PEDCO 5th Annual High Performance Buildings Seminar
Keynote & Breakout Session Course Descriptions

Morning Keynote: 7:45am-8:45am

Title: Moving Toward Net Zero in the Mainstream: New Construction & Existing Buildings

Speaker: Jessica Bollhoefer
Director, Strategic Initiatives
Northwestern University

Course Description:
Through the Energy Independence and Security Act of 2007, the DOE supports the goal of net zero energy for all new commercial buildings by 2030, specifies a zero-energy target for 50% of U.S. commercial buildings by 2040 and net zero for all U.S. commercial buildings by 2050. Meanwhile, according to the U.S. Department of Energy (DOE) Annual Energy Review, electricity consumption in the commercial building sector doubled between 1980 and 2003 and is expected to increase another 50% by 2025. The juxtaposition of these two factors clearly defines the disconnect surrounding net zero energy for commercial buildings in the U.S.

New construction Net Zero Energy Buildings (NZEB) continue to be the exception and not the rule and historically low energy rates in many parts of the country are hindering further advancement in efficiencies for new and existing buildings. So how will we get there?

Key Learnings
• Current market hesitation and challenges facing clients looking to undertake NZEB.
• Present case studies of projects that were initiated with NZEB goals, challenges they faced and project status updates.
• Energy efficiency initiatives that can be undertaken by both new and existing properties that actually pay back.
• On and off-site alternative energy solutions that can supplement energy efficiency to drive NZEB goals.

About Jessica
Jessica Bollhoefer led JLL’s Midwest Sustainability Practice with the Project and Development Services group, focused on helping JLL’s clients use less energy, waste and water while reducing their real estate costs and improving occupant comfort and productivity. As a leader of the practice, she was focused on reducing building energy use and the impact of construction on the environment through the implementation of green certifications and sustainability focused real estate initiatives. Projects include a diverse portfolio of large-scale construction and renovation projects, corporate headquarters, landmark restorations, interior build-outs, energy retrofits and LEED certifications. Ms. Bollhoefer holds a Master of Science from Columbia University in New York and a Bachelor of Arts in Architecture from the University of Pennsylvania.
Lunch Keynote: 12:15am-1:15pm

Title: Design With Knowledge – Integrated Sustainable Design

Speakers:
Mr. Jakob Stromann-Andersen, PhD
Head of Sustainability Engineering & DGNB Auditor - Urban Districts
Henning Larsen Architects

Course Description:
We need to change the concept of sustainability from focusing on technical installations and solutions, to obtaining a holistic approach where different dimensions, such as daylight, are addressed with equal importance in the early design. While making the first sketches, energy reduction must be at the top of the agenda, since this is the phase where the framework and preconditions for the energy consumption after completion are established. This requires scientific knowledge of how architecture and aesthetics impact the energy consumption – as regards height, width, orientation, materials and user behaviour.

We call this approach “Three Steps of Learning”, and this will be a focal point of the lecture. One important parameter to take into account when creating spaces is daylight. This will serve as one exemplification of implementing knowledge in building design along other case studies which will be presented in the lecture.

Key Learnings
- Connect the link between science and architecture.
- Explain why sustainability is more than technology and architecture is more than aesthetics.
- Identify important design parameters to achieve sustainable results.
- Understand how sustainability is forging identity for developers and organizations.

About Jakob
Jakob holds an M.Sc. and Ph.D. in Architectural Engineering and is a DGNB Certified Auditor of City Districts. As Chief Engineer in Henning Larsen Architects' Department of Sustainability, Jakob works to develop visions and solutions within the field of sustainable design. He conducts research on the future design of cities and masterplans and on the internal energy consumption of buildings. As DGNB Auditor of City Districts, Jakob qualifies new sustainable building and city development projects for DGNB certification.
Afternoon Keynote: 1:45pm-2:45pm

Title: 1:10:100 – NetZero At Scale

Speaker:
Mr. Matthew Herman
Associate Principal
BuroHappold Engineering

Course Description:
Matthew Herman from BuroHappold Engineering will present recent work addressing the challenges surrounding Zero Energy Buildings. He will discuss the terms and calculations used to define Zero Energy at various scales in the built environment. Using case studies from BuroHappold’s work he will discuss lessons learned and design impacts when planning for zero energy projects at the building scale, masterplan scale, and city planning scale. He will review the impact net zero buildings have on policy definition, design process impact, technology and budget realities as well as infrastructure implication.

Key Learnings:
- Review and understand the calculations behind the Department of Energy’s definition of a Zero Energy Building.
- Be able to compare and contrast the DOE definition with other net zero strategies and definitions.
- Discuss Policy and planning impacts of zero energy buildings at various scales of the built environment using case studies.

Matthew Herman leads BuroHappold’s Chicago office and is responsible for the day to day operations of the MEP and Environmental design teams. He has led projects ranging in scale from system component design to master planning. Mr. Herman has provided project management and coordination for educational, commercial, residential, cultural, and civic projects. He brings an interdisciplinary approach balancing architecture and engineering in a cost effective and sustainable manner.

Mr. Herman’s educational background includes the study of architecture, building systems and project management. His specialty is low energy design and energy analysis including energy modeling, post occupancy monitoring, and life cycle assessment for existing buildings and new construction. Mr. Herman has experience working with clients and design teams during all phases of development, construction and operations. Having worked on projects around the globe, he uses this knowledge to bring creative ideas and design thinking to every project.
Morning Breakout Sessions 1: 9:15am-10:15am

Breakout: 1A

Course Title: Utilizing VRF Technology to Achieve Net Zero

Sponsored By: The Habegger Corporation

Speaker:
Mr. Mike Machemehl
Commercial Regional Manager, HVAC Advanced Products
Mitsubishi Electric US Cooling & Heating

Course Description:
This presentation will review how VRF heat recovery systems work, what makes them so efficient and will also include an overview of real life projects where VRF has been used to achieve Net Zero and The Living Building Challenge. Additional focus will be on how to make ultra energy efficient VRF systems affordable including current utility incentives and rebates that are available.

Key Learning:
- Understand the different types of VRF systems available: changeover, heat recovery, hyperheat, air cooled & water cooled.
- Identify which VRF systems types are best suited to Net Zero and LBC projects including actual installed projects.
- Understand the financial side of VRF systems, i.e. first cost, operating cost and utility incentives.
- Learn about special applications for reclaiming waste heat, such as domestic water pre-heat, and the resulting energy savings.

About Michael
Mike is the Commercial Regional Manager for Mitsubishi Electric Cooling and Heating and supports the City Multi Commercial VRF product line in Ohio, West Virginia, and Michigan. A graduate of The Ohio State University, Mike is a registered Professional Engineer in the State of Ohio, a Certified Energy Manager (CEM) and has over 25 years of experience in the commercial HVAC market, including 19 years as a Trane Sales Engineer in the Columbus market.

Breakout: 1B

Presentation Title: What Does High Performance Roof Design Look Like?

Sponsored By: Tremco

Speaker:
David L. Hart LEED BD+C
Living Building Challenge Ambassador, Certified Technical Roof Consultant, Tremco
Course Description: Traditional roof design seeks to keep the water out and reduce energy loss. Unfortunately, it continues to accelerate raw material resource depletion, landfill issues, stormwater problems, habitat destruction, and heat island contribution. Higher performance roof design satisfies the minimum traditional offering and goes significantly beyond by providing improved raw material resource management, far better energy and water utilization, habitat restoration, and human productivity. These are areas that need attention if we are to maintain our societal foundations. Come and learn how you can design more performance into this part of the building envelope, become a net positive solution provider, and reduce life cycle costs.

Key Learnings:
- Understand where traditional roof system design falls short and what high performance roof design can accomplish.
- Learn how to custom design high performance roof assemblies for your project.
- Become aware of the positive ripple effect from higher performance on other aspects of your building, the environment and your bottom line.
- Design towards net zero water and energy is needed, and is becoming the standard already in other parts of the world.
- Start thinking about becoming part of the solution.

Breakout: 1C

Course Title: Dynamic Electrochromic Facades

Sponsored By: AR Design

Speaker: Mr. Tim Davis, Owner, AR Design

Course Description: This presentation will start with understanding the appeal of glass in architecture, the current issues with glass and the associated, limited solutions. Then the presentation will examine the dynamic glazing option, the benefits, and review electrochromic technology in more detail.

Key Learnings:
- Understand the impact of dynamic electrochromic glazing on the design of façades.
- Evaluate the benefits of a dynamic electrochromic façade solution.
- Determine when and where dynamic electrochromic glazing makes sense.
- Analyze how dynamic electrochromic glazing solutions can be implemented in buildings.

Breakout: 1D

Presentation Title: Architectural Design Strategies for more Sustainable Buildings

Sponsored By: KZF Design
Speakers:
- Doug Marsh – SVP and Public Markets Leader, KZF Design
- Brady Hartmann – Architect, KZF Design
- Greg Speidel – Senior Project Manager, HGC Construction
- J. Kelly Kissock – Department of Mechanical and Aerospace Engineering/Renewable and Clean Energy, University of Dayton
- Mark Fisher – Senior Director of Facilities, Planning and Sustainability, Cincinnati Zoo

Course Description:
Sustainable design is more than building system efficiency, materials, lighting controls and fixtures. A sustainable building incorporates architectural techniques that create the basis all other sustainable “components.” True integrated design includes architectural strategies such as building reuse, building siting/placement, massing, orientation, envelope/façade design, glazing and other physical factors impact energy consumption and building systems – before engineers and interior designers are involved. This one hour roundtable discussion will feature design/construction experts discussing architectural design strategies that create more sustainable buildings.

Key Learnings:
- Review and understand a series of architectural design/implementation techniques and strategies.
- Discuss strategies, their benefits, and challenges.
- Understanding perspectives of architects, engineers, contractor, and facility owners.
- Topics may include: SMART, double facades, resilient design, photochromic glass, rain screens, air barriers, renewable energy, etc.

Morning Breakout Sessions 2 – 10:45am-11:45am

Breakout: 2A

Presentation Title: Solutions to Reduce Energy Consumption in Life Safety Laboratory Exhaust Systems

Sponsored By: EAP, Inc.

Speaker:
Matt Gaedtke, Segment Manager, Greenheck Fan Corporation

Course Description:
Laboratory exhaust systems are a significant energy consumer for higher education, government, and industrial labs. Many of these systems are continuously operating. This presentation reviews the basics of laboratory exhaust systems and introduces technologies that can lower the energy consumption while maintaining the necessary safety requirements.

Key Learnings:
- Understand lab exhaust system basics including constant and variable volume systems.
- How improper duct work can impair your facility’s performance.
• Review lab exhaust fan systems and improved nozzle technologies that reduce energy and sound levels.
• How to safely apply energy recovery in lab environments.
• Explain fan staging techniques as well as introduce variable geometry nozzles.

Breakout: 2B

Presentation Title: Attaining A High-Performance Enclosure

Sponsored By: Façade Forensics

Speaker:
Mr. Michael Lewis, AIA, NCARB, FASTM, MEng
Facade Forensics

Course Description:
Reducing energy consumption while improving indoor climate quality depends on a properly-performing enclosure. Yet the usual process of design and construction, even with intended focus on enclosure quality, usually fails to identify deficiencies until occupancy. Projects attempting to employ enclosure commissioning to identify and resolve deficiencies also frequently fail to achieve enclosures that perform properly long-term. Truly high-performing enclosures are even rarer. Learn how to achieve a high-performance enclosure by comprehending its key objectives, means to measure, and most common failures, all before occupancy.

Key Learnings:
• Define performance in subjective and quantifiable objective terms; what differentiates “high” performance from “basic” performance.
• Establish methods to measure and verify performance thresholds.
• Show how to recognize, avoid, and correct common failures.
• Describe how to customize the enclosure commissioning process for your project.

Breakout: 2C

Presentation Title: Using Energy Data Analytics to Identify and Quantify Energy Saving Projects.

Sponsored By: PEDCO E & A Services, Inc. & Pathian Incorporated

Speaker:
Dan Buchanan, President and Founder of Pathian Incorporated

Course Description:
In 2010, Pathian Incorporated filed and received a U.S. patent for a new energy benchmarking method called Pathian® Analysis. This benchmarking process is fundamentally different from all other benchmarking processes, as we identified the time period of evaluation, not weather, as the principle barrier to accurately compare peer group energy consumption habits. Pathian will explain the rationale behind this new benchmarking process, the distinct advantages it has over nationally accepted weather-normalization methods, and how it can be applied to improve traditional benchmarking processes for both buildings and HVAC equipment.
Pathian will first introduce Pathian® Curves, discuss the difference between Pathian Curves and traditional baseline comparison energy curves, and show how these weather-normalized energy curves are used to create performance indices in order to analyze peer group performance for commercial buildings, mechanical systems and their components. With a basic understanding of Pathian Curves, we will introduce the Syrx™ Numbering System, a peer group classification system used to catalog performance indices for peer comparison. Pathian will then present a case study demonstrating how these curves and performance indices can be used to generate variance reports used to identify and quantify energy conservation opportunities and then measure, verify and sustain results.

Learning Objectives
- Understand how to use real-time HVAC component level energy analytics to identify, quantify and estimate HVAC energy saving opportunities.
- Via live website demonstration, gain a basic understanding of component level benchmarking concepts and how the new analytical process is deployed.
- Understand how real-time energy audits and variance reports are generated for central plants, HVAC equipment and their components (i.e. fans, hydronic coils, dampers, valves, etc.).
- Live case study example: Use real-time analytics to evaluate the present and past performance of 4,500 ton central chilled water plant.

Breakout: 2D

Presentation Title: The Role of Solar PV in Net Zero Buildings

Sponsored By: Melink

Speaker:
Mr. Steve Melink  
Founder, Owner, & President, Melink Corporation

Course Description:
The purpose of this presentation is to show the complementary role of solar PV technology to the various energy efficiency strategies you may be using. Whether for new construction or existing buildings, solar PV is typically the most cost-effective way to achieve NZB after you have implemented best-practice HVAC and lighting measures. Learn how to make your buildings virtual power-plants that produce their own clean energy and which can protect you against the unknown costs and risks of conventional brown power.

Learning Objectives
- Understand the financing behind solar PV technology and how you can achieve a return on your investment.
- Understand the design and installation process utilized for solar PV technology.
- Learn the best way to operate and maintain your facility with solar PV technology.
- Understand the application of several types of solar PV technology via case studies.
Afternoon Breakout Sessions 3: 3:00pm-4:00pm *(Repeat of selected previous sessions)*

**Breakout: 3A**

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**Breakout: 3B**

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