smith Energy Engineers, Niwot, CO

Experiences in Designing and Constructing a LEED Cafeteria on the NREL Campus
Rois M. Langner, National Renewable Energy Laboratory, Golden, CO

Practical Approaches to Developing and Using Energy Models for LEED Restaurants
Adam P. Jarboe, Member, YUMI Global Engineering, Louisville, KY

SEMINAR (ADVANCED)

IEA EBC Annex 59: High Temperature Cooling and Low Temperature Heating In Buildings

Track: HVAC&R Fundamentals and Applications

Sponsor: 06.03 Central Forced Air Heating and Cooling Systems, 06.05 Radiant Heating and Cooling

Chair: Bjarne Olesen, Technical University of Denmark, Copenhagen, Denmark

It is important to minimize temperature differences in heating, ventilation and air conditioning (HVAC) systems because high differences result in reduced efficiencies and therefore increased energy use. Annex59 is thus starting from a new perspective and from this is developing a novel concept for analyzing HVAC systems in buildings. The ultimate goal of the Annex is hence to: Build up new concept of analyzing HVAC system from the perspective of reducing mixture loss and transfer loss then apply it in high temperature cooling and low temperature heating system. The seminar introduces the current progress of Annex 59.

Introduction of IEA ECBCS Annex 59
Yi Jiang, Tsinghua University, Beijing, China

Cooling Load Extraction: Radiant vs. Air System
Stefano Corgnal, Politecnico di Torino, Torino, Italy

Energy Monitoring of Thermally Activated Building Systems Coupled to Geothermal Heat Pumps
Vincent Lemort, University of Liège, Liège, Belgium

SEMINAR (INTERMEDIATE)

Indoor Air Quality and Comfort: Ventilation and Air-Conditioning

Track: Indoor Environment

Sponsor: 05.03 Room Air Distribution, Publishing and Education Council

Chair: Reinhard Radermacher, Ph.D., Fellow ASHRAE, University of Maryland, College Park, MD

This session offers a select group of recently published papers from the ASHRAE's *HVAC&R Research* egarding new developments in ventilation and air-conditioning technology to include research of displacement ventilation with a radiant floor heating/cooling system, and human response to convective and radiant cooling.

Human Response to Local Convective and Radiant Cooling in a Warm Environment
Arsen K. Melikov, Ph.D., Fellow ASHRAE, Technical University of Denmark, Lyngby, Denmark

Experimental Study including Subjective Evaluations of Mixing and Displacement Ventilation Combined with Radiant Floor Heating/Cooling System
Angela Simone, Ph.D., Member, Denmark Technical University, Kgs. Lyngby, CA, Denmark

Stratum Ventilation: A Solution to Elevated Room Temperature
John Zhang Lin, Ph.D., City University of Hong Kong, Hong Kong, Hong Kong

SEMINAR (INTERMEDIATE)

Tools and Methods to Manage Laboratory and Research Facilities for Effective and Efficient Long-term Operations

Track: Installation, Commissioning, Operation and Maintenance

Sponsor: 09.10 Laboratory Systems

Chair: Carol Donovan, Associate Member, Sebesta Blomberg & Associates, Woburn, MA

Research facilities and biosafety laboratories present a unique challenge to designers, owners, and operators with their inherent complexity of systems, health and safety requirements, regulatory compliance, energy use intensity, and environmental impacts. These mission critical facilities require continuous monitoring and commissioning and a team approach to communications between operators and users to ensure maximum system reliability and safe operations. The presenters in this seminar provide perspectives to broaden our understanding of how complex laboratory systems and operations can be combined with quality facility management and commissioning to achieve effective and efficient long-term operations.

Annual Biocontainment Performance Verification
Scott Rusk, Kansas State University, Manhattan, KS

Use of Specialized Commissioning Tests to Maximize Performance of VAV Lab Ventilation Systems
Thomas Smith, Member, Exposure Control Technologies, Inc., Cary, NC

12 Things You Need to Know About Monitoring-Based Commissioning (MBCx)
Craig Engelbrecht, Siemens Technologies, Buffalo Grove, IL

Tuesday, July 1, 9:45 a.m.–10:45 a.m.

SEMINAR (INTERMEDIATE)

Impact of Emerging Technologies and Practices on ISO Standards and Design Guides For Cleanrooms

Track: Standards, Guidelines and Codes

Sponsor: 09.11 Clean Spaces

Chair: Wei Sun, P.E., Member, Engsysco, Ann Arbor, MI

The seminar covers multiple sectors of emerging technologies and practices in today's cleanrooms, and more importantly their current or future impacts on ISO standards, IEST and ASHRAE design guidelines. One presentation illustrates a computational tool which can handle various process energy loads beyond the capacity of traditional building energy software; another introduces innovative approaches to reduce costs in cleanroom construction, energy consumption, and maintenance; and another presentation reveals new ASHRAE research findings of room pressure control technologies and airlock use and the newly released ASHRAE "Pressure Differential Table" for cleanrooms.

Computational Tool for Energy Consumption Prediction for Cleanroom Facilities and Applicability Study for Standards and Design Guides
Shih Cheng Hu, Ph.D., Member, Cheng Kang Chang and Yi Eun Cheng, National Taipei University of Technology, Taipei, Taiwan

Good Practices of Contamination Control in Clean Manufacturing: Case Study and Beyond
Vinod P. (V. P) Gupta, P.E., Member, SM, St. Paul, MN

Updated Cleanroom Design Guidelines from Recent ASHRAE Pressure Differential and Airlock Studies
Wei Sun, P.E., Member, Engsysco Inc., Ann Arbor, MI

SEMINAR (INTERMEDIATE)

Developing Airflow and Thermal Models for Data Centers: Comparing and Contrasting the Design and Operation Use Cases

Track: HVAC&R Fundamentals and Applications

Sponsor: 09.09 Mission Critical Facilities, Technology Spaces and Electronic Equipment

Chair: Nick Gangemi, Member, Facility Gateway Corp, Penfield, NY

Enterprise data centers require significant cooling. CFD modeling can be used for a variety of tasks from conceptual design, through assessment, to operational deployment decisions to maximize the data hall availability, capacity and efficiency. With increasing use, a variety of tools and modeling strategies have been developed. What can be achieved, and how quickly, will depend on the modeling tool sophistication and the user's modeling decisions. This session looks at concept and operation to enable prospective users to understand the different approaches for different uses and the skills they will need to be effective.

Airflow and Thermal Modeling for the Design of Data Centers
James VanGilder, P.E., Member, Schneider Electric, Billerica, MA

Calibration: Developing a Useful Airflow and Thermal Model to Maximize DC Availability Capacity and Efficiency
Mark Seymour, Member, Future Facilities, London, United Kingdom

SEMINAR (INTERMEDIATE)

Controls

Track: HVAC&R Systems & Equipment

Sponsor: 01.04 Control Theory and Application, Publishing and Education Council

Chair: Reinhard Radermacher, Ph.D., Fellow ASHRAE, University of Maryland, College Park, MD

This session offers a select group of recently published papers from the ASHRAE's *HVAC&R Research* on new developments in model predictive controls and virtual airflow meters.

Implementation of Model Predictive Control for an HVAC System in a Mid-Size Commercial Building
Russell Taylor, Ph.D., Member, United Technologies Research Center, East Hartford, CT

Investigations of a Virtual Airflow Meter Using Projected Motor and Fan Efficiencies
Gang Wang, Ph.D., University of Miami, Coral Gables, FL

SEMINAR (INTERMEDIATE)

Liquid Desiccant Dehumidification as a Way to Enhance IAQ and DOAS System Performance

Track: HVAC&R Systems & Equipment

Sponsor: 08.12 Desiccant Dehumidification Equipment and Components

Chair: Michael S. Sherber, P.E., Member, PPL SavageALERT, Inc., Rocky Hill, CT

This session describes how liquid desiccant systems can enhance indoor air quality and the performance of dedicated outside air systems (DOAS) in building HVAC systems.

Improving Indoor Air Quality with Liquid Desiccant Air Conditioning
Philip C. Farese, Ph.D., Member, Advantix Systems, Sunrise, FL

First Results of Testing and Demonstration Program of a Membrane Liquid Desiccant DOAS System
Peter Vandermeulen, Associate Member[a] and Eric Kozubal, Member[b], (1)TAC Technologies, Woburn, MA, (2) National Renewable Energy Laboratory, Golden, CO

SEMINAR (INTERMEDIATE)

What The Well?

Track: Ground Source Heat Pumps

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications

Chair: Chris Grey, P.E., Member, Southern Company, Birmingham, AL

The Research Summit will present innovations in HVAC&R research.

Believe it or not, for geothermal heat pump systems to be GEOTHERMAL heat pumps, they must tie into the Earth. Yup, it's true! The series of GSHP sessions continue with a focus on considerations for components outside the building. Design considerations for closed loop systems including material selection, sizing, and applicable codes are covered. Following this is a discussion of surface water heat pumps and a research update on surface water heat exchangers. Finally a highly experienced driller shares common pitfalls made during well/loop design and give some suggestions to save time and money.

Closed Loop Ground Heat Exchangers from the Ground Up (or Down)
Kirk T. Mescher, PE., Member, CM Engineering, Inc., Columbia, MO

Design Tools for Surface Water Heat Pump Systems
Jeffrey Spitler, Ph.D., P.E., Oklahoma State University, Stillwater, OK

Geothermal Design Effects on Installation
Russell Buras, LoopTech International, New Waverly, TX

WORKSHOP (INTERMEDIATE)

A Multi-Dimensional View of HVAC Maintenance

Track: Installation, Commissioning, Operation and Maintenance

Sponsor: 07.03 Operation and Maintenance Management

Chair: Robert G. Baker, Fellow ASHRAE, BBJ Consulting Service, Riverview, FL

Standard 180 (Inspection and Maintenance of Commercial Building HVAC Systems), first published in 2008 has achieved broad acceptance. In addition, it is referenced in both the UMC and IMC Codes and groups in California have put considerable effort into building utility incentive programs around it designed to improve the level and quality of maintenance of rooftop units in that state. This seminar explores the success of the various applications of the standard from different vantage points; the Design Engineer, Service Provider, Building Owner and Regulatory Authority.

The Contractor/Service Provider
Mike Gallagher, P.E., Member, Western Allied Corp., Santa Fe Springs, CA

The Building Owner/Engineer
Richard A. Danks, Member, NASA, Cleveland, OH

Tuesday, July 1, 11 a.m.–12:30 p.m.

TECHNICAL PAPER SESSION (INTERMEDIATE)

Air Distribution Analysis of Terminal Units and VAV System Control

Track: Research Summit

Sponsor: 05.05 Room Air Distribution

These papers are meshed together on two simple topics: variable air volume (VAV) terminal units and diffusers. Two papers are based on the performance of VAV boxes and how they assist in energy reduction and personal comfort. Two others discuss the impact of the air pattern and distribution in the space. And finally a session that ties these together to utilize static pressure rest.

Energy Efficient Static Pressure Reset in VAV Systems
Yin Ma, University of Dayton, Dayton, OH

Numerical Study of a Ventilation System Based on Wall Confluent Jets
Sotareh Janbakhsh, Linkoping University, Linkoping, Sweden

Preliminary Test and Analysis of a Stirling Engine Based Residential Tri-generation System at TRCA Archetype Sustainable House
Navid Ekrami, Ryerson University, Toronto, ON, Canada

Characterizing Airflow and Power of VAV Series Fan-Powered Terminal Units from Component Data: Part 1
Peng Yin, Student Member, Texas A&M University, College Station, TX

Characterizing Airflow and Power of VAV Series Fan-Powered Terminal Units from Component Data: Part 2
Peng Yin, Student Member, Texas A&M University, College Station, TX

CONFERENCE PAPER SESSION (INTERMEDIATE)

Methods to Predict and Verify Outstanding IEQ

Track: Indoor Environment

Design of superior indoor environments requires attention to several factors including lighting, sound, air movement, contaminant transport and thermal comfort. The papers in this session describe models, laboratory tests and field measurements that advance the state-of-the-art in indoor environmental design.

Effect of Wall Exhaust and Spill Locations on Indoor Air Quality in a Chemical Laboratory
Essam E. Khalil, Ph.D., Fellow ASHRAE, Sami Morad, Dr.Ing., Mahmoud Fouad, Dr.Ing., Member and Ayman Shabaan, P.Eng., Cairo University, Cairo, Egypt

Annual Daylight Glare Evaluation for Typical Perimeter Offices: Simulation Models Versus Full Scale Experiments Including Shading Controls
Ying Chieh Chan, Student Member, Iason Konstantzos, P.E., Student Member and Athanasios (Thanos) Tzempelikos, Ph.D., Member, Purdue University, West Lafayette, IN

Transport of Respiratory Aerosols in Patient Corridors Subject to Directional and Non-Directional Airflow: A Case Study
Ehsan S. Mousavi Ritzi, Student Member and Kevin R. Grosskopf, Ph.D., Associate Member, University of Nebraska, Lincoln, NE

Assessment of the Indoor Environmental Quality in a Dutch Daycare Center
Mark de Waard[1], Wim Zeller[1] and Proukje van Dijken[2], (1)TU Eindhoven, Eindhoven, Netherlands, (2)BBA, Rotterdam, Netherlands

Determining Annoyance Thresholds of Tones in Noise
Jennifer M. Francis, Joonhee Lee and Lily M. Wang, Ph.D., Member, University of Nebraska, Omaha, NE

CONFERENCE PAPER SESSION (INTERMEDIATE)

New Developments in Simulation and Modeling of Ground Heat Exchangers

Track: Ground Source Heat Pumps

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications

Simulation and modeling of ground heat exchangers is commonly used for both design and energy calculations of ground source heat pump systems. This session covers new developments in simulation and modeling of ground heat exchangers and interpretation of thermal response tests used to estimate thermal conductivity for simulation and design of ground heat exchangers.

A New Hybrid Model for Bore Field Heat Exchangers Performance Evaluation
Damien T. S. Picard, Ph.D., Catholic University of Leuven (KU Leuven), Leuven, Belgium

The Effect of Natural Convection on Thermal Response Test
Wonjun Choi and Ryozo Ooka, Ph.D., Affiliate, University of Tokyo, Tokyo, Japan

Experimental Validation of a Numerical Model for the Thermal Response of a Borehole Field
Patricia Monzó, P.Eng.[1], Félix Ruiz Calvo, P.Eng.[2], José Acuña, Ph.D.[1] and Carla Montagud, Ph.D.[2], (1) Royal Institute of Technology, Stockholm, Sweden, (2) Universitat Politècnica de València, Valencia, Spain

An Alternative to ASHRAE's Design Length Equation for Sizing Borehole Heat Exchangers
Mohammadamin Ahmadfard and Michel Bernier, Ph.D., Member, Ecole Polytechnique de Montreal, Montreal, QC, Canada

CONFERENCE PAPER SESSION (INTERMEDIATE)

Fire and Smoke Safety Design for Large and Tall Buildings

Track: HVAC&R Fundamentals and Applications

Sponsor: 05.06 Control of Fire and Smoke

Proper design of a smoke control system requires that specific fire scenarios including design fires need to be analyzed, taking into account the characteristics of each project. Fire data on temporal combustion characteristics that define design fires, such as heat release rates, temperatures, radiant heat flux, smoke and composition of fire gases for different fire scenarios are indispensable in carrying out fire safety engineering analysis and design of buildings. This session also presents a hand calculation method of analyzing high-rise smoke movement based on an analytical model and its solution to the coupled heat and mass transfer through shafts.

Design Fires for Large and Tall Buildings
John H. Klote, Ph.D., P.E., Fellow ASHRAE, Fire and Smoke Consulting, Leesburg, VA

Results of Fire Experiments to Quantify Residential Design Fires
Alex Bwalya, Ph.D., Ahmed Kashef, Ph.D., P.E., Member and Gary Lougheed, Ph.D., National Research Council Canada, Ottawa, ON, Canada

A Hand Calculation Method of Smoke Movement through High-Rise Building Shaft
Dahai (Damon) Qi, Student Member, Liangzhu (Leon) Wang, Ph.D., Member and Radu Zmeureanu, Ph.D., Member, Concordia University, Montreal, QC, Canada

CONFERENCE PAPER SESSION (INTERMEDIATE)

Evaluating Building Performance for Real Cost Saving Options

Track: Installation, Commissioning, Operation and Maintenance

Sponsor: 07.06 Building Energy Performance, 07.09 Building Commissioning

This session provides building energy modeling ideas to reduce the difference between modeled energy consumption with metered energy consumption and how these models can be used to evaluate energy conservation methods during the measurement and verification process. It also addresses quantitative airtightness testing that is required in some energy codes and ways to maximize boiler efficiency at part-load conditions.

Building Enclosure Airtightness Testing in Washington State: Lessons Learned About Air Barrier Systems and Large Building Testing Procedures
Graham Finch, P.Eng., Associate Member, RDH Building Engineering Ltd., Vancouver, BC, Canada

Targeted Calibration of Energy Models for Existing Buildings
Ery Djunaedy, Ph.D., Member and Kevin Van Den Wymelenberg, University of Idaho, Boise, ID

Use Calibrated Whole Building Energy Model to Disaggregate Retrofit Savings and Evaluate Demand- Response Strategies
Ke Xu, Ph.D., Associate Member[1], James Frakhaut, Ph.D.[2], Fayam Daigoshaai, Ph.D.[2], Scott Wagner[2] and Mark Stutman, Member[2], (1)The Pennsylvania State University, Philadelphia, PA, (2)The Pennsylvania State University, University Park, PA

Case Study: Optimization of an Industrial Steam Boiler System Operation
Bei Zhang, Ph.D., Student Member, Yunhua Li, Ph.D., Student Member and Mingsheng Liu, Ph.D., P.E., Member, Bes Tech Inc., Omaha, NE

SEMINAR (INTERMEDIATE)

Advances in Low GWP Refrigerants

Track: Refrigeration

Sponsor: 03.01 Refrigerants and Secondary Coolants, MTG: Lower GWP Alternative Refrigerants

Chair: Barbara Minor, Member, DuPont, Wilmington, DE

Significant progress is being made in the development and testing of low GWP alternatives to HFC and HCFC refrigerants. This seminar focuses on applications of refrigerant development, including air conditioning, high temperature heat pumps and refrigeration. Of particular concern is development of new refrigerants for air conditioning that perform well at high ambient temperatures. Some regions are just beginning their transition away from HCFC-22 and are looking for low GWP HCFC-22 alternatives with similar performance.

Considerations for the Development of Sustainable Refrigerants for Air Conditioning
Thomas J. Leck, Ph.D., Member, DuPont de Nemours and Company, Wilmington, DE

Refrigerant/Lubricant Properties of New Low GWP Options
Gregory Smith, Honeywell, Buffalo, NY

Zero-ODP, Low-GWP Working Fluids for High Temperature Heat Pumps
Konstantinos Kontomaris, Ph.D., Member, DuPont, Wilmington, DE

Sustainable Refrigerant Solutions for HVAC&R
Laurent Abbas, Ph.D., Associate Member, Arkema Inc., King of Prussia, PA

SEMINAR (INTERMEDIATE)

Gain Market Recognition by Elevating Your Firm's Brand & Social Media for Business: Are YOU Taking Advantage of It?

Track: Professional Skills

Sponsor: Electronic Communications Committee

Chair: Karine Leblanc, Member, US Air Conditioning Distributors Engineering, City of Industry, CA

Gaining market recognition in today's technology-obsessed world is easy when you position yourself as a technical expert by writing white papers, trade publication articles or even posting your ideas on social media sites. With 1 billion Facebook users, 645M Twitter users and 370 more apps, it's no wonder that businesses are moving forward with the social media era—ASHRAE being one of them. This session proves to you WHY you need to be published and WHAT it takes to make it happen.

The Who, What, Where, When and Why of Getting Published
Mindi L. Zissman, Zissman Media, Chicago, IL

What Works and What Doesn't Work
Mary Moore, Member, Syska Hennessy Group, Fairfax, VA

Repurposing it All
Tony Kampa, Environmental Systems Design, Chicago, IL

Social Media for Business: Are You Taking Advantage of It?
Karine Leblanc, Member, US Air Conditioning Distributors Engineering, City of Industry, CA

SEMINAR (INTERMEDIATE)

Measuring Commercial HVAC Performance through Load-Based Testing

Track: Standards, Guidelines and Codes

Sponsor: 08.11 Unitary and Room Air Conditioners and Heat Pumps, co: 8.7, 07.06 Building Energy Performance

Chair: Mira Vowles, Member, Bonneville Power Administration, Portland, OR

Load-based testing is intended to better represent the energy consumption of HVAC equipment in real-world conditions, especially variable capacity and climate-specific systems and accessories. Rather than testing at a fixed entering condition, load-based testing targets various loads and ambient conditions, to develop a performance map for the system. It is also intended to capture the impact of accessories, like economizers, variable speed components, staging, evaporative strategies and control algorithms. This seminar covers the need for unitary commercial equipment load-based testing and several approaches to develop system performance maps.

The Shortcomings of Traditional Single-Number Efficiency Metrics, and the Potential Value of a Load-Based Rating Method
Dan Berman, Member, Western Cooling Efficiency Center, Davis, CA

Research to Develop and Use a Load-Based Method of Test
Reid Hart, P.E., Member, Pacific Northwest National Laboratory, Richland, WA

Load-Based Testing of Variable Refrigerant Flow Systems
Ron Domitrovic, Ph.D., Member, EPRI, Knoxville, TN

Laboratory and Field Performance Testing of Climate-Appropriate Commercial Air Conditioners
Jonathan Woolley, Member, University of California - Davis

Tuesday, July 1, 1:30 p.m.–3 p.m.

SEMINAR (INTERMEDIATE)

Case Studies of Energy Reduction in Existing Buildings: Lessons Learned on How Involving Owners and Operators in Design and Execution Creates Successful Long Term Results

Track: Installation, Commissioning, Operation and Maintenance

Sponsor: 09.01 Large Building Air-Conditioning Systems

Chair: Rachel Romero, Associate Member, NREL, Golden, CO

This seminar presents three case studies illustrating how involving owners and operating/maintenance personnel during design and construction results in buildings that are more successful and perform better over the long term. When planning and designing for energy efficient systems, projects benefit significantly from user and operator input. Operating and maintenance personnel have experiences that most designers do not. Their insight is critical to a successful project, especially for integrated design and sustainability. A higher education laboratory, an electric company headquarters building, and a government office building focus on lessons learned from the project.

Saving Energy in the Electric Company Headquarters Building, Rebuilding HVAC Systems while Occupied
John Kuempel Jr., P.E., Member, DeBra Kuempel, Mechanical/Electrical, Cincinnati, OH

Commissioning and Maintaining a Building during a Floor-By-Floor Renovation
Steven Nicklas, EMCOR Government Services, Arlington, VA

Retrofits for Laboratory Buildings
Kelley P. Cramm, P.E., Member, Henderson Engineers, Lenexa, KS

Tuesday, July 1, 3:15 p.m.–4:45 p.m.

SEMINAR (ADVANCED)

The Road to Success With the New Refrigeration Commissioning Guide

Track: Refrigeration

Sponsor: Refrigeration Committee, TC10.7, TC3.01, TC2.8, 08.01 Positive Displacement Compressors

Chair: Georgi S. Kazachki, Ph.D., Fellow ASHRAE, Dayton Phoenix Group, Inc., Dayton, OH

Refrigeration systems account for a

significant portion of commercial building energy use and are often the largest energy end use in food and beverage facilities. The goal of this seminar is to introduce the newly developed Refrigeration Commissioning Guide for Commercial and Industrial Systems and to illustrate the benefits of its proper application.

Development of the New Refrigeration Commissioning Guide
Richard R. Royal, PE., Member, Walmart, Bentonville, AR

Commissioning during Planning and Design
Caleb Carl Nelson, P.E., Member, CTA, Missoula, MT

Commissioning during Construction and Installation
Bryan Beltler, PE., Member, Source Refrigeration and HVAC, Anaheim, CA

Commissioning During Start-up and First-Year Operation
Jason Robbins, P.E., Member, Walgreens, Springfield, IL

Wednesday, July 2, 8 a.m.–9:30 AM

TECHNICAL PAPER SESSION (INTERMEDIATE)

CFD and Hand Calcs: Fan Pressure, Duct Fittings, and Smoke Control

Track: Research Summit

Sponsor: 05.06 Control of Fire and Smoke, 05.01 Fans

When analyzing the effects of air flow and pressures within a duct or a large open space, analytics or CFD modeling can be utilized. In this session, the improved computational relations, effects of airflow disturbances, and smoke control are addressed.

Improvement of Computational Relations for Fan Pressures in HVAC Systems
Mikhail Nudelman, Hill Mechanical Services, Vernon Hills, IL

Analyzing the Effects of Air Flow Disturbances on Measurement and Control Equipment Positioned Downstream and Close to an Air Duct Elbow for the Purpose of Optimizing System Performance using a CFD Technique
Ali Hasan, Parsons Int. Inc., Doha, Qatar

Critical Ventilation Velocity and Smoke Control: Part 1, A Preliminary Analysis of Uncertainty
Kai Kang, Ph.D., Member, KAI Consulting Engineers, Nutley, NJ

Critical Ventilation Velocity and Smoke Control: Part 2, Application Considerations using Example of Jet Fan Ventilation
Kai Kang, Ph.D., Member, KAI Consulting Engineers, Nutley, NJ

CONFERENCE PAPER SESSION (INTERMEDIATE)

Radiant Cooling, District Energy and Multi-Objective Optimization

Track: Research Summit

Sponsor: 07.06 Building Energy Performance

Residential buildings with high performance thermal enclosures and thermal mass have been demonstrated to have minimal (3°F to 4°F) daily temperature swings. When such buildings are constructed on concrete slab foundations it is possible to cool the mass using radiant distribution and to use the floor mass to delay the delivery of cooling to times when lower outdoor temperatures favor the performance of air-to-water vapor compression cooling systems (chillers or reverse cycle heat pumps). This session also investigates the extent to which the procedure options of stepwise regression analysis influence the measurements of variables sensitivities.

Improving EER with Off Peak Radiant Cooling
David Springer, Member, Davis Energy Group, Davis, CA

Investigating the Potential of Residential District Energy
Nelson Rumo, Ph.D., Member[1], Vicente Bortone, P.E.[2], Juan Carlo Zambrano, PEng., Affiliate[2] and Aleyani Zambrano[3], (1)The University of Texas at Tyler, Tyler, TX, (2) Johnson Controls Inc., Lenexa, KS, (3)Universidad Nacional Experimental del Táchira, San Cristobal, Venezuela

Polymeric Hollow Fiber Heat Exchangers: Liquid-to-Gas Application
Ilya Astrouski and Miroslav Raudensky, Brno University of Technology, Brno, Czech Republic

A Comparison of Approaches to Stepwise Regression Analysis for Variables Sensitivity Measurements Used with a Multi-Objective Optimization Problem
Mengchao Wang and Jonathan Wright, Loughborough University, Loughborough, United Kingdom

CONFERENCE PAPER SESSION (INTERMEDIATE)

Natural Ventilation, UFAD, Dilution Ventilation Systems and Thermal 3-D Modeling

Track: Research Summit

With the focus on low energy and sustainable buildings today, building designers, engineers and researchers alike increasingly attempt to incorporate natural ventilation. UFAD and whole building dilution in innovative building practices. Implementing effective energy saving measures for the building's HVAC system can reduce building energy consumption, reduce peak demand, and improve building comfort for the occupants. A fully automatic approach to construct a 3-D thermal model of the building interior, which can potentially be used for automated building retrocommissioning will also be addressed.

Wind-Driven Airflow through Various Building Openings: Preliminary Results from Experimental Fluid Mechanics Using Particle Image Velocimetry
L. James Lo, Ph.D., Member, National Institute of Standards and Technology, Gaithersburg, MD

Automatic Generation of Thermal 3D Point Clouds of Building Interiors
Omar Oreifej, Ph.D. and Avideh Zakhor, Ph.D., University of California, Berkeley, Berkeley, CA

Multizone Air Change and Airflow in Two Houses under Operation of Different Whole-Building Ventilation Systems
Armin Rudd, Member, ABT Systems LLC, Annville, PA

Performance Study of an Underfloor Air Distribution System in an Education Building to Identify Building Energy Efficiency Improvement Opportunities
Juan Zhao, Ph.D., Associate Member, Vasiliy Khmelenko and James Watt, Texas A&M University, College Station, TX

CONFERENCE PAPER SESSION (INTERMEDIATE)

Retro-Commissioning Effectiveness

Track: Installation, Commissioning, Operation, Maintenance of Existing Buildings

Sponsor: 07.09 Building Commissioning, TRG7 Tools for Sustainable Building Operations, Maintenance and Cost Analysis

Retrocommissioning, as a systematic process for identifying and improving less-than-optimal energy performance in an existing building's equipment and control systems, is arguably one the most cost effective strategy for reducing energy consumption in buildings. Possible detectable HVAC deficiencies in energy consumption data are explored. Development of a building cluster emulator for building/building and building/grid operation optimization are introduced.

Residential HVAC Commissioning through Energy Consumption Data Analysis
Kristen S. Cetin, Student Member and Attila Novoselac, Ph.D., Member, University of Texas at Austin, Austin, TX

Corridor Pressurization System Performance in Multi-Unit Residential Buildings
Lorne Ricketts, Student Member and Graham Finch, P.Eng., Associate Member, RDH Building Engineering Ltd., Vancouver, BC, Canada

Net-Zero Energy Impact Building Clusters Emulator for Operation Strategies Assessment
Xiwang Li, Student Member and Jin Wen, Ph.D., Member, Drexel University, Philadelphia, PA

The Potential Energy Efficiency of a Hybrid Designed House: A Post-Occupancy Case Study on the Heating and Cooling System
Shan He and Ulrike Passe, Iowa State University, Ames, IA

The Investigation into Retro-Commissioning Effectiveness in Tropical Climate
Ljiljana Marjanovic Halburd, Ph.D.[1] and Challa Vanu Kumar, Member[2], (1) University College London, London, United Kingdom, (2)EnergyConservation.Sg (Comfort Management Pte. Ltd.), Singapore

SEMINAR (INTERMEDIATE)

Extending ASHRAE's Impact: How Savings Verification Software Tools Implement Guideline 14's Methods to Raise Investor Confidence

Track: Standards, Guidelines and Codes

Sponsor: 04.07 Energy Calculations

Chair: Chris Balbach, P.E., Member, Performance Systems Development, Ithaca, NY

ASHRAE Guideline 14 provides savings verification methods that increase investor confidence in building efficiency projects. However, widespread acceptance of its methods is still lacking. Open-source and proprietary software verification tools have gained popularity and bridge this gap, but stakeholders have little guidance in assessing their accuracy. This seminar demonstrates public domain tools capable of generating ASHRAE compliant savings estimates. A recently completed project that developed methods and a protocol for testing these tools are discussed. The need for a standard method of test for inverse modeling tools is explored.

User-Friendly M&V Based on ASHRAE Guidelines with a Free and Flexible Spreadsheet Add-in
William Koran, P.E., Member, NorthWrite, Inc., Lake Oswego, OR

Cost-Effective Accurate and Free Public Domain Building Energy Performance and Savings Analysis Tool
David A. Jump, Ph.D., P.E., Member, Quantum Energy Services & Technologies, Inc., Berkeley, CA

Unlocking Automated M&V: Assessment of Energy Baseline Model Accuracy
Jessica Granderson, Ph.D., Lawrence Berkeley National Laboratory, Berkeley, CA

SEMINAR (INTERMEDIATE)

Ground Source Systems Commissioning and Closeout: Unique Issues, Avoiding Fatal Flaws and Ensuring Client Satisfaction

Track: Ground Source Heat Pumps

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications, 07.09 Building Commissioning

Chair: Cary Smith, Member, Sound Geothermal Corp., Sandy, UT

High performance ground source systems require a little TLC to properly bring them online and ensure that the system meets the design intent and owner's needs. This process begins during the design phase and continues through construction and start-up. The design team, commissioning agent, and general contractor need to be invested and engaged with the project. Properly executed, this will result in a well-tuned building system and a happy client. This seminar addresses some of the to-dos and not-to-dos during the process.

Commissioning and Close-Out Tips for Geothermal Heat Pump Systems: Addressing GHP Nuances to Meet the Design Intent and Owners Project Requirement
Michael Kuk, Member, Sieben Energy Associates, Chicago, IL

Best Practices for a Well-Integrated Geothermal Heat Pump System
Lisa Mallna, P.E., Member, Mallna Engineering Corporation, Sacramento, CA

Did the Client Get What they Were Promised?
Kent T. Bell, P.E., Member, Harris Consulting Engineers, Las Vegas, NV

SEMINAR (INTERMEDIATE)

Optimized Controls Strategies for Radiant Heating and Cooling

Track: HVAC&R Fundamentals and Applications

Sponsor: 06.05 Radiant Heating and Cooling

Chair: Michael P. O'Rourke, Member, Barcol Air Ltd, Denver, CO

This seminar discusses and presents real-world design examples of how to apply controls to assure energy efficiency in radiant heating and cooling projects. Issues such as zoning, Standard 55 requirements as well as discussions of condensation controls and low mass vs. high mass system control issues are presented.

Condensation Avoidance and Optimizing Radiant Controls for Radiant Slab Systems
Daniel H. Nall, P.E., Member, Thornton Tomasetti Group, New York, NY

Residential Controls for Active Radiant Systems
Gary Hayden, P.E., Member, gbH Engineering, Norfork, VA

Occupant Comfort Control through Radiant Systems
Peter Simmonds, Ph.D., Fellow ASHRAE, Stantec, Sherman Oaks, CA

Control of Radiant Systems for Energy Efficiency
Peter Rumsey, Rumsey Energy Innovations, Oakland, CA

SEMINAR (INTERMEDIATE)

Performance Monitoring: Get the Energy Savings You Were Promised

Track: Installation, Commissioning, Operation and Maintenance

Sponsor: 01.04 Control Theory and Application

Chair: Marcelo Acosta, PEng., Member, Armstrong Fluid Technologies, Toronto, ON, Canada

Current energy performance standards require complex systems which more often than not are misunderstood by the construction, operations and maintenance teams. This leads to buildings never performing as promised or beginning to underperform soon after commissioning due to undetected malfunctions and operation misunderstandings. The speakers present the findings of a study by the Univ. of California quantifying the resulting energy waste; available solutions of different complexity and effectiveness; a successful solution implemented in large university campus in Massachusetts; and how the new ASHRAE Guideline 13 section on Performance Monitoring facilitates including preventive measures into building systems design.

Monitoring Based Commissioning: A Must in a World of High Energy Efficiency
Mark Gallagher, Member, Armstrong Fluid Technologies, Toronto, ON, Canada

Achieve Savings and Rebates: Using Automated Diagnostics
Dr. Nicholas T. Gayeski, Ph.D., KGS Buildings, LLC, Cambridge, MA

Specifying Performance Monitoring with ASHRAE Guideline 13
Dave Kahn, P.E., Member, RMH Group, Lakewood, CO

Wednesday, July 2, 9:45 a.m.–10:45 a.m.

CONFERENCE PAPER SESSION (INTERMEDIATE)

Demand Shifting, Duct Sealing and Particulate Concentrations: Three Peas in a Pod?

Track: Research Summit

This eclectic session starts with a new use of phase change materials to shift demand in cold storage facilities. Next come results from measurement of different sizes of particulate concentrations in two dozen hospital rooms followed by results from applying and testing a new duct sealing technology suitable for use in ducts with large leaks. What connects these papers? Each presents significant research results without a close companion topic among the research papers submitted.

A Paradigm Shift in Cold Storage Design: Using Thermal Mass and PCMs to Shift Demand off-Peak
R., Gary Black, P.E.[1] and Raymond C. Cole, P.E., Member[2], (1)University of California, Berkeley, Berkeley, CA, (2)Axiom Engineers, Monterey, CA

Airborne Particulate Concentrations in Hospital Rooms
Larry Dlugosz, Ph.D., Member, NOAA, Silver Springs, MD

Cost Effective Lining Technology for Sealing and Rehabilitation of Deteriorated HVAC Ducts
Ashis Kumar Roy[1], Chris Bartlett[1], Shaurav Alam, Ph.D.[1], Erez N. Allouche, Dr.Ing., P.Eng.[1] and Ravi Gorthala, Ph.D.[2], (1) Louisiana Tech University, Ruston, LA, (2) Steven Winter Associates Inc., Norwalk, CT

CONFERENCE PAPER SESSION (INTERMEDIATE)

Improving on the Fundamentals

Track: HVAC&R Fundamentals and Applications

Sponsor: 09.09 Mission Critical Facilities, Technology Spaces and Electronic Equipment

These papers explore changes in three areas of Fundamentals: ASHRAE Standard 55 for thermal comfort and airflow perception; new methods for evaluating sound in ductwork; and energy conservation measures that utilize voltage reductions in residential air-conditioning systems.

Airflow Perception and Draught Rating for Varying Thermal Conditions
Ahmet Ugursal, Ph.D., Charles Culp, P.E., Fellow ASHRAE, and Louis G. Tassinary, Ph.D., Texas A&M University, College Station, TX

Residential Split-System Performance in Utility Voltage Reduction Operation
Anish Galiwad, Tom Short, John Bush, Associate Member, and Ron Domitrovic, Ph.D., Member, EPRI, Knoxville, TN

Analysis of Flow, Temperature, and Sound Propagation in HVAC Ducts Using Two-Ports
Tamer Elnady, Ph.D.[1], Mina Waigh[1] and Mats Åbom, Ph.D.[2], (1)Ain Shams University, Cairo, Egypt, (2)KTH Marcus Wallenberg Laboratory, Stockholm, Sweden

SEMINAR (BASIC)

Basics of HVAC Noise Control: Environmental Noise Impact and Mitigation

Track: HVAC&R Fundamentals and Applications

Sponsor: 02.06 Sound and Vibration Control

Chair: Erik Miller Klein, P.E., Member, SSA Acoustics, LLP, Seattle, WA

Environmental noise from exterior and exterior ventilating equipment is a common challenge and issue for engineers and equipment manufacturers. This session explores the current and future of environmental noise codes, how the presence of tones in environmental noise is a common cause for complaints, and feasible noise control options for the exterior equipment.

Environmental Noise Codes: Current and Future
Erik Miller Klein, P.E., Member, SSA Acoustics, LLP, Seattle, WA

The Presence of Tones in Environmental Noise
Jennifer Francis, Student Member and Lily M. Wang, Ph.D., Member, University of Nebraska - Lincoln, Omaha, NE

Noise Control Solutions for Rooftop Equipment
Dan Laforgia, Member[1] and Sami Elkhazin[2], (1)Vibro Acoustics, New York City, NY, (2)Vibro Acoustics, Markham, ON, Canada

The Technical Program will be held at the Washington State Convention Center.

SEMINAR (INTERMEDIATE)

Central Plant GCHP Systems

Track: Ground Source Heat Pumps

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications

Chair: Michel Bernier, Ph.D., Member, Ecole Polytechnique De Montreal, Montreal, QC, Canada

Central plant GCHP systems use central water-to-water equipment to move thermal energy between the ground coupled heat exchanger, a chilled water loop, and a hot water loop. Here, the term 'central plant' implies the mechanical equipment is in one centralized location and does not imply a campus is served. Real-life examples of central plant GCHP systems are presented in this seminar with an emphasis on design issues and on potential advantages of such system over decentralized GCHP systems.

Central Plant GSHPs: Basic Considerations and Approaches
Scott P Hackel, PE., Associate Member, Energy Center of Wisconsin, Madison, WI

Central Plant GCHP for High Energy Efficiency Commercial Buildings
Roland Charneux, PEng., Fellow ASHRAE, Pageau Morel et Associés Inc., Montreal, QC, Canada

SEMINAR (ADVANCED)

Modeling Industrial Spaces

Track: Indoor Environment

Sponsor: 04.10 Indoor Environmental Modeling

Chair: Chao Hsin Lin, Ph.D., Fellow ASHRAE, The Boeing Company, Seattle, WA

There are specific ventilation requirements for various industrial indoor environments. The objectives of this seminar are: 1) to share the experience of applying numerical modeling techniques currently practiced or under development for industrial ventilation applications; and 2) to demonstrate the state-of-the-art of industrial ventilation and environmental control by using computational fluid dynamics tools and techniques.

Indoor Environment and Energy Analysis for a Winery Building
Qingyan Chen, Ph.D., Fellow ASHRAE, Purdue University, West Lafayette, WA

Exposure Control and Sustainability in Large Aircraft Painting Facilities
James S. Bennett, Ph.D., Member, NIOSH, Cincinnati, OH

Reducing Hazardous Fume Concentration in Industrial Workplaces by CFD Analysis
Reza Ghias, Ph.D., Member, Southland Industries, Dulles, VA

SEMINAR (BASIC)

Radiant Heating and Cooling System Design 101: A Step-by-Step Approach

Track: HVAC&R Fundamentals and Applications

Sponsor: 06.05 Radiant Heating and Cooling

Chair: Devin A. Abellon, P.E., Member, Uponor, Phoenix, AZ

The seminar takes designers through a step-by-step thermal-to-hydraulic calculation for a single zone embedded pipe radiant floor heating and cooling zone. Included will be discussion on how to use the Figure 9 Design Graph for Sensible Heating and Cooling with Floor and Ceiling Panels from the *ASHRAE Handbook—HVAC Systems and Equipment*.

12-Step Design Process for Embedded Pipe Radiant Systems
Robert Bean PL(Eng.) R.E.T., Member, Indoor Climate Consultants Inc., Calgary, AB, Canada

SEMINAR (INTERMEDIATE)

Successfully Applying Sorption Technologies for Fun and Profit

Track: HVAC&R Systems & Equipment

Sponsor: 08.03 Absorption and Heat Operated Machines

Chair: Ersin Gencek, P.E., Associate Member, Real Engineering Services LLC, Totowa, NJ

In this session, recent developments from efforts to develop gas-fired water heaters for residential and commercial applications are presented. In addition, comprehensive design considerations for ammonia-water binary system equipment are introduced for commercial manufacturers.

Gas-fired Heat Pump Water Heaters
Kyle Gluesenkamp, Ph.D., Student Member, Oak Ridge National Laboratories, Knoxville, TN

Design Considerations for Ammonia-Water Binary System Equipment for Commercial Manufacturers
Samuel Leggett, Associate Member, Luvata HTS Americas, Grenada, MS

WORKSHOP (INTERMEDIATE)

Achieving High Delta T: Keys to High-Performance District Energy Systems

Track: HVAC&R Fundamentals and Applications

Sponsor: 06.02 District Energy

Chair: Lucas B. Hyman, P.E., Member, Goss Engineering, Inc., Corona, CA; John S. Andrepont, Life Member, The Cool Solutions Company, Lisle, IL

This workshop addresses the topic of water temperature differential (ΔT) and its impact on district energy (hot and chilled water) systems. The impact of ΔT is amplified in district energy systems. The workshop discusses issues resulting from poor ΔT in a district energy system including a reduction in capacity and an increase in pumping energy. Common causes of low ΔT are discussed along with mitigation strategies through two case studies which demonstrate how system ΔT can be improved and even surpass design ΔT, including how thermal storage benefits from high system ΔT.

Wednesday, July 2, 11 a.m.–12:30 p.m.

TECHNICAL PAPER SESSION (INTERMEDIATE)

Improving Building Energy Consumption

Track: HVAC&R Fundamentals and Applications

Sponsor: 04.07 Energy Calculations, 06.09 Thermal Storage

The papers in this session are focused on energy consumption and value. There is a session on the benefits of ice storage systems. Using energy simulation to address building energy is discussed as well. Finally, business value models are analyzed for a true representation of the financial goals of the study.

Improving Accuracy of Building Energy Modeling Simulation Programs with Weather File Compensation Factors
Benjamin Wall, University of Massachusetts Amherst

Business Value as the Driver for Management of Building Energy Assets
Niloofar Salahi, Rutgers, the State University of New Jersey, Piscataway, NJ

Optimizing Building Energy Footprint using Integrated Reliability and EnergyPlus Simulation Approach
Khashayar Maharl, Rutgers, the State University of New Jersey, Piscataway, NJ

TECHNICAL PAPER SESSION (INTERMEDIATE)

Control Theories: Tested

Track: Indoor Environment

Sponsor: 01.04 Control Theory and Application

The five papers presented in this session provide an array of control strategies to improve how they operate. Analysis and research are shared in regards to calibration and accuracy, air side economizers, energy reduction, and adaptive logic.

Reducing Energy in HVAC Engineering
KH Chan

Robust Adaptive Control for a Class of Nonlinear Systems using Backstepping Method
Zouari Farouk

Sensor Data Management, Validation, Correction and Provenance for Building Technologies
Charles Castello, Ph.D., Affiliate, Oak Ridge National Laboratory, Oak Ridge, TN

Energy Analysis, Optimal High Limit Control and Engineering Approach of Air-Side Economizers
Gang Wang, Ph.D., P.E., Member, University of Miami, Coral Gables, FL

TECHNICAL PAPER SESSION (INTERMEDIATE)

Optimization of Ground Coupled Heat Exchangers and Heat Pumps

Track: Ground Source Heat Pumps

Sponsor: 06.08 Geothermal Heat Pumps and Energy Recovery Applications, 06.08 Geothermal Heat Pumps and Energy Recovery Applications

The first presentation presents the time constant modeling of geothermal heat pumps at compressor start up. The aim of the second presentation is to show how the number and positioning of boreholes for a given area can affect the fluid and ground temperature variations and the required borehole length.

One- and Two-Time Constant Models to Predict the Capacity of Geothermal Heat Pumps in Cycling Conditions
Michel Bernier, Ph.D., Member, Ecole Polytechnique De Montreal, Montreal, QC, Canada

Analysis of the Energy Performance and Control Optimization of a GSHP Installation
Javier Cervera Vazquez, Universitat Politecnica de Valencia, Valencia, Spain

Should the Optimization Horizon in Optimal Control of Ground Coupled Heat Pump Systems Cover the Inter-seasonal Time Scale?
Stefan Antonov, KU Leuven, Heverlee, Belgium

Experimental Validation of Ground Heat Exchanger Design Methodologies using Real Monitored Data
James R. Cullin, Student Member, Oklahoma State University, Stillwater, OK

CONFERENCE PAPER SESSION (INTERMEDIATE)

HVAC Systems and Equipment Analysis

Track: HVAC&R Systems & Equipment

This session explores the operation of variable refrigerant flow (VRF) heat pumps, under floor air distribution (UFAD), solar assisted residential micro-trigeneration, wasting of water and energy in residential hot water distribution systems, and thermal load error propagation due to inaccurate inputs in commercial buildings.

Error Propagation in Commercial Building Load Calculation
Sergio Escobar, Ph.D., Associate Member, Amit Shah, Cullen Bash and Niru Kumari, Hewlett Packard, Palo Alto, CA

Field Comparison Study of Indoor Environment Quality in Office Buildings with Underfloor Air Distribution and Overhead Ventilation Systems
Boualem Ouazia, Ph.D.[1], Alexandra Thompson, Ph.D.[1], Daniel Booth, PEng.[1] and Michel Tardif, PEng., Member[2]
(1)National Research Council Canada, Ottawa, ON, Canada, (2)CanmetENERGY Natural Resources Canada, Ottawa, ON, Canada

Energetic, Environmental and Economic Modelling of a Solar Assisted Residential Micro-Trigeneration System in a Mediterranean Climate
Simon Paul Borg, Ph.D.[1], Nicolas James Kelly, Ph.D.[2] and Vincent Buhagiar, Ph.D.[1], (1) University of Malta, Msida, Malta, (2) University of Strathclyde, Glasgow, United Kingdom

Near Real-Time Monitoring of Residential Hot Water Distribution System Performance
J.D. Lutz, P.E., Member, Lawrence Berkeley National Laboratory, Berkeley, CA

A New Model to Simulate Energy Performance of VRF Systems
Tianzhen Hong, Ph.D., P.E., Member[1], Xiufeng Pang, Ph.D., P.E., Member[1], Oren Schetrit[2], Liping Wang, Ph.D., P.E.[1], Shinichi Kasahara[3], Yoshinori Yura[3] and Ryohei Hinokuma[3], (1)Lawrence Berkeley National Laboratory, Berkeley, CA, (2)Daikin Industries, Osaka, Japan, (3) Daikin US Corporation, Irvine, CA

CONFERENCE PAPER SESSION (INTERMEDIATE)

Fundamentally Important Design Issues

Track: HVAC&R Fundamentals and Applications

Sponsor: 04.02 Climatic Information, 04.03 Ventilation Requirements and Infiltration

These papers span the breadth of fundamentals. Firstly by evaluating the tools that we use to determine loads: analyzing the ASHRAE weather data including localized effects like urban heat island and the effects of moisture on pourous insulation materials. Then case study analysis of tunnels on I-90 in Seattle review smoke management after adding HOV lanes and the balance of ventilation and fire suppression in life safety measures.

Smoke Management Systems Upgrades for I-90 Tunnels in Seattle
Igor Maevski, Member[1], Bob Josephson, P.E.[2], Raymond C. Klein, P.E., Member[1], Yuan Li, P.E., Member[1], Doug Haight, P.E.[3], Zak Griffith, P.E.[3] and Jarrod Alston, P.E., Member[1], (1)Jacobs Engineering, New York, NY, (2)Jacobs Engineering, Seattle, WA, (3) WSDOT, Seattle, WA, (4)Arup, Cambridge, MA

The Effects of Ventilation Systems on Fixed Fire Suppression Systems in Tunnels
David Byungjin Hahm, Associate Member, Yuan Li, P.E., Member and Igor Maevski, Ph.D., P.E., Member, Jacobs Engineering, New York, NY

CFD Modeling of Moisture Evolution in Three Phases Subject to Sharp Change of Boundary Temperature
Lei Chen[1], Tengfei Zhang, Ph.D., Member and Shugang Wang, Ph.D., Dalian University of Technology, Dalian, China

An Evaluation of ASHRAE's Climatic Design Conditions Against Actual Long-Term Recorded Weather Data
Joe Huang, Member, White Box Technologies, Moraga, CA

SEMINAR (INTERMEDIATE)

The IAQ Procedure is Alive and Well: Updates Related to Standard 62.1, TRG4.IAQP, and LEED v4.0

Track: Standards, Guidelines and Codes

Sponsor: 02.03 Gaseous Air Contaminants and Gas Contaminant Removal Equipment, SSPC 62.1, SSPC 145, TRG4.IAQP; 02.04 Particulate Air Contaminants and Particulate Contaminant Removal Equipment

Chair: Christopher O. Muller, Member, Purafil Inc., Doraville, GA

The IAQ Procedure has been an "on-again, off-again" method of determining the required outdoor ventilation rates in Standard 62.1-2013. There has been renewed interest in using this method for the purposes of energy conservation and improving and maintaining IAQ. This seminar provides an update on currently activities related to the IAQ Procedure with regard to Standard 62.1, ASHRAE Technical Resource Group 4 IAQP, LEED EQpc68, and a recent case study describing successful application of the IAQP.

ASHRAE Standard 62.1: The IAQ Procedure and the Concept of Additivity
Dennis Stanke, Member, Trane (Retired), La Crosse, WI

The IAQ Procedure and Contaminants of Concern: Who, What, Where and Why?
Charles Seyffer, Member, Camfil, Riverdale, NJ

LEED Certification and the IAQ Procedure: It Can be Done
Charlene Bayer, Ph.D., Member, Georgia Tech Research Institute, Atlanta, GA, USA and Hygiela Sciences LLC, Atlanta, GA

A Practical Example of the IAQ Procedure in Practice
Scott Williams, Target Corp., Minneapolis, MN

CONFERENCE PAPER SESSION (INTERMEDIATE)

New Professional Skills, Codes and Ethics

Track: Standards, Guidelines and Codes

Sponsor: 01.07 Business, Management & General Legal Education

To fulfill the demand for Net Zero Energy Buildings there is a need for synergy between the architectural and engineering domain. Designers that adhere to the Water Efficiency recommendations listed in ASHRAE 189.1 and the IgCC should see positive results in their water use calculations for commercial building applications that use energy-efficient cooling towers, closed circuit coolers and evaporative condensers for their HVAC systems. This session shows through actual residential energy use data that the implementation of the codes are yielding the energy reductions that were expected.

Integral Design a New Necessary Professional Skill for Architect and HVAC-Engineers to Cope with Their New Roles for Sustainable Development
Wim Zeller, TU Eindhoven, Eindhoven, Netherlands

Interpreting and Applying Cooling Tower Water Efficiency Design Recommendations in Sustainable Building Codes
Daryn S. Cline, Member, EVAPCO, Inc., Taneytown, MD

Ethical Practice for Consulting Engineers
Stephen W. Duda, P.E., Fellow ASHRAE, Ross & Baruzzini, Inc., St. Louis, MO

Verification of the Energy Savings from the Implementation of the Residential Building Codes in Texas
Juan Carlos Baltazar, Chunlu Mao, Student Member and Jeff Haberl, Texas A&M University, College Station, TX

SEMINAR (BASIC)

Air-to-Air Energy Recovery Ventilation Standards Overview Including the Applicable ASHRAE 90.1 Changes and the Upcoming ISO Standard

Track: Standards, Guidelines and Codes

Sponsor: 05.05 Air-to-Air Energy Recovery

Chair: Ronnie Moffitt, P.E., Member, Trane, Inc., Lexington, KY

The session educates the audience on the standards and guideline applicable to air-to-air energy recovery. The changes in ASHRAE 90.1-2013 that relate to Air-to-Air Energy Recovery will be presented. Attendees learn what additional applications are now covered. AHRI Standard 1060, Guideline W, and Guideline V will be presented along with an overview on the benefits of the AHRI ERV Certification Program. A review of ASHRAE 84-2013 is presented as well as a preview of ISO Standard 16494.

90.1-2013 Changes Related to Air-to-Air Energy Recovery
Paul Pieper, PEng., Member, Venmar CES, St Leonard d'Aston, QC, Canada

Benefits of the AHRI ERV Certification Program
Helen Davis, P.E., Member, AHRI, Arlington, VA

Overview of ASHRAE 84-2013 and Preview of ISO-16494
Matthew L. Friedlander, Member, RenewAire LLC, Madison, WI

ASHRAE

Shaping Tomorrow's Built Environment Today

Student Membership Application

What You'll Get With Your ASHRAE Student Membership!

What's "Cool" In ASHRAE

- ASHRAE maintains standards for indoor air quality
- ASHRAE promotes energy efficiency, savings and recovery
- ASHRAE reports on building controls, automation and integration
- ASHRAE focuses on green building issues and green technology
- ASHRAE promotes solar and other alternative energy sources
- ASHRAE offers certification programs, online learning opportunities and courses and seminars at ASHRAE Conferences

How Can ASHRAE Help You?

- Provide access to new technology
- Offer professional development opportunities
- Create opportunities for networking
- Offer online continuing education programs and eLearning programs

Student Member Benefits

- Access to members-only web pages
- Discounts on ASHRAE Handbooks
- Monthly ASHRAE Journal – print and digital
- HVAC&R Industry and Society Connections eNewsletters
- Discounted ASHRAE Annual and Winter Conference registration (AHR Expo, Student Program, Technical Sessions)
- Virtual online HVAC&R resume posting, job and internship searching program

ASHRAE Student Member Opportunities

- Society and chapter-level scholarships for both undergraduate and graduate engineering students
- Discounts for student members on select publications, go to www.ashrae.org/studentbookstore for more information
- Student Design Competition
- Networking with local ASHRAE Chapters
- Senior Undergraduate Project Grant Program
- At the student branch level, you'll enjoy meeting other students with similar interests – if your school hasn't yet started a student branch, take charge and contact a faculty member and ask for help on getting started!

You can continue your student membership after college with the SmartStart Program. The SmartStart program locks in the price of student dues for the first year of membership after graduation.

Visit www.ashrae.org/students to join online!

ASHRAE STUDENT MEMBERSHIP APPLICATION

ASHRAE • 1791 TULLIE CIRCLE NE • ATLANTA, GA 30329-2305 •FAX: 678-539-2212

FIRST NAME:

LAST NAME:

DATE OF BIRTH (mm/dd/yyyy) ☐☐/☐☐/☐☐☐☐

Current Mailing Address: (this will be where all correspondence will be sent unless otherwise specified)

Street Address: _____ Apt. # _____ City: _____

State/Province: _____ Postal Code: _____ Country: _____

Email: _____ Alternate email: _____ Phone: _____

Permanent Mailing Address: (during the Summer Months and after graduation)

☐ **Check if Current Address is the same as Permanent Address**

Street Address: _____ Apt. # _____ City: _____

State/Province: _____ Postal Code: _____ Country: _____

Email: _____ Alternate email: _____ Phone: _____

ASHRAE protects contact information provided by its members and customers. To view ASHRAE's privacy policy visit www.ashrae.org/privacypolicy.

All student applicants must have the name and member number of an ASHRAE member serving as their student sponsor. If your Student Branch Advisor is an active Associate or Full member, he/she can serve as your sponsor. If you need assistance locating a sponsor, please email **students@ashrae.org or call 678-539-1212**. Also, you must list the name, phone and email address of your faculty advisor or course instructor.

Sponsor Name: _____ ASHRAE Member #: _____

Advisor/Instructor: _____ Phone: _____

Email _____

I would like to participate in the activities of the _____ ASHRAE Chapter.

School Name: _____

Street Address: _____ City _____ State: _____

Country: _____ Postal Code _____

Expected Graduation Date: _____

Full time: ☐ Part time: ☐ Degree: _____

Classification: Freshman ☐ Sophomore ☐ Junior ☐ Senior ☐ Masters/PhD. ☐

ASHRAE Student Membership $20.00 USD

ASHRAE Handbook - Fundamentals ☐ I-P ☐ SI

(you will receive the most current edition of Fundamentals)

More than 900 pages of HVAC&R technical information and it includes the CD! (List Price $199)

Student Member Price: $49.00 USD $_____ USD

CD Only: $39.00 USD Total $_____ USD

*Additional books are available at ashrae.org/studentbookstore

*Please allow up to 30 days to receive new member packets. For U.S. book orders, allow 3-5 business days from processing. For international locations and Canada, allow 7-10 business days from processing.

To receive your subscription to the ASHRAE Journal, please answer the following questions by entering the appropriate codes in the spaces provided.

Which best describes your firm?
11. Consulting Engineering
12. Architect/Architectural & Eng Services
15. Design/Build
21. Contractor
26. Property Mgmt & Dev
31. Industrial Facility
41. Commercial Facility
42. Government, Healthcare, Education
43. Utility
51. Manufacturer/HVAC&R Equipment
61. Manufacturer's Representative
62. Sales Engineering
71. Wholesaler or Distributor
83. Library
84. Technical, Professional or Trade Association
86. **Student**
91. Other (Please Specify)

Which best describes your title?
B. President
C. Partner
D. Associate
E. Owner
F. Vice President
G. Vice President Eng, Chief Engineer
K. Design Engineer
L. Project/Application Engineer
O. Facility Engineer/Manager
P. Research/Development Engineer
R. Sales Engineer, Sales
S. Purchasing Agent
T. Draftsperson
U. Estimator
W. Technician
X. Instructor, Professor
Y. **Student**
Z. Librarian
ZZ. Other (Please Specify)

ASHRAE Society Dues include $6.00 for ASHRAE Journal. This amount is not deductible from Membership dues.

Please complete the ENTIRE application to ensure accuracy. Incomplete applications will NOT be processed.

Method of payment: ☐ VISA / Master Card ☐ American Express ☐ Diner's Club ☐ Check or money order enclosed*

Card Number: _____ Expiration Date _____ CVV No. _____ Amount: _____

Signature: _____ Date: _____

Print Name (as it appears on card): _____

***Checks will be accepted in U.S. and Canadian funds. Credit Card payments will be accepted in U.S. funds only.**

Board of Governors Meeting Minutes

ASHRAE Rochester Chapter

BOARD OF GOVERNORS MEETING MINUTES

Meeting Date: Wednesday, April 2, 2014
Location: Trane Office, Rochester, NY

President / CRC Alternate	Rob Wind	X
President Elect / Program	Ed Burns	X
Vice President /Tech Session	Christina Walter	X
Secretary	Jeff Close	X
Treasurer	Bill Clark	X
Immediate Past President / CRC Delegate	Michelle Sommerman	
Board of Gov. (1)	Mike Benedict	
Board of Gov. (1)	Scott Edwards	X
Board of Gov. (2)	Eric Smith	
Board of Gov. (2)	Paul Kenna	X
Board of Gov. (3)	Jim Browe	
Board of Gov. (3)	Michelle Sommerman	
Attendance	Tim Duprey	
Historian	Lee Loomis	
Membership Promotion	Jake Hall	
Newsletter Editor	Scott Edwards	X
Research Promotion	Paul Kenna	X
Awards	Al Rodgers	
CTTC	Jeff Wiedrick	
Education	Bill Murray	
Publicity	Mark Kukla	
Website	Kevin Wind	
YEA Chair	Matt Kremers	X
Student Activities	Chris Lukasiewicz	
Nominating (2nd Past President)	Jeff Ellis	
Picnic/Golf Chair	Jim Browe	
Buyers Guide	Stephanie Dempsey	
Valentine's Dinner Dance	Jody M. McGarry	
Refrigeration	Mike Nohle	

Board of Governors Meeting Minutes

Roll Call: The above noted individuals were present.

Call to Order: 7:30 am

Minutes:

- **Previous Meeting Minutes –** Minutes were distributed electronically and comments received were incorporated. FYI, no copies will be available at the BOG meetings.
- **Treasurer's Report :** Bill Clark
  - See attached Treasurer's report dated 03/30/2014.
- **Program/ Tech Session:** Ed Burns
  - Discussed suggestions for next year's program survey. Possibly have a suggestion box at the golf registration.
- **Refrigeration:** Mike Nohle (not present)
  - Wegmans Refrigeration Tour scheduled for April 7th.
  -
- **Tech Awards:** Jeff Wiedrick (not present)
  - One submission for a tech awards was sent in.
- **Attendance:** Tim Duprey (not present)
  - March Meeting = 58 attended
  - April Meeting = 43 RSVP
- **Membership:** Jake Hall (not present)
  - Current membership: 232, Student members: ~3
- **Awards:** Al Rodgers (not present)
- **Student Activities:** Chris Lukasiewicz (not present)
  - Making contact with MCC to promote ASHRAE
  - Collecting old ASHRAE Handbooks for students
- **YEA:** Matt Kremers
  - Chilled Beam presentation = 4/8 @ 6:00pm
- **Research:** Paul Kenna
  - Current contributions behind schedule
- **Newsletter:** Scott Edwards
  - RES deadline = 04/10/2014
  - Electronic Newsletter deadline = 18th of each month

Board of Governors Meeting Minutes

- **Buyer's Guide:** Stephanie Dempsey / Chuck White (not present)
  - Looking into if we can utilize direct links through ASHRAE website
  - The current list will be sent out for review and assistance on making additional calls. Deadline will be established (~end of month).
  - Total currently ~15

- **Historian:** Lee Loomis (not present)
  - Looking for ideas to assemble a Psychometrics display for the CRC
  - Al identified that he had some old items that would work
  - Discussed an article in the ASHRAE Journal ~5 years ago on the topic
  - Scott Sills suggested he has a contact for someone with a lot of Willis Carrier's old stuff.

- **Website:** Kevin Wind (not present)
  - Few items have been updated on the website.

- **Nominating:** Jeff Ellis (not present)
  - Ballots are out for next year's BOG. Results will be announced at the Golf / Picnic Outing.

- **Publicity:** Mark Kukla (not present)
  - ASHRAE Facebook page is up and running. Please "like" us.
  - Send any digital awards or photos of local projects to Mark for posting.

- **Valentine's Dinner Dance:** Jody McGarry (not present)

- **Picnic / Golf Outing:** Jim Browe (not present)
  - Need sponsorship and registrations ASAP.
  - Event scheduled for 5/12 @ Ravenwood.

- **CRC2016:** Jim Browe (not present)
  - Met with Wendy Ford (Visit Rochester) to provide overview of event and discuss guidelines / requirements.
  - Wendy is currently soliciting hotel accommodations and will be reporting back on multiple options for us to evaluate.

- **Old Business:**
  - Scholarship = Bill Clark to withdraw funds. Bill Murray to resend draft outline for scholarship. board approved unanimously to pursue a one year $1,000 trial scholarship out of the Charles Lynch Fund.
  - Rob to update MOPS with adjustments in chair positions.

- **New Business:**

- **Next Meeting:** TBD

- The meeting was adjourned at 8:05 am

Tips for ASHRAE Scholarship Applicants

Make sure …

- You meet all applicable criteria
- You read the application carefully and answer all questions completely and honestly.
- The application and all required documents are submitted or postmarked on or before the applicable deadline.
- Your application is NEAT, legible (typed or handwritten clearly), and proper English (correct grammar and spelling) is used when responding to essay questions.
- To take time to submit a brief, non-required introductory cover letter
- You are clear and thorough when stating goals and financial need.
- You contact the nearest ASHRAE chapter for an interview with the Student Activities Chair or other officer to learn more about the Society.
- You find out if your school hosts an ASHRAE student branch.
- You contact ASHRAE headquarters if you have any questions and to ensure your application has been completed and submitted properly.

More information on the scholarship and details on how to apply can be found at www.ashrae.org/scholarships.

Your technical training provider presents…

Air Conditioning Fundamentals 2014

Target Audience: Essentially anyone who wants to broaden their base in fundamentals will greatly benefit.

- Any Direct or Indirect AM who has not had the opportunity to attend GTP
  - Perhaps a local new hire salesperson - that can't commit to 6-months at GTP
  - Someone who was promoted from within
  - A new hire that came from outside our industry
- Any BAS AE, PM, PA, Application Specialist or Estimator who wants to broaden their base in the fundamentals

Primary Benefit: Students will enjoy learning as much practical knowledge as possible about Air Conditioning Fundamentals. Students won't waste a great deal of time in theory. The typical student can immediately apply what he/she learns upon returning to their office. Past attendees have enhanced their overall confidence and found many ways to apply their recently acquired knowledge.

Course Offerings (Rochester, NY): (these classes are 3-days; Tuesday - Thursday)

[ ] Jun 17-19 **'Airside Fundamentals-II'** (Duct Design, Fans & Fan Laws & Acoustics)

[ ] Aug 19-21 **'Systems Fundamentals'** (HVAC Systems, Dehumidification, IceStorage-LowTempAir, Bldg Pressurization)

Course Offerings (Harrisburg, PA): (these classes are 3-days; Tuesday - Thursday)

[ ] Feb 18-20 **'Airside Fundamentals-I'** (Load Design and Psychrometrics)

[ ] Mar 18-20 **'Refrigeration Fundamentals'** (Refrig Basics, Refrig Piping, Refrig & Our Environment)

[ ] Apr 15-17 **'Energy Efficient Design Fundamentals'** (Chiller-Side, Air-Side, System Controls, Energy Recovery, VRF)

[ ] May 20-22 **'Product Fundamentals'** (AHU, WSHP, RTU, Chillers, Fan Coils, UV, VRF)

Note: For more information about each of these classes, log onto BeckerLearning.com

Registration Deadline: Each course will be filled on a first-come-first-reserved basis (established by receipt of payment).

Contact: Joe Becker, Becker Learning / **106 Needlewood Drive / Harrisburg, PA 17112**
Phone: (585) 317-0000 Email: Joe@BeckerLearning.com

More Details for 3-day courses:

Where: We will hold the 3-day classes at the local hotels listed below. These hotels will hold a block of rooms at the Becker Learning discounted price up until 15-days before the class - so please make your reservations right away. All you need to do is let them know that you are part of the Becker Learning group.

* Rochester, NY (Greece): Homewood Suites at 400 Center Place Drive, Rochester, NY 14615 - **(585) 865-8534** at the Becker Learning rate of$114/night
* Harrisburg, PA: The Holiday Inn Express at 4021 Union Deposit Road, Harrisburg, PA 17109 - **(717) 561-8100** at the Becker Learning rate of $103/night

Time: We will start each morning at 8:00 AM and end by 5:00 PM (except Thursday when we end by 4:00 PM for travelers)

Food: Lunch, mid-morning and mid-afternoon snacks & drinks are provided.

What is not included: Transportation, other meals & lodging.

Travel: **Arrival:** Since the seminar starts at 8:00 a.m., plan to arrive the night before.
Departure: You can book flights out of Rochester as early as 5:30 p.m. on Thursday since our Hotel is less than 10-miles from the airport. Harrisburg flights should be booked after 6:00 pm as the hotel is a bit farther (about 30-minutes) from the airport.

Registration: Please fill out this form for each person attending, and mail it along with a **Check** or **Purchase Order** (made out to '**Becker Learning**') to:

Becker Learning / 106 Needlewood Drive, Harrisburg, PA 17112

Payment Deadline: Complete Payment must be received prior to the start of the class.

2014 Courses: Rochester, NY: [ ] Airside-II [ ] Systems
(check all that apply) Harrisburg, PA: [ ] Airside-I [ ] Refrigeration [ ] Energy [ ] Products

Name:_____ Title: _____

Trane Office: _____

Address: _____

Phone:( ) Email:

Type	# of Courses	$/course	Total Cost $	Check # or PO #
3-day		$1,100		

Authorizing Person

Printed Name	Signature	Date

****If a PO is given, full payment must be received prior to the first day of class.*

Cancellation Policy:

- If someone cancels 60-days prior to the start of the class => no cancellation charge.
- If someone cancels 30-60 days prior to the start of class => 50% cancellation charge
- If someone cancels less than 30-days before the start of class, or simply doesn't show up => charged the full amount

Teaching Methodology:

Similar to the way Joe taught nine classes in the Graduate Training Program of The Trane Company, students will learn a concept and then immediately apply this new knowledge with an application problem. Quiz/testing will also be used to measure the overall effectiveness of the teaching. In this way, the program receives continual improvement through direct feedback.

About the Instructor:

Joe Becker is a graduate of the University of Wisconsin-Madison with degrees in Naval Science and Industrial Engineering (1979). He is also a Graduate from the U.S. Naval Nuclear Power School at Mare Island, California (1975). Joe is a registered Professional Engineer (Wisconsin 1990).

After nine years in the Navy, Joe resigned his Commission in the Civil Engineer Corps. Since graduating from Trane's GTP class of 83-II, he worked as a Systems Engineer in C.D.S., Marketing Engineer in the Variable Air Volume Product Group, Manager of Technical Training in GTP, Sales Engineer, Sales Manager in Rochester/Syracuse & Regional Sales Manager for the NE Territory.

Joe currently works part-time for Trane's East Territory & provides technical training through Becker Learning.

Bellenger Book Corner

WELCOME TO THE BELLENGER BOOK CORNER

Mrs. Lynn G. Bellenger was an avid reader and supporter of continuing education. She encouraged local firms to create internship opportunities for aspiring engineers in order for them to gain more experience.

Lynn had an extensive library collection of books ranging from introductory HVAC and hydronic systems to controls and energy efficiency manuals written by colleagues and friends that she had met through ASHRAE.

This section is dedicated in Lynn's honor to provide additional reading materials relevant to the ever-changing technology in the HVAC field. We hope this will be an especially valuable section for young engineers who are just starting their careers.

IN THIS ISSUE: TECHNICAL COMMITTEES

What Is A Technical Committee?

The technical expertise of ASHRAE is concentrated in its **Technical Committees (TCs), Task Groups (TGs), Technical Resource Groups (TRGs) and Multidisciplinary Task Group (MTGs)** . These groups are responsible for:

- *preparing the text of ASHRAE Handbook chapters*
- *originating, coordinating, and supervising Society-sponsored research projects*
- *presenting programs at ASHRAE meetings*
- *reviewing technical papers*
- *evaluating the need for standards*
- *and advising the Society on all aspects of the technology it embraces*

ASHRAE TCs consist of people who have a recognized proficiency in a specific field of interest. TGs, similar to TCs, are formed when a subject of current interest is not covered in the scope of an existing TC or when the subject encompasses the scope of more than one TC. TRGs are similar to TCs except that their responsibilities are limited to preparing, reviewing, or revising technical material. They do not have responsibility for programs, research, or standards. MTGs are different from TCs, TGs, and TRGs. The objective of the MTG is to first try and better coordinate and focus the activities of the affiliated TC and non-TC groups (EHC, REF, SSPCs, outside groups, etc) that make-up the MTG on the task for which the MTG was created without duplicating the functions of a TC or TG so that the task can be completed as efficiently as possible.

If you have further questions about TC Committee membership or TC Committee operations, please see Applying for Membership on a Technical Committee.

If you know of a good manual that you would like to share with us, please send it to the newsletter editor Scott Edwards at scott.edwards@trane.com. In order to keep with ASHRAE's goal of supporting continuing education without commercialization, we ask all reading materials recommended for this section be either ASHRAE sponsored or non-vendor specific.

News

1791 Tullie Cir. NE | Atlanta, Ga. 30329-2305 | 404-636-8400 | www.ashrae.org

For Release:
April 4, 2014

Contact: Jodi Scott
Public Relations
678-539-1140
jscott@ashrae.org

ASHRAE Proposes to Move All Residential IAQ Requirements to Standard 62.2

ATLANTA – Dwelling units of multifamily buildings of any height would fall under ASHRAE's residential ventilation standard, 62.2, under a proposed change designed to provide consistency of ventilation requirements.

Currently, ANSI/ASHRAE Standard 62.1-2013, *Ventilation for Acceptable Indoor Air Quality*, has responsibility for multifamily residential buildings 4 stories or more, while ANSI/ASHRAE Standard 62.2-2013, *Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings*, has responsibility for residential buildings 3 stories and less.

"The Standards 62.1 and 62.2 committees are proposing scope changes that would result in the dwelling units of all multifamily buildings being covered by Standard 62.2," Paul Francisco, chair of the Standard 62.2 committee, said. "Common areas would be covered by 62.1. This will provide consistency of ventilation requirements for dwelling units regardless of building height. For new construction, this will result in a change of requirements for dwelling units in 4+ story buildings. For the retrofit market, this change will result in coverage by ASHRAE ventilation standards for the first time in 4+ story buildings."

The proposed changes are being made via addendum *a* to Standard 62.1-2013 and addendum *g* to Standard 62.2-2013, which are open for public review from April 4 to May 4, 2014. For more information or to submit comments, visit www.ashrae.org/publicreviews.

The ventilation rates for dwelling units in Standard 62.1 are different from the rates in Standard 62.2, and this inconsistency has caused concern for some, according to 62.1 committee chair Roger Hedrick. Additionally, Standard 62.1 does not address modest retrofits whereas Standard 62.2 does.

"The retrofit market is a major user of ASHRAE ventilation standards," he said. "This will allow for consistency across dwelling units and also allow application of ASHRAE ventilation standards to the multifamily retrofit market."

Francisco agreed, saying, "Given the growth of the retrofit industry in multifamily dwellings it is important to ensure that these situations are covered in ASHRAE's ventilation standards."

News

1791 Tullie Cir. NE | Atlanta, Ga. 30329-2305 | 404-636-8400 | www.ashrae.org

For Release:
April 10, 2014

Contact: Jodi Scott
Public Relations
678-539-1140
jscott@ashrae.org

Supply Water Temperature Classification New Addition to Updated Guidance on Cooling Data Centers

ATLANTA— Data center rack heat loads are steadily climbing, creating a need for liquid cooling solutions to reduce the volume of airflow needed, as well as lower processor temperatures for better computer performance. "Liquid Cooling Guidelines for Datacom Equipment Centers," second edition, recently published by ASHRAE, provides best practice guidance for implementing liquid cooling systems in data centers.

"There is an increasing interest in liquid cooled IT equipment at the rack, equipment and component levels," Don Beaty, publication chair of Technical Committee 9.9., Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment, said. "There is also increased interest in reuse of the heat rejected from IT equipment. One of the more important changes to the second edition is the addition of supply water temperature classification."

Beaty claims that the addition of liquid classes can have a similar effect on the industry as the creation of supply air temperature classes did—which was the critical enabler to the use of economizers in data centers.

"There are five water temperature classes with the highest temperature class being >45 C (113 F), which opens up possibilities for using the rejected heat for building heating systems," he said.

The guide bridges the liquid cooling systems by providing guidelines on interface requirements between the chilled-water system and the technology cooling system and on the requirements of liquid-cooled systems that attach to a datacom electronics rack to aid in data center thermal management.

Also included are updated references and further information on approach temperatures and liquid immersion cooling, plus guidance on water quality problems and wetted material requirements.

Additionally, the guide covers definitions for liquid and air cooling as they apply to IT equipment, along with an overview of chilled-water and condenser water systems and other datacom equipment cooling options.

This book is the fourth in the ASHRAE Datacom Series, authored by ASHRAE TC 9.9.

The cost of "Liquid Cooling Guidelines for Datacom Equipment Centers," second edition, is $54 ($46 ASHRAE members). To order, contact ASHRAE Customer Contact Center at 1-800-527-4723 (United States and Canada) or 404-636-8400 (worldwide), fax 678-539-2129, or visit www.ashrae.org/bookstore.

ASHRAE, founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment. The Society and its more than 50,000 members worldwide focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability. Through research, standards writing, publishing, certification and continuing education, ASHRAE shapes tomorrow's built environment today. More information can be found at www.ashrae.org/news.

News

1791 Tullie Cir. NE | Atlanta, Ga. 30329-2305 | 404-636-8400 | www.ashrae.org

For Release:
April 16, 2014

Contact: Jodi Scott
Public Relations
678-539-1140
jscott@ashrae.org

ASHRAE 2014 Annual Conference Announced for Seattle

ATLANTA— While abundant rain and thriving evergreens keep the city of Seattle green and lush, the city has taken the concept of "green" to a whole different level. Sustainability is promoted in all aspects of life, which makes Seattle the perfect location for ASHRAE's 2014 Annual Conference.

The Conference takes place June 28-July 2.For more information or to register, visit www.ashrae.org/seattle.

The Technical Program kicks off June 29, with interactive programs and a networking coffee break, and concludes July 2. The program addresses broad topics in the application of technology to practice, specific applications in ground source heat pumps, operations and maintenance and indoor environmental quality, as well as new reports on research taking place worldwide.

Featured is a track on Ground Source Heat Pumps State of the Art: Design, Performance and Research, which addresses all aspects of design that lead to optimally performing systems in addition to avoiding common pitfalls that lead to poorly performing systems.

The Conference also features the second annual ASHRAE Research Summit, which presents innovations in HVAC&R research with particular emphasis on high performance building design and its role in a clean energy economy, and brings together researchers to present and discuss the latest research. Researchers present papers, seminars and forums or participate in panel discussions. Also, highlights on ongoing ASHRAE funded research are presented.

Attendees also can take part in courses offered by the ASHRAE Learning Institute, including two full-day professional development seminars and seven half-day short courses. New is a course on building demand response and the coming smart grid.

ASHRAE also offers its Building Energy Assessment Professional (BEAP) and Building Energy Modeling Professional (BEMP) exams on July 1.

The keynote speaker is Robert Bryce, one of America's most prominent energy journalists and a senior fellow at the Manhattan Institute. He serves as the keynote speaker at the opening Plenary Session, held Saturday, June 28. Registration is not required to attend the session, which also features the Honors and Awards program.

Denis Hayes, president and CEO, Bullitt Center, serves as keynote speaker at the Technical Plenary, Sunday, June 29. Conference registration is required to attend. In his remarks, Hayes discusses the problems and opportunities associated with "net positive" commercial construction, using the Bullitt Center as an illustration of what is currently possible.

Technical tours at the Conference include Federal Center South Building 1202; The Fred Hutchinson Cancer Research Center 1100 Eastlake Facility; The Bullitt Center; the Bill and Melinda Gates Foundation Headquarters; the University of Washington Molecular Engineering & Sciences Building; and the University of Washington Power Plant.

General tours include Tillicum Village; Show Me Seattle; Aircrafts, Airpark and Aviation Artifacts; Leisurely Lakes Cruise; Going Boeing; Cascades, Cabernets and Chocolates; and Museum of History and Industry (MOHAI).

The Conference takes place at the Sheraton Seattle and the Washington State Convention Center. To register or more information, visit www.ashrae.org/seattle.

News

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Ground Source Heat Pumps Focus of Technical Program Track at ASHRAE 2014 Annual Conference

ATLANTA—A new track added to the Technical Program at ASHRAE's 2014 Annual Conference speaks to the challenges engineers face when designing ground source heat pumps as compared to more traditional systems.

The Conference takes place June 28-July 2, Seattle, Wash. For more information or to register, visit www.ashrae.org/seattle.

The Technical Program kicks off June 29, with interactive programs and a networking coffee break, and concludes July 2. The program addresses broad topics in the application of technology to practice, specific applications in ground source heat pumps, operations and maintenance and indoor environmental quality, as well as new reports on research taking place worldwide.

New to the Technical Program is a track on Ground Source Heat Pumps (GSHP) State of the Art: Design, Performance and Research, which addresses all aspects of design that lead to optimally performing systems in addition to avoiding common pitfalls that lead to poorly performing systems.

The track was organized by ASHRAE, the National Ground Water Association (NGWA), the International Ground Source Heat Pump Association (IGSHPA) and the Geothermal Exchange Organization (GEO).

"There are a number of challenges that engineers face that are different from conventional HVAC systems, such as ground coupling, working with drillers, the importance of annual heating and cooling loads to ground heat exchanger design," Jeff Spitler, an ASHRAE member who helped create the track, said. "This track addresses the entire design and installation process from site evaluation to commissioning and system operation. In addition, GSHP systems are inherently energy efficient, but poor choices in the design can compromise this inherent efficiency. 'What not to do' is also addressed in the track."

Spitler said organizers have drawn in researchers from around the world to discuss new advances in the field so attendees have the opportunity to hear about both the latest research and state-of-the-art design practice.

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"We want to help practicing engineers understand where the industry began, where it stands currently (what tools and design guides are available), and where it is headed (through the programs showcasing current research)," Lisa Meline, recent chair of ASHRAE's technical committee 6.8, Geothermal Heat Pump and Energy Recovery Applications, said. "We also hope to impart guidance to the practicing engineers on the ground heat exchanger portion of a ground-source design. Many engineers shy away from this type of design because they don't understand it. We want to change that and reinforce the need to provide single-point-of responsibility for all different types of HVAC system designs, including this one."

Sessions in the track are:

Sunday, June 29

- Step 1: Assessing a Project Site for Geothermal Heat Pump Applications
- Ground Source Heat Pump System Performance Case Studies in Different Climates Around the World
- GEO 2.0: From the Ground Up, an Overview of the Updated ASHRAE GSHP 'Blue Book'
- Ground Source Heat Pump System Case Studies

Monday, June 30

- Geothermal Heat Pump Track Keynote Presentation
- Documentation and Contract Administration in Tendered and Design/Build Ground-Coupled Heat Pump Projects
- Ground Source Heat Pumps: Historical Perspective and Track Overview

Tuesday, July 1

- Monitoring of Ground Source Heat Pump Systems
- What the Well?
- New Developments in Simulation and Modeling of Ground Heat Exchangers

Wednesday, July 2

- Ground Source Systems Commissioning and Closeout: Unique Issues, Avoiding Fatal Flaws and Ensuring Client Satisfaction
- Central Plant GCHP Systems
- Optimization of Ground Coupled Heat Exchangers and Heat Pumps

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