ASHRAE Rocky Mountain Chapter

32nd Annual Technical Conference:

Sponsored By:

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Shaping Tomorrow's Built Environment Today

Friday, May 3rd, 2024

Register and pay at www.rockymtnashrae.com

Sheraton Denver West Hotel
360 Union Boulevard
Lakewood, CO 80228

Co-Sponsored by Rocky Mountain NEBB

GBCI Continuing Education Hours provided by:

Western Mechanical Solutions
SUSTAINABLE HEATING COOLING

U.S. Green Building Council Chapter
COLORADO

32nd Annual Technical Conference:

Shaping Tomorrow's Built Environment Today

For Whom:

Presentations for entry level and senior level engineers, architects, designers, students, salespersons, manufacturers, contractors, building officials, building owners, and building managers and operators.

When & Where:

Friday, May 3rd, 2024, at the:

Sheraton Denver West Hotel
360 Union Blvd.
Lakewood, CO 80228

Professional Development Hours (PDH):

The sessions eligible for GBCI credit are indicated on the Certificate of Attendance. If you would like GBCI credit, please sign the attendance sheet located in these sessions. In addition to signing in, credits must be self-reported to GBCI.

Thank-you:

We would like to thank all our sponsors for this event. Sponsor names are listed below and will be on signage at the conference. Without everyone's support, this conference would not be possible.

Your Cost:

Prices before April 7th

$275.00 Member Full Day Ticket (Includes Lunch)
$325.00 Non-Member Full Day Ticket (Includes Lunch)
$255.00 5+ Attendees Full Day Ticket (Includes Lunch)
- Price is Per Ticket, Must Have 5 or More Attendees
$60.00 Keynote Presentation and Lunch Only Ticket
- (Member / Non-Member)

Prices After 5:00pm April 24th

$295.00 Member Full Day Ticket (Includes Lunch)
$345.00 Non-Member Full Day Ticket (Includes Lunch)
$275.00 5+ Attendees Full Day Ticket (Includes Lunch)
- Price is Per Ticket, Must Have 5 or More Attendees
$75.00 Keynote Presentation and Lunch Only Ticket
- (Member / Non-Member)

Prices Day Of:

$345 Flat Fee for Full Day (Includes Lunch)
$75 Keynote Presentation and Lunch Only

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Luncheon Keynote Address:

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Challenge Accepted: Tackling the Climate Crisis

We are living in global climate emergency. Scientific evidence proves that human-caused emissions are accelerating the change in climate at a record pace. But there is hope. **"Challenge Accepted: Tackling the Climate Crisis"** explores integrated solutions to address the effects of the climate crisis through meaningful building decarbonization strategies. This presentation highlights how ASHRAE is equipping its members with new knowledge, expanding energy efficient building design efforts and providing climate leadership and resources to the global built environment.

Speaker: Ginger Scoggins, P.E., Fellow ASHRAE, is ASHRAE's President for the 2023-24 term. Scoggins previously served on the ASHRAE Board of Directors as president-elect, treasurer, vice president and director and regional chair.

For her time and dedication to ASHRAE and the industry, she is the recipient of the Exceptional Service Award and Distinguished Service Award. She chaired the ASHRAE Building Headquarters Ad Hoc committee, leading the Society's $20 million fully net-zero-energy building renovation project.

Scoggins has 35 years of experience as a licensed mechanical engineer and is a certified commissioning agent and certified energy manager. She is the president and owner of Engineered Designs, Inc. in Cary, N.C. – a full-service consulting engineering firm – where she works on the design and commissioning of projects ranging from $4 to $90 million in construction cost. Her focus is on designing high-performing buildings across a wide variety of markets.

Scoggins is a 1986 graduate of Tennessee Technological University, earning a Bachelor of Science in Mechanical Engineering.

Afternoon Technical Keynote and Open Bar:

Keynote Sponsored by: Western Mechanical Solutions

Western Mechanical Solutions

SUSTAINABLE HEATING COOLING

Open Bar Sponsored by: AAON, Bosch, and Trane

AAON BOSCH TRANE

Am I engaged? How do I know?

Ever wonder how much more we could get done if the people around you just did it your way? Have you wondered what feels like to work on things you truly enjoy? Ever question how engaged you really are at work? Engagement is as complex as it is simple – a deep, complex topic that makes or breaks achieving fulfillment in our working lives. This session will focus on how, why, and the roots of our engagement, how others impact our engagement, and where our default internal wiring and learned ways of thinking impact our environments. After this interactive, hands-on session, you'll take away tangible applications to immediately implement to impact cultures you work in with intention.

Afternoon Technical Keynote and Open Bar (continued):

Speaker: Kyle Majchrowski is the founder of Ripple Intent, a non-profit group which leads events focused on improving people, teams, and organizations. In his professional role as Senior Project Executive within Banner Health, Kyle supports the team that manages facilities, renovations and new construction throughout 5 States. Kyle's leadership with Ripple Intent impacts team performance, implementing collaborative efforts to build a strong culture of trust and vulnerability to deliver successful outcomes. Driven to substantially impact workplace connection and engagement, Kyle brings together people in a way the is unique, energizing, and inspiring.

Kyle has a unique perspective which combines experience as a subcontractor, contractor, developer, and institutional owner as well as time within technology firms. Combining degrees in Construction Management and Industrial Technology, he channels his passion for delivering the best cultural environment within for his teams to succeed.

Speaker: Christine Sosnowski has over 10 years of rich experience with architecture and construction firms. She's honed her expertise in a wide variety of roles spanning from preconstruction to project close-out. She holds certifications in DBIA and CM-Lean, and has experience with all contract types. Her most recent achievement was being recognized as an ENR Top 20 under 40 Young Professional for the Rocky Mountain region in 2024.

Christine is especially passionate about creating extraordinary alignment between the owner, contractor, and architect. She actively challenges the conventional 'trust-but-verify' mindset in the industry. She's a skilled problem solver, always on the lookout for innovative methods to improve team dynamics and communication. This is evident with her experience facilitating retrospective discussions, and encouraging teams to reflect on past projects to improve future collaborations. Her goal is for all team members to want to work on the same project again.

Beyond her professional pursuits, Christine fosters children, plays competitive volleyball, and skis.

7:30 – 8:00: Check-In / Registration

Breakfast Sponsored by: AAON, Annexair, EBTRON, RMH Group, and Seeley International

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RMH GROUP

SEELEY INTERNATIONAL

Afternoon Break Sponsored by: Annexair, Engineered Products Group, and MK Plastics

Track 1 – HVAC&R Fundamentals

Sponsored by: Western Mechanical Solutions

8:00am – 8:55am: Do You Know the Reverse Carnot?

The Reverse Carnot Cycle extracts heat from one system and expel it into another system. To properly explain this process in detail our presentation will be diving into Thermodynamics, Pressure Enthalpy diagrams, Gas Compression Process, Conservation of Energy as we break down the refrigeration cycle. Whether specifying, installing, maintaining, or purchasing equipment it's important to know the principles that drive how air conditioning equipment operates.

Speaker: Nathan Ducey, P.E. is a Sales Engineer at Western Mechanical Solutions. Nathan has been active in the industry for nearly five years, having experience working in equipment sales and for an equipment manufacturer. He graduated from Gonzaga University in 2017 with a degree in Mechanical Engineering. Nathan is an active member in ASHRAE and is a co-chair of the Denver Chapter of the YEA Committee.

9:00am – 9:55am: Psychrometrics

This presentation will cover the basics of psychrometrics and the psychrometric chart. Terminology, chart layout, and uses will be discussed. How to use a psychrometric chart for system design and formulas will also be discussed.

Speaker: Michael Fulton, P.E. founded Western Mechanical Solutions to focus on minimizing the energy use of buildings through innovative application of engineering. WMS represents various energy recovery products. Mike has 30 years of experience in equipment sales, consulting and construction. He graduated from the University of Maine with a degree in Mechanical Engineering. He is actively involved with ASHRAE, past president of the Rocky Mountain Chapter (2002-2003), has been involved with the local ASHRAE tech conference since 1996, and has been the north section (Fort Collins) chair since 2008.

10:25am – 11:30am: Energy Modeling Basics

This presentation will cover the basics of energy modeling. The intent is not to teach attendees how to perform modeling, but rather to promote understanding of the process and concepts to improve how designers, owners, and contractors interact with energy models on their projects. The presentation will discuss why and when to run an energy model, as well as the different types of models, calculation methods, and modeling software available. Typical modeling inputs, assumptions, and results will be reviewed. The presentation will also summarize relevant codes, standards, and certifications, and highlight energy modeling requirements in local amendments for Denver and Colorado.

Speaker: Sara Persily, P.E. is a mechanical engineer and associate at BCER Engineering. She has been in the HVAC industry for over seven years and has a passion for designing energy efficient building systems. She is an ASHRAE certified Building Energy Modeling Professional and a LEED AP BD+C. Sara is the 2023-2024 Treasurer for the Rocky Mountain ASHRAE Chapter and has also previously served as Junior Board Member, YEA Co-Chair, and voting member on the ASHRAE 62.1 IAQ Guideline Subcommittee. She has a Bachelor of Science in Chemical Engineering from the University of Virginia.

1:15pm – 2:10pm: Commissioning 101

A walkthrough of commissioning requirements based on code requirements (Denver and IECC) and LEED commissioning requirements. Slides will include information on what systems need to be commissioned, how commissioning fits into the project schedule and design/construction teams, and the benefits CxA services offer to projects and owners.

Speaker: Mike Day leads ME Engineers' commissioning group and brings over 30 years of experience in commissioning and the design of HVAC, plumbing and fire protection systems. Mike has led the commissioning of large commercial buildings, tenant improvement projects, major professional sports facilities, and educational facilities. Recent commissioned projects include Climate Pledge Arena, UBS Arena at Belmont Park, and Wrigley Field Renovations.

2:30pm – 3:25pm: An Introduction to ANSI/ASHRAE Standard 55

ANSI/ASHRAE Standard 55 defines the range of indoor thermal environmental conditions acceptable to the majority of occupants. An understanding of this standard is integral to the design of a new building or renovation, as it accommodates a variety of comfort solutions that contribute to sustainable building. The purpose of this presentation is to introduce ANSI/ASHRAE Standard 55, which explains occupant thermal comfort requirements and how they affect design, and consider changes incorporated in the 2020/2023 versions of the standard.

Speaker: Christian Taber is a Principal Engineer at Big Ass Fans focusing on codes and standards. He is an ASHRAE certified High-Performance Building Design Professional, a Certified Energy Manager, and a committee member of ASHRAE Standards 90.1 and 189.1. He was also a member of the USGBC Energy and Atmosphere Technical Advisory Group. He is a committee member for recent revisions to AMCA 230, AMCA 208, and AMCA 211. He holds an M.S. in mechanical engineering and B.S. in chemical engineering from Iowa State University, and an M.S. in biosystems engineering from the University of Kentucky.

TRACK 2 – HVAC&R SYSTEMS & APPLICATIONS

Sponsored by: CFM Company

8:00am – 8:55am: Decarbonization of Ventilation Systems

The journey toward sustainable and energy-efficient indoor environments begins with the decarbonization of ventilation systems. In this presentation, we will unmask the Carbon Sources in Air handling Units (AHUs). We will conjure some strategies for the electrification of heating and humidification while analyzing its impact on the AHU design. We will explore the benefits of our heroic sidekick, Energy recovery, and determine how we find the right one for our application. Finally we will review our fan energy and look at ways of taming this carbon beast. This session will help engineers, ESCOs, design build contractors, and building Owners to understand the benefits of designing a energy efficient AHU.

Speaker: Andrew Neely, P.Eng is a licensed professional engineer in the province of Ontario and holds a Bachelor of Engineering degree from McMaster University. Andrew has been employed with Johnson Controls since 2011, where he has held various roles including inside and outside equipment sales positions. He is currently the Regional Sales Manager for York Air Handling Units at Johnson Controls, covering the Canada, and the Western US regions. Andrew brings an refreshing perspective to the recent trends towards building decarbonization as he has been involved with various P3 (Public, private partnerships) and Sustainable Infrastructure projects throughout the US and Canada. Andrew currently resides in Hamilton, Ontario, Canada.

9:00am – 9:55am: Electrical Considerations for Mechanical Systems

This presentation will cover electrical considerations that mechanical engineering should consider while designing. Topics include: Fault Currents (SCCR and KAIC), Phase Monitors, NEC (National Electric Code) Clearances, Phase Monitoring for VFDs,

VFD Harmonic Filtering, FLA vs MCA, and Electrification Requirements.

Speaker: Matt O'Boyle is a principal at ME Engineers with nearly 20 years of experience. He is a registered professional engineer that specializes in developing electrical distribution systems, lighting design, fire alarm systems, and design of lighting control systems. Matt designs a variety of project types, ranging from professional/collegiate sports venues and museums to commercial buildings.

Speaker: Korey Kirschenmann is a principal at ME Engineers with nearly 20 years of experience. He is a registered professional engineer that specializes in power distribution system design from medium to low voltage, site utility coordination, lighting design, and life-safety systems. Korey designs a variety of project types, ranging from convention centers to commercial developments and provides electrical overlay.

10:25am – 11:20am: Chilled Water Systems: Don't Be Controlled by Your Chiller's Envelope

Why do we let our chillers demand more energy from our cooling systems? Why do we sacrifice our overall system efficiency to the demands of our chiller envelope? This lecture will help you to understand how to design and implement the highest levels of efficiencies into your chilled water system, while still maintaining optimized performances from your chiller and pumping equipment.

Speaker: James Murphy is a Sales Manager with LONG Building Technologies, specializing in chillers, air handlers, and large DX equipment. He has over 25 years of experience working primarily with large consulting engineers and end users. James supports many different vertical markets including indoor agriculture, healthcare, and critical environments like data centers and laboratories.

1:15pm – 2:10pm: Adiabatic Humidification: Technology overview, applications, energy benefits, and how to execute for success.

Adiabatic humidifiers pose an opportunity for end users to increase their energy efficiency while tackling other goals with these technologies. The presentation will cover those applications and help the audience better understand where to apply those technologies. We will also cover the challenges that we need to accept or overcome and talk through executing a successful application.

Speaker: David Baird is a Senior Applications Engineer at DriSteem Corporation based in Eden Prairie, MN. He has been at DriSteem for about 17 years in various roles in engineering, marketing, and sales. His current focus is the application of DriSteem products in the built environment ranging from sizing, selection, performance, and custom applications. He has a bachelor's degree in Mechanical Engineering from North Dakota State University and a master's degree in business administration from the University of St. Thomas.

David has been in the HVAC industry for 20+ years with additional experience as a design engineer at a MEP firm and an air handler manufacturer. He currently shares his expertise through involvement on several ASHRAE technical committees ranging from humidification, evaporative cooling, and mechanical dehumidification.

2:30pm – 3:25pm: Low Ambient VRF Design Strategies

VRF Technology presents an effective way to handle electrification in low ambient conditions. This presentation will cover the challenges low ambient temperatures pose to VRF systems and provide design strategies to ensure successful projects without sacrificing the energy efficiency of the system.

Speaker: **Andrew Schmidt, PhD** has over twenty years of experience in engineering & technology; he spent the bulk of his career to date in the oil and gas industry as a petroleum engineer working in Mexico, Texas and Colorado with a focus on improving efficiency and effectiveness of hydraulic fracturing operations. In 2021, Andrew shifted over to the HVAC industry where he is using his experience with complex systems, product development and implementation of new technology to assist engineers with VRF system design and layout. Andrew is a VRF Sales Engineer at LONG Building Technologies where his main focus is outside engineering sales and design of VRF systems.

Track 3 – SUSTAINABILITY

Sponsored by: Blackmore and Glunt

8:00am – 8:55am: New Energy Codes and Building Performance Standards

This presentation will cover a multitude of topics around new energy codes and building performance standards. It will provide an overview of the following:

- Key changes to the 2021 IECC from the 2018 IECC
- Important provisions from the 2022 Denver Energy Code
- The Colorado Energy Office's Model Electric Ready and Solar Ready Code
- The City and County of Denver's Energize Denver Ordinance
- The State of Colorado House Bill 21-1286 (Building Benchmarking and Performance Standards)

Speaker: Libby Middleton, PE, LEED BD+C is a Professional Engineer with over five years of experience in the building energy field. Libby works with design teams to evaluate cost-effective energy design solutions and energy code compliance using building energy models. Libby's modeling specialization is with OpenStudio and EnergyPlus in a wide array of building types. She provides training on the current energy codes and research on electrification and new technology.

9:00am – 9:55am: Decarbonizing Heating and Cooling: The Promise of CO2 Heat Pumps

As rules, regulations, and ESG initiatives continue to drive the demand for electrification, decarbonization, and detoxification in our built environments, we need new solutions. CO2 (R-744) heat pumps offer a complete solution for both heating and cooling needs across all climates. New technological innovations have led to the development of products that replace chillers, furnaces, boilers, and domestic hot water systems. Join us to learn more about CO2 heat pump technologies.

Speaker: Sean Jarvie Chief Technology Officer at Flow Environmental Systems, Inc., is a technical leader and innovative problem solver, driven by his passion for creating a better world for future generations through clean technology and environmental stewardship. With 20 years of experience working for OEMs of all sizes, Sean has developed a unique perspective and deep understanding of the HVAC and Refrigeration industries. He is not only an engineer, but also a hands-on practitioner with experience in laboratory and field service. Sean is a strong advocate for innovation, efficiency, and sustainability. He is committed to helping organizations achieve their goals while minimizing their environmental impact. His technical expertise and practical knowledge enable him to lead and inspire others in the industry. Beyond professional pursuits, Sean loves spending time with his wife and two amazing children, working on his personal permaculture retreat, hiking, and sharing meals with friends and family.

10:25am – 11:20am: Minimizing Operational Carbon within Whole Life Carbon for New Construction

This session will review the operational carbon from (B6) energy usage emissions along with (B7) water and wastewater emissions and (B1) refrigerant leakage (C1) end-of-life leakage with respect to the building's (A1-A5) construction related emissions for a 28-yr study period. We will present the results for office and multi-family buildings in five different climate zones to review what strategies led to the lowest operational GHG emissions. We will tally the GHG emissions per ASHRAE Standard 240P (using EN 15978 nomenclature) and review the carbon offsets in order to achieve net zero carbon per ASHRAE Standard 228.

Speaker: Jamy Bacchus, PE is an Associate Principal at ME Engineers where he manages their sustainability and modeling group. He has been a mechanical engineer and sustainability advocate in commercial buildings for nearly 30 years serving as design engineer, policy analyst, code consultant, energy modeler, energy auditor, professor and mentor. He is the Chair of the USGBC's Energy & Atmosphere Technical Advisory Group to the LEED rating system and helped develop LEED v5. He liaises with ASHRAE Standards 90.1 and 189.1 working groups on carbon metrics. He was a voting member of 2022 Denver Energy Code and Green Code committees. Jamy regularly presents at ASHRAE and Greenbuild conferences on energy and carbon emissions from the built environment. He has worked at Integral Group, Natural Resources Defense Council, Arup, Battle McCarthy and WSP in NYC, DC, SF, London and Denver.

Speaker: Caitlin Anderson, PE is an Associate within the building performance group at ME Engineers. She has

experience with energy modeling for LEED, code, and design assistance on a wide range of building types including schools, office buildings, and sports facilities. She works on other forms of sustainability driven analysis including solar assessment. She is very involved with the Rocky Mountain ASHRAE chapter and currently serves as the President Elect for the 2023-2024 year. Caitlin obtained her bachelor's degree in mechanical engineering from the University of Santa Barbara and her master's in Building Systems at the University of Colorado Boulder. While at the University of Colorado she also obtained certificates in Renewable and Sustainable Energy as well as Engineering in Developing Communities. She is a LEED AP BD+C.

1:15pm – 2:10pm: Analyzing Adaptive Reuse of Hydronic System Components for Decarbonization

Commercial buildings account for approximately 20% of CO2 emissions in the US, so to effectively address the challenge of decarbonization we must wholistically address the built environment. Roughly 80% of buildings targeted for decarbonization will be existing, some a result of plans designated as "Adaptive-Reuse". This session will aim to summarize how we address decarbonization in existing buildings, providing the most immediate opportunity to help our built environment, and its infrastructure, operate more efficiently and sustainably.

Speaker: Taylor Goade, Technical Training Manager at Bell & Gossett (a Xylem brand), is an engineer and (more importantly) an education and sustainability advocate, has spent nearly a decade in the commercial and industrial space serving in a variety of different roles. Currently, Taylor assists in teaching courses in the Bell & Gossett Little Red Schoolhouse aimed at training individuals on various Design & Application-related topics, utilizing his background to help others solve the biggest challenges in their respective communities.

2:30pm – 3:25pm: Deep Geothermal Energy – Potential, Viability, and Cost

Shallow geo-exchange systems utilizing bore fields a few hundred feet deep that provide heating and cooling using heat pumps in buildings has been used for many years in our industry. Deep geothermal energy for heating or power production has been traditionally been limited to areas with a relatively shallow geothermal resource such as a naturally-occurring hot springs or geysers producing hot water for building heat or steam for power production. However, new deep well geothermal energy is now being employed using advanced drilling techniques to access "hot rocks" several thousand feet below the surface of the earth to provide significant heating or power production at the megawatt scale. Prinston University is doing it, Google is doing it, and CU Boulder is considering it. A panel of experts in the field will discuss the application, viability, and cost of such systems.

Speaker: Bill Green is currently the RMH principal in charge of the Geothermal Energy Study for CU Boulder under the Colorado Geothermal Energy Grant Program being administered by the Colorado Energy Office with modeling being supported by NREL researchers. He holds a Bachelor of Science degree in Mechanical Engineering from the University of Colorado at Boulder, and is a registered professional engineer, a member of the ASHRAE, ASME, NSPE, ACEC, is a Designated Design-Build Professional Fellow (FDBIA) with the Design-Build Institute of America, and a LEED Accredited Professional with the U.S. Green Building Council.

Speaker: Chris Cheng is Manager of Development Engineering for Eavor Technologies in Calgary, Canada. He is a graduate of Mechanical Engineering with a Petroleum Engineering minor from the University of Calgary. Prior to joining Eavor, he spent over a decade in the upstream oil and gas sector working in the Western Canadian Sedimentary Basin with his final five years in the industry specializing in new technology development. While working on the Heavy Oil Technology team at Devon Canada, Chris led a multi-disciplinary team from conception to execution of an Experimental Scheme to test conductive heating of a heavy oil reservoir in Northeast Alberta.

In 2012, Chris co-founded Holiday Rejects Apparel Inc., and appeared on Canadian reality TV show Dragons' Den where he and his partners pitched and executed a deal with three of the five Dragon investors. In 2018, his most recent venture, Full Circle Energy, was amalgamated with Canuc Resources Corporation (TSX-V: CDA), where he is currently a member of the board as an independent director.

Speaker: Dr. Koenraad Beckers is a staff research engineer within the Thermal Energy Science & Technologies Group at the National Renewable Energy Laboratory (NREL) in Golden, Colorado, USA. His research focuses on geothermal reservoir and surface plant modeling and analyzing techno-economic performance of geothermal energy for power production and district heating and cooling systems. Dr. Koenraad Beckers holds a B.S. and M.S. in mechanical engineering from University of

Leuven and a PhD in chemical engineering from Cornell University.

Speaker: Mike Turman is Director of Design and Construction, CU Boulder and oversees the construction project management team in the Office of Planning, Design, and Construction. The group of nearly 30 staff is responsible for the execution of approximately 400 non-capital and capital projects per year, including early project development, construction, project completion, occupancy and warranty.

Track 4 – DDC

Sponsored by: ATS

8:00am – 8:55am: Building Automation Basics

This presentation will cover the basics of controls and DDC. This will include terminology, system types, and the evolution to DDC systems. Controllers and interface hardware as well as their types of inputs and outputs will be covered. We will also be learning about the software side of DDC which include interfaces, programming, and protocols.

Speaker: Ken Nekvasil, MBA General Manager for Energy Services of Colorado, has been in the HVAC industry for over 39 years. He has extensive experience in building automation controls from operational, engineering, sales and management perspectives. He also has a wide range experience with the integration of many low voltage building systems including the rapidly expanding IOT segment.

9:00am – 9:55am: Clever Solutions for Evolving Heat Densities in Data Centers

As recently as a few years ago the average heat output from a rack of typical servers was somewhere between 5-10 KW may be as high as 12 KW in some cases. But with the tidal wave of Artificial Intelligence and High-Performance Computing (HPC) applications, the heat densities for these applications have skyrocketed to as much as 50-100 KW per rack. The old-fashioned techniques of cooling a data center are no longer valid. In this session, we will discuss what changed and why, and then we will talk about the future of cooling and how to implement it.

Speaker: **David Kandel** was one of the original development engineers in the Belimo control valve development group. He was an integral part of the group that developed the original CCV (Characterized Control Valve) and the PICCV (Pressure Independent Characterized Control Valve). Originally hired by Belimo in 1998, Mr. Kandel has held the roles of Manager of Valve Development and Product Manager for Control Valves and he currently works as an Application Consultant for Data Centers and other strategic markets

10:25am – 11:20am: Ventilation Control: Code Compliance AND Energy Savings

Ventilation is such a massive consumer of mechanical system energy. In this session we will take a deep dive into ASHRAE 62.1 and look at various ways that automation can play a role in ventilation strategies that are both code complaint and reduce energy. We will also touch on IECC 2021 compliance and the role of automation systems on required FDD, energy monitoring, and sequences of operation.

Speaker: **Josh Harwood** is a Mechanical Principal at Cator Ruma and Associates. In his role, Josh oversees projects in a wide array of market sectors including mission critical, healthcare and education. Josh combines years spent commissioning and operational experience into his approach to mechanical design. A graduate of the University of Colorado (Mechanical Engineering) and of the Naval Nuclear Power program and Denver University (MS Data Science), Josh combines technical expertise with practical application to deliver thoughtful and timely advice to his clients and guidance to his projects. His experience with big data acquisition, manipulation and visualization gives Josh a unique perspective on the role of automation in building performance.

1:15pm – 2:10pm: Preventive Maintenance in 2024

How do you ensure longevity and sustainability of a Building Automation System, while leveraging the tools available in 2024? We'll discuss the recommended ASHRAE building automation maintenance, replacement, and specification guidelines. While learning how to maximize preventative maintenance by

incorporating traditional functional performance testing and automated analytics.

Speaker: Lance Andriunas has spent the last 30 years in various roles Commercial HVAC. He started as a contractor working for his fathers control company, before joining Belimo and Honeywell consecutively. He held several different roles within the commercial division. He created and led the field device team nationally. Then held several different RSM roles within the residential, combustion and Alerton business units. At ATS Rocky Mtn, he is able to use his experience in mechanical systems, controls, and peripherals gives him the ability to help end users achieve their service and operational goals.

2:30pm – 3:25pm: The Future of AI in BAS

The integration of Artificial Intelligence (AI) into the commercial building automation industry is poised to revolutionize how buildings are managed and operated, focusing on field level controllers, supervisory level controllers, and analytics. In this presentation, we'll discuss how AI will become more adaptive and responsive to the immediate environment, how it will enhance the coordination and optimization of various building systems; and how advance analytics will provide deep insights into building operations, identifying trends, anomalies, and opportunities for optimization that were previously undetectable.

Speaker: David Jonas With over three decades of expertise in the building automation sector, David Jonas has built a distinguished career in facilities services and the mechanical industry. He brings a comprehensive skill set encompassing system development, programming, system integration, and consulting. His proficiency extends to project and departmental budget management, team leadership, construction oversight, project coordination, and driving business growth. David's extensive experience, gained through hands-on work in both field and office environments, has shaped him into the professional he is today.

Track 5 – Critical Environments

Sponsored by: Air Purification

8:00am – 8:55am: Building Resilience in Critical Environments

This presentation examines the consulting engineer's role in establishing resilience within the built environment. It will review the cost of resilience and the importance of early coordination efforts between stakeholder and the design team. We investigate existing building codes and guidelines, such as FGI, for resiliency. Lastly, we evaluate case studies for critical environments and the efforts taken to increase resiliency within a facility.

Learning Objectives

- Defining resilience in the built environment
- Evaluate the cost of resilience for critical facilities
- Examine resilience in building codes and guidelines
- Review case studies and design responses

Speaker: Alex Bakel, PE is a mechanical engineer with Affiliated Engineers in Denver, CO. His experience spans HVAC design, construction administration, and project management. Alex has led mechanical system designs for healthcare facilities, science and technology projects, complex existing facility renovations, and heating and cooling plants. Alex has a strong background in HVAC equipment and provides a unique perspective when evaluating solutions. He is a licensed professional engineer in Colorado and received a Bachelor of Science degree in mechanical engineering from the University of Wisconsin – Madison in 2014.

9:00am – 9:55am: Smart Lab Solutions

This course will provide insights into approaches to sustainable laboratory design and renovations. Specific project examples will be provided to demonstrate the potential opportunities for energy cost avoidance and move towards carbon neutrality. This information should provide the attendees with knowledge to implement some of these strategies at their facilities. We will share the results from ASHRAE reports and other sources. The

course will also provide information regarding how data analytics can be used to better understand the drivers behind energy consumption in laboratory buildings. This course will also introduce a new solution for providing audits in existing laboratory buildings or for new designs using PC Optimizer simulation analysis tool.

Learning Objectives

• Understand laboratory stakeholders and their key objectives.
• Key standards defining laboratory airflow requirements.
• How system visualization can improve operating and maintenance performance.

Speaker: Tyler Kee joined Phoenix Controls in 2022 . Prior to Phoenix Controls, Tyler was a Business Unit Manager for a process control and industrial automation distributor. Tyler currently serves on ASHRAE TC9.10 – Laboratory Systems. Tyler holds a BSME from University of Idaho, a Master of Industrial Distribution from Texas A&M, and is a Control Systems Professional Engineer. When not working Tyler enjoys cycling and skiing with his family.

10:25am – 11:20am: Air Handling Best Practices for Designing Data Centers, Laboratories, Hospitals and Healthcare Facilities

Precise control over temperature, humidity, cleanliness, and air quality is of utmost importance for the protection of sensitive processes, equipment, products, or people. These environments often require specialized air handling equipment and stringent monitoring to maintain specific conditions. This presentation will review optimal strategies and considerations in the design of air handling equipment. We will discuss the best practices associated with the above-noted critical environment sectors. Examples of various applications will be utilized to demonstrate advantages and disadvantages of different air handling configurations.

Learning Objectives

• Designing flexible systems

• Air-to-Air energy recovery to improve efficiency while maintaining stringent ventilation requirements

• Ensuring air handling equipment have adequate accessibility for maintenance and cleaning to uphold hygiene standards

• Incorporating redundant systems for uninterrupted operation

• Controlling humidity levels to prevent equipment corrosion and static buildup

• Incorporating UV germicidal irradiation to control airborne pathogens and improve indoor air quality

• Implementing HEPA filtration

Speaker: Ryan Power has been in the HVAC industry for 20 years, with a wealth of expertise in providing custom air handling solutions. Throughout his tenure, Ryan has been a driving force behind numerous successful projects, leveraging his deep understanding of industry standards, best practices, and cutting-edge technologies. His multifaceted skill set encompasses a keen eye for detail in system design, a nuanced understanding of client needs, and an unparalleled ability to deliver tailor-made solutions.

Ryan's journey in the HVAC sector has been marked by a passion for staying ahead of industry trends and advancements. This dedication has not only earned him a reputation as a trusted advisor but has also positioned him as a go-to resource for clients seeking expert guidance on complex HVAC systems.

As a Technical Sales Advisor, Ryan has been collaborating closely with clients to analyze requirements, propose optimal solutions, and ensure seamless implementation. His strategic insights, coupled with a proven track record of fostering long-lasting client relationships, have been instrumental in driving both individual and organizational success.

1:15pm – 2:10pm: Cleanrooms -- What are the Requirements?

Clean room ISO classifications dictate allowable particulate concentrations in clean room spaces. The ISO classification is determined by the application of the space. This is determined by professionals who specialize in the validation process. To achieve these particulate concentration levels, filtration and air change rates (dilution) are used. ASHRAE Handbook – HVAC Applications Chapter 19 documents clean space requirements for a multitude of applications and discusses ways to achieve air change rate and filtration requirements. There are many HVAC system configurations that can be utilized to provide necessary air change rates and meet code requirements. IMC section 510 Hazardous exhaust and Industrial Ventilation: A manual of recommended practice establishes exhaust system construction

requirements and system configuration. During this presentation, we will discuss these items in more detail.

Learning Objectives:

• Understand ISO classifications and potential applications.

• Understand clean room code requirements.

• Identify HVAC equipment and system configuration options for clean room spaces as described in ASHRAE Handbook – HVAC Applications.

• Understand ASHRAE 52.2 (method of testing general ventilation air-cleaning devices for removal efficiency by particle size).

Speaker: Brad Eisenbarth, PE is a Mechanical Engineer licensed in Colorado with 10+ years HVAC design and project management experience in a range of building types, in both new-build and renovation projects. His extensive experience includes healthcare, pharmaceutical, laboratory, education, kitchen, and recreational facilities across the country for both public and private clients. At CannonDesign, Brad leads the mechanical engineering group for the Denver office supporting projects locally and nationally. He is involved in the Colorado ACE Mentoring program working with high school students in the Denver metro area to inform and inspire them to advance in the AEC Industry and is actively involved in ASHRAE and ISPE. Brad received an Architectural Engineering degree from the University of Kansas in 2013.

2:30pm – 3:25pm: Colocation Data Centers and Overview of Key Deliverables (Electrical & Mechanical)

Data center industry is booming! It is growing at an exceptional rate with many data centers following tried and true practices for delivering power and cooling, while others are challenging status quo with new innovative approaches and technologies. The colocation offering has helped diversify the data center portfolio but comes with its own challenges. This presentation will go through the fundamentals of delivering power, cooling, and jump deeper into the cooling technologies and approaches to data center design.

Learning Objectives

• Data center stack and value we offer as design professionals.

• Colocation and how it differs from other data center offerings.

• Electrical power path for most data center applications.

• Cooling approach and variations on how to keep data centers cool.

• Varieties of cooling technologies and their benefits & drawbacks.

Speaker: Matt Wiley is Director of Operations. He is responsible for mechanical and electrical infrastructure and service management for H5 Data Centers' colocation customers in the Northwest region. Matt has over 15 years of experience in critical operations, site acquisitions, data center design and operations, mechanical engineering, and project management.

Prior to joining H5 Data Centers, Mr. Wiley supported IBM's largest data center campus through leading capital investments, process development, and personnel growth. Matthew had also worked alongside Navy Nuclear servicemen and qualified civilian Engineering Officer of the Watch.

Mr. Wiley studied Engineering at Colorado State University and received a Bachelor of Science degree in Mechanical Engineering. He also obtained a Masters of Science degree from University of Nebraska Lincoln in Industrial and Management Systems Engineering. He has achieved Data Center Design Professional, Data Center Energy Management certifications, and controls certifications.