8:00 am–4:30 pm

High Performance Mechanical Systems for Houses That Work™

High Performance Mechanical Systems for Houses That Work™ is a mid-level, full-day seminar geared toward builders, designers, code officials, and trade allies that focuses on HVAC, ventilation, hot water, indoor air quality and electronic home controls in high performance housing. In the past several years, residential mechanical systems have grown in complexity and scope as energy codes have mandated higher insulation levels, better windows and tighter construction. There is now a great opportunity to rethink and redesign HVAC, hot water heating and electronic home control systems as they are major contributors to energy efficiency goals. This course will first review the key building science concepts that have changed the way houses are built and identify the relevant changes to mechanical systems. The remainder of the course will focus on the proper sizing and selection of appropriate mechanical equipment for high performance. Compelling opportunities to simultaneously optimize comfort, durability, safety and health, efficiency and cost will also be identified.

Learning Objectives

- Gain an understanding of the basic building science concepts relevant to mechanical systems in high performance housing.
- Know the sizing adjustments, calculations and commissioning process for low load residential HVAC systems and how to choose the proper system for a specific climate zone.
- Understand the main causes of Indoor Air Quality (IAQ) concerns and their mitigation, including the effect of the building envelope on the need for ventilation and strategies and types of ventilation systems, including new technologies.
- Recognize opportunities for a wide range of equipment such as space heating, space cooling, water heating, indoor air quality and occupant control.
- Comprehend the role of electronic controls systems with relation to mechanical equipment and achievable energy savings; learn how to choose the right system and maximize integration with other equipment in the home.

Gord Cooke
Construction Instruction, Inc.

Career Highlights:

- A regular contributor to many industry publications and writer of a monthly column on HVAC systems for Mechanical Business magazine
- EEBA – Excellence in Building Legacy Award – 2013
- EnerQuality Corp/Ontario Home Builders Association – Hall of Fame Inductee 2007
- Member of over a dozen industry associations across North America
- Chairman of Canadian Standard Association F280 Residential Heat-Loss/Heat-Gain Standard, which now recognizes proper sizing of mechanical systems in high-performance homes

Gord Cooke is a partner with Construction Instruction, Inc. Cooke is a professional engineer with over 25 years of experience in the low- and high-rise residential building industry. As an educator, industry consultant and much sought-after presenter, Cooke has a unique talent for taking the building science issues that he sees in the field and presenting them in an easily understood and practical real-world manner. Cooke has particular expertise in applied building science, energy-efficient housing initiatives, innovative HVAC systems, ventilation and Indoor Air Quality (IAQ). He has developed and delivered a multitude of workshops in these fields, as well as sales and marketing courses for builders and real estate agents to help them best promote the features and benefits of high performance houses.

Join us for the Monday evening welcome reception!

Join us at the DECC for complimentary refreshments, music and networking.
4:30 pm to 7:00 pm in the French River room.

8:00 am–4:30 pm

The Whats & Whys of Effective Building Design (Commercial Buildings)

This session is geared toward architects, engineers, contractors, facility managers, energy professionals and anyone interested in energy-efficient building design.

As a building owner, you might ask yourself the following questions: Where do I start on the path of building design? What do I need to know? Where can I go to get the answers I need to have a building that performs in the way I intend? Answering these questions could be the difference between "just being satisfied" and having a building that exceeds expectations for energy efficiency and innovation. It's not only choosing a box with all the pieces, but also knowing how the pieces fit together that will make the biggest difference.

The objective of this full day of learning is to bring the design community, suppliers, and facility owners and operators together in the pursuit of constructing buildings that use energy effectively for the long term. The morning will start with a brief overview of the major components of effective design. We will then concentrate on each major component individually, starting with lighting design and controls. The afternoon will focus on heating, ventilation, control options, and other space conditioning technologies. Special consideration will be given to how each HVAC component works individually and as a system in effective design. The day will close with learning how to ensure it all comes together and the building continues to perform at the peak of design. This includes the role effective commissioning/re-commissioning plays in the design process.

Each session will include an opportunity for the audience and presenters to identify and discuss how a design team can work together. We will explore how to set objectives, build for performance and avoid pitfalls. In addition, we will discuss local case studies that succeeded and those that faced challenges.

Presentations by
Rebecca Ellis, Questions & Solutions Engineering; Jay Marshall, ON2 Solutions; Brandon Smith, Holophane; Charles Holt and Paul Rauker, Daikin

Rebecca Ellis
Questions & Solutions Engineering

Jay Marshall
ON2 Solutions

Brandon Smith
Holophane

Charles Holt
Daikin

Paul Rauker
Daikin

Session Descriptions—Tuesday, February 21

7:00–8:15 am

The Form and Function of Solar Energy in Cold Climates (Harborside 203)
Solar energy is a cost-effective and appropriate technology that can dramatically augment the performance of residential and commercial buildings. However, as a site-specific technology, there are significant design-build considerations, particularly in cold climates, to ensure proper form and function. This session will cover the suite of appropriate solar technologies and their deployment for long-term energy and economic benefit. We also will discuss assessing sites and the process of identifying the most appropriate technology. Finally, we will cover current utility and state incentives, economics, and other costs and benefits of various solar energy applications.
Jason Edens, Rural Renewable Energy Alliance (RREAL)

Asbestos—Yes, It's Still Around (Harborside 204)
The Minnesota Department of Health is actively developing an update to rules that will either already be in effect or published with an effective date in the not-too-distant future. Also, there are federal developments that may bring about a ban on many or even all asbestos, if passed. These developments will significantly affect the residential and commercial construction industries. Using our "bedroom" cut-away training prop and accompanying demonstrations, we will explore different materials and locations where asbestos can be found and how these situations should be handled.
Bob Rogalla, Lake States Environmental, Ltd.

Building Clean—Do You Know What You're Putting in Your Houses? A Discussion on Energy-Efficient Products (Gooseberry Falls Room)
The Clean Economy Manufacturing Center, an initiative of The BlueGreen Alliance, is involved in an energy efficiency project that's mapping the manufacturing footprint, greening energy efficient products by better understanding potential health concerns and growing the economy. We are helping manufacturers better understand energy efficient product markets and providing tools that help users and organizations locate those products. These tools include innovative online database tools and supply chain maps as well as information guides and in-person education. This session provides an introduction to these tools and their benefits.
Dale Reckman, BlueGreen Alliance

8:30–10:00 am

Renewable Energy Systems and the National Electrical Code (NEC)—2017 Update (Part 1 of 2) (Harborside 203)
The changes in the NEC for renewable energy and energy storage systems are extensive in the 2017 update of the code. These changes will affect PV and other renewable energy systems design and require significant adjustments to how we approach systems. This session will review the changes and present options for making designs compliant with the new code. Understanding these changes will be vital for all contractors and designers in the renewable energy and energy storage field.
Christopher LaForge, Great Northern Solar

Steam vs. Hot Water Boiler Systems: Pros and Cons (French River Room)
Minnesota's Sustainable Buildings 2030 (SB 2030) is a progressive energy conservation program that helps design teams and owners significantly reduce the energy usage and carbon footprint of their building projects. SB 2030 outlines specific performance targets for energy use in buildings to achieve the goal of carbon-neutrality by 2030. Session attendees will learn from B3 project leaders how to leverage the use of an integrative process. They'll also learn about energy modeling, utility assistance programs, commissioning, and actual performance tracking to set and achieve SB 2030 targets.
Matt Kiemen, Ryan Company Inc.

Beyond Code Programs That Give You and Your Customer the Edge (Part 1 of 4) (Harborside 302)
The first session in this four-part series presents an overview of what makes a high performance house, including the science that assures houses are healthy, durable, and energy and water efficient. It also will cover material, adaptability, resiliency, what makes a good design, and affordability. This session will make the case for using code, programs, and best practices to the benefit of both the builder and the customer.
Patrick Huelman, University of Minnesota; Marilou Cheple, Marilou Cheple Consulting; Rachel Wagner, Wagner Zaun Architecture; Michael Resch, Residential Science Resources

What You Need to Know About Residential Furnaces, Air Conditioners and Heat Pumps If You're NOT an HVAC Professional (Harborside 204)
This session is meant to help builders, remodelers and homeowners better understand the key choices among furnaces, air conditioners and air source heat pumps—and to get top performance out of this equipment. Did you know that more than 80 percent of central air conditioners are installed improperly and do not achieve their rated efficiency? We'll cover what matters—and what doesn't—for maximizing comfort and minimizing heating and cooling bills. Based on independent monitoring and testing of hundreds of systems in Minnesota and Wisconsin, this will be a lively and practical session using an interactive audience polling system. Test your knowledge and bring your questions!
Scott Pigg, Seventhwave

EV Charging Strategies (Gooseberry Falls Room)
There are over 500,000 plug-in vehicles (PEVs) on U.S. roads every day, and the sales numbers are increasing every month. In Minnesota, 4,000 PEV owners will drive over 30 million gas-free miles this year. Owners will charge their PEVs mainly at home, but PEV charging infrastructure will be needed in other locations such as workplaces. New areas of interest are corridor charging that enables long trips with EVs and destination charging that hotels, parks and other destinations can offer to attract more customers and visitors. This presentation will provide information on plug-in vehicles and PEV charging choices. For more information, visit www.MultiHousingCharging.com and www.workplacecharging.com
Jukka Kukkonen, PlugInConnect

EEBA Houses That Work™ (Part 1 of 4) (Harborside 304)
In this full-day session, participants will learn about complex changes in home design, building materials, mechanical systems, appliances, code, healthy housing, compliance and consumer lifestyles and expectations that make every builder, supplier, and trade contractor's job more demanding. EEBA will cover the basics of building science and how it is applied to create high performance homes. By the end of the session, attendees will have a thorough understanding of how to build better attics, walls and foundations and how to choose HVAC systems that integrate properly into their homes. This session also will cover how building science principles improve the marketing position for building professionals. Presenters will provide case studies of builders who have changed their building processes and gained return through communicating the value of high performance homes.
Justin Wilson, Construction Instruction, Inc.

Session Descriptions—Tuesday, February 21

Renewable Energy Systems and the National Electrical Code (NEC)—2017 Update (Part 2 of 2) (Harborside 203)
The changes in the NEC for renewable energy and energy storage systems are extensive in the 2017 update of the Code. These changes will affect PV and other renewable energy systems design and require significant adjustments to how we approach systems. This session will review the changes and present options for making designs compliant with the new code. Understanding these changes will be vital for all contractors and designers in the renewable energy and energy storage field.
Christopher LaForge, Great Northern Solar

Saving Energy In Existing Multifamily Buildings (French River Room)
This session will explore challenges and opportunities in achieving energy savings in multifamily buildings. Using case studies and examples from recent Center for Energy and Environment (CEE) research and energy efficiency programs, this session will provide an overview of technologies and strategies that have proven to be effective energy efficiency measures in Minnesota multifamily buildings, including ventilation system retrofits, optimizing boiler control systems, optimizing condensing boilers, retrofitting trash chutes, upgrading through-wall units, and adding demand-based controls to domestic hot water recirculation pumps. Learn from CEE's field experience and gain an understanding of what works and what doesn't work in retrofitting energy efficiency measures in multifamily buildings.
Daniel May, Center for Energy and Environment (CEE)

Beyond Code Programs That Give You and Your Customer the Edge (Part 2 of 4) (Harborside 302)
Part two of this four-part series will define and explain several programs, including both energy programs and utility programs. The history and technical aspects of each program will be explained. Presenters also will cover participant compliance including an overview of the process, cost, certifications offered, rebates, and oversight.
Patrick Huelman, University of Minnesota; Marilou Cheple, Marilou Cheple Consulting; Rachel Wagner, Wagner Zaun Architecture; Michael Resch, Residential Science Resources

Balanced Ventilation Strategies for Cold Climate Housing (Harborside 204)
This session will explore balanced ventilation systems from an installation, service and operation perspective. Options on sizing and duct design will be part of the session along with pros and cons of the duct/system design with and without a furnace system. Find out if the systems you are installing in your homes are meeting the 2015 Minnesota Energy Code. Learn about control strategies that are simple and functional and the difference between a HRV/ERV systems.
Mike Wilson, Dakota Supply Group

Hearth Products 101 For Today's Builders (Gooseberry Falls Room)
Hearth 101 provides fundamental product knowledge and technical information about all major categories of hearth appliances and venting systems. The session will cover what products are available in the market and why they may or not be suitable for this climate. We will discuss how to determine if a hearth appliance can be the proper product for the space and how it can affect both indoor and outdoor air quality. In addition, we will discuss maintenance, trouble shooting and the advantages of using a qualified expert for installation and service.
Rodger Holland, Holland & Hearth; Michael Norby, Brownstone Distributing; Peter Solac, Woodland Stoves and Fireplaces

EEBA Houses That Work™ (Part 2 of 4) (Harborside 304)
In this full-day session, participants will learn about complex changes in home design, building materials, mechanical systems, appliances, code, healthy housing, compliance and consumer lifestyles and expectations that make every builder, supplier, and trade contractor's job more demanding. EEBA will cover the basics of building science and how it is applied to create high performance homes. By the end of the session, attendees will have a thorough understanding of how to build better attics, walls and foundations and how to choose HVAC systems that integrate properly into their homes. This session also will cover how building science principles improve the marketing position for building professionals. Presenters will provide case studies of builders who have changed their building processes and gained return through communicating the value of high performance homes.
Justin Wilson, Construction Instruction, Inc.

10:30 am–12:00 pm

Incorporating Solar into Residential New Construction (Harborside 203)
This session will focus on the highlights and benefits of solar energy in new construction from the home buyer's perspective. We will also highlight the value proposition for the builders and cover the key factors related to incorporating solar in new home construction. Future homeowners are starting to ask for more; they want their new dream home to be more energy efficient and they are seeking energy independence. Homeowners want to incorporate the latest and greatest technologies available and solar panels are among the new features homeowners are asking for. How can a home builder capitalize on this trend?
Jack Kluempke, Minnesota Department of Commerce

Pre- and Post-Retrofit Assessments and Inspections (French River Room)
For an energy-efficent retrofit to be truly successful, pre- and post-construction assessments and inspections must be performed. Simple walk arounds and a blower door test in the end aren't giving us the results we're after. See what seemingly obvious and hidden factors are commonly found in existing homes. What questions need to be asked of the owner and the potential contractor? How often does work need to be inspected? It might surprise you. Learn how building science and product knowledge affect the end result. And when did we stop reading the directions?
Bill McAnally, McAnally Consulting

Beyond Code Programs That Give You and Your Customer the Edge (Part 3 of 4) (Harborside 302)
Part three of this four-part series is an analysis of the programs presented in part two. Presenters will combine part one details on what makes a high performance house and compare each program with those performance details. Attendees also will learn the complexity of each program and how to make decisions on which program will benefit them and their customers.
Patrick Huelman, University of Minnesota; Marilou Cheple, Marilou Cheple Consulting; Rachel Wagner, Wagner Zaun Architecture; Michael Resch, Residential Science Resources

1:00–2:30 pm

Session Descriptions—Tuesday, February 21

1:00–2:30 pm cont'd

Slab on Grade Construction: Meeting the MN Energy Code Shell and HVAC Requirements (Harborside 204)
This session is divided into two sections—building shell and HVAC. The presenter will focus on ways to meet the new 2015 Energy Code.
Building Shell: Why is it more difficult for a slab on grade structure to pass the house tightness test than one with a basement? Learn about air sealing details that will help you achieve a tighter house. Common areas that are overlooked when it comes to air sealing will be talked about. Blower door results will be discussed.
HVAC: Learn about different HVAC options, and how these designs might affect passing the house tightness and duct tightness test for your house. Techniques on duct sealing and meeting air leakage requirements if your ductwork is in the attic and balance ventilation will be discussed.
Mike Wilson, Dakota Supply Group

The Internet of Things (IOT)—The Nexus of Technologies in the Home and Business (Gooseberry Falls Room)
The merging of technologies with operability via the Internet and hand-held devices is creating new opportunities for sustainable development and energy system design. The Internet of Things (IOT) is now allowing users to control and monitor a vast array of the systems in their homes or businesses. This session will review the state of the art of IOT and how renewable energy systems will interface with IOT. Many cost-savings opportunities will be advanced by these developments and the session will open a window into this incredible potential.
Christopher LaForge, Great Northern Solar

EEBA Houses That Work™ (Part 3 of 4) (Harborside 304)
In this full-day session, participants will learn about complex changes in home design, building materials, mechanical systems, appliances, code, healthy housing, compliance and consumer lifestyles and expectations that make every builder, supplier, and trade contractor's job more demanding. EEBA will cover the basics of building science and how it is applied to create high performance homes. By the end of the session, attendees will have a thorough understanding of how to build better attics, walls and foundations and how to choose HVAC systems that integrate properly into their homes. This session also will cover how building science principles improve the marketing position for building professionals. Presenters will provide case studies of builders who have changed their building processes and gained return through communicating the value of high performance homes.
Justin Wilson, Construction Instruction, Inc.

3:00–4:30 pm

Solar Electric and Energy Storage—Hartley Nature Center Project—A Case Study (Harborside 203)
Energy storage has been the holy grail of renewable energy for decades. With the advent of many new players in the field bringing energy storage into systems, the ability to retrofit existing systems has now become a reality. This session will review the current state of the technology and available equipment. Chris will share the process used at the Hartley Nature Center to rehabilitate its system and introduce storage to the system to create a resilient community shelter site.
Chris LaForge, Great Northern Solar

Breaking Down Barriers to Multifamily Energy Efficiency: Data and Financing (French River Room)
Join us for a panel discussion exploring Energy Efficiency in Multifamily buildings in Minnesota. Topics will include: the value of energy usage data, the EnergyScoreCards MN benchmarking pilot results, case studies of multifamily retrofits, and models for overcoming financing barriers.
Billy Weber, University of Minnesota; Virginia Rutter, Eutectics; Drew Quirk, Xcel Energy

Beyond Code Programs That Give You and Your Customer the Edge (Part 4 of 4) (Harborside 302)
The final part of this four-part series offers an interactive discussion of the high performance home programs, how a builder might choose a program that best meets their needs, and how they can educate their customers. Each panel expert will present some of their personal takeaways on why they would choose certain building practices.
Patrick Huelman, University of Minnesota; Marilou Cheple, Marilou Cheple Consulting; Rachel Wagner, Wagner Zaun Architecture; Michael Resch, Residential Science Resources

Keeping Ground Source Heat Pump Systems on the Table (Harborside 204)
Building owners upgrading or selecting an HVAC system for their project are concerned about energy efficiency and the environment. ground source heat pump (GSHP) systems are often considered early but are discarded by design teams because "they are too expensive" or "don't work here." Optimizing the design of a GSHP system is different than designing a conventional system. This presentation discusses two projects and how this efficient and reliable renewable energy option was "kept on the table" in Minnesota rather than being discarded without serious consideration.
Ed Lohrenz, GEOptimize Inc.

Heating and Cooling a Minnesota Home with a SkyTherm (roof pond) North (Gooseberry Falls Room)
A summary of the thermal performance of five different passive solar test-cells (Direct Gain, Trombe-wall, Water-wall, Sunspace, and Roofpond) and a control test-cell will show evidence for the case of using a SkyTherm North to passively heat and cool a house. This passive solar method will work for 97 percent of the heating degree days and cooling degree days in Minnesota. Even though the strategy has been proven to work, little is known about it and the value it has for having a real impact on energy consumption.
Kitrina Stratton, SunWindLight

EEBA Houses That Work™ (Part 4 of 4) (Harborside 304)
In this full-day session, participants will learn about complex changes in home design, building materials, mechanical systems, appliances, code, healthy housing, compliance and consumer lifestyles and expectations that make every builder, supplier, and trade contractor's job more demanding. EEBA will cover the basics of building science and how it is applied to create high performance homes. By the end of the session, attendees will have a thorough understanding of how to build better attics, walls and foundations and how to choose HVAC systems that integrate properly into their homes. This session also will cover how building science principles improve the marketing position for building professionals. Presenters will provide case studies of builders who have changed their building processes and gained return through communicating the value of high performance homes.
Justin Wilson, Construction Instruction, Inc.

Session Descriptions—Wednesday, February 22

7:00–8:15 am

Practical Methods of Conducting Lead-Safe Remodeling, Repair and Painting Activities (Harborside 204)
Our presentation uses a bedroom cut-away 12 feet wide and 6 feet deep within. Using this model, we will demonstrate methods to establish a lead-safe work area per the EPA and state Lead RRP rules applying to dwellings and child-occupied facilities built before 1978. Our demonstrations and discussions will explore different methods that are used to accomplish one of the major objectives of the Lead rules, which is to minimize the chance of poisoning a child by minimizing dust that contains lead from layer(s) of older paint. This presentation will be valuable to contractors interested in learning or reviewing the requirements and most up-to-date methods.
Dave Louis, Lake States Environmental, Ltd

Passive House: Commercial Projects (Gooseberry Falls Room)
This session illustrates the opportunities for Passive House on commercial projects. Follow four case studies and learn how the Passive House building energy standard affects project planning and design and what changes are made to the building envelope and mechanical systems to achieve it. Furthermore, this session will highlight the differences in initial cost and life cycle cost, and provide insights into the energy conservation and CO_2 reduction potential.

Intep and TE Studio designed the first certified Passive House in North America, as well as the first certified cold climate Passive House and the first certified cold climate Passive House retrofit (EnerPHit) in the world. Learn more at intep.com and testudio.com
Tim Eian, TE Studio, Ltd.

Recommended Window Installation (Harborside 302)
The hands-on demonstration will feature a mock construction wall with rough opening, along with an attached weather resistive barrier and window. The instructors will use these materials to illustrate installation concerns—noting level, plumb, square, and true—and to explain the barrier system flashing details. The demo will be used to present methods of installation and to discuss substrates and material choices for sealants and flashings, noting how they interface with the wall. Manufacturer-recommended sealants and flashing products will be discussed. There will be opportunities for questions and audience interaction.
Eric Klein and Erick Filby, Marvin Windows and Doors

8:30–10:00 am

High-Performance Mechanical Systems for High-Performance Enclosures (Harborside 203)
This session will be constructed around building science principles and current technology applications for robust, high-performance homes that go well beyond codes for superior comfort, efficiency, durability, and indoor air quality. High-perfromance enclosures have significantly changed the demands on the mechanical systems. We will begin with a short review of the critical shortcomings of our current mechanical systems in delivering consistent and persistent performance. Then we will zero in on the design and delivery of systems-based, best-practice solutions for heating, cooling, dehumidification, filtration, ventilation, hot water, and make-up air for high-performance zero energy ready homes.
Patrick Huelman, University of Minnesota

Passive House: Residential Retrofit (EnerPHit) (Harborside 204)
This session showcases the first residential Passive House retrofit in a cold climate zone on the planet, the MinnePHit House. Sit back, relax, and enjoy the journey from planning and design through construction and certification. Learn what it takes to bring an older home into the 21st century of performance.

TE Studio designed the first certified Passive House in Wisconsin and the first certified cold climate Passive House retrofit (EnerPHit) in the world. Learn more at testudio.com
Tim Eian, TE Studio, Ltd

Building New Homes Above the Energy Code: Rewards, Rebates, and Incentives (French River Room)
This session will explore energy upgrades that builders can make to their homes to make them more energy efficient than a code built home. We will see whether energy improvements are driving consumers in their home purchase, what utility rebates are available to builders, and whether builder warranty calls have any correlation to energy improvements. Find out what utility rebates are available around the state for new construction and which ones can help subsidize the costs of these energy improvements. We'll open up the discussion of how some of these energy improvements might be incentives for builders to lower warranty callbacks.
Phil Anderson, Neighborhood Energy Connection; Aaron Riendeau, St. Croix Energy Solutions, Inc.

Case Study—Wrenshall Residence—A Local Architect Puts His Money Where His Mouth Is (Gooseberry Falls Room)
Architect Elden Lindamood designs energy-efficient homes. Faced with tight budgets and the client's emotional decisions that come with designing homes, he is frequently disappointed when design details or energy efficiency are sacrificed to reduce costs. Lindamood will talk about design, and what factors drive decisions during home design. He will relate that to his experience of designing and building a super-insulated home for himself and his partner. You'll hear about the things he gave up in the face of budgetary constraints, the things he refused to bend on, and why he hates the word "payback."
Elden Lindamood, Wagner Zaun Architecture

Continuous Insulation Strategies—Building the Perfect Wall in an Imperfect World (Harborside 302)
This session will explore how to build perfect walls by imperfect people to meet the demands of the escalating code changes. There is not just one "right way" to build a perfect wall. We will offer different ways of building an energy efficient wall for retrofit and new construction using continuous insulation or "CI" strategies. Simplicity can be applied universally to any type of interior or exterior wall assemblies or building process. In this imperfect world stressed out by dynamic change, we in the construction industry need to step back from our overly complex processes and unrealistic expectations and simplify what we are doing.
Dean Seibert and Ed Scherrer, InSoFast LLC

Session Descriptions—Wednesday, February 22

10:30 am–12:00 pm

Condensing Boiler Optimization (Harborside 203)
This session is an update for an ongoing conservation and research development grant project studying residential condensing boiler operation and optimization. The presentation will report on existing boiler installations, optimization and tune-up potential, as well as new quality installations that ensure optimal boiler performance. Our goal is to understand how condensing boilers are being installed and set up and to identify methods for optimizing performance. This presentation will focus on the performance of over 15 new and existing condensing boilers and will include best practices for installation, sizing, integration with existing radiators and emitters, tune-ups and ongoing maintenance and the impact of these practices on performance.
Ben Schoenbauer and Dave Bohac, Center for Energy and Environment (CEE); Rebecca Olson, Neighborhood Energy Connection

So, Tell Me about Your Problem House (Harborside 204)
Many normal homes have severe problems during weather extremes such as a wet summer, a cold winter, a snowy winter, or a snowy cold winter. In other homes, a problem appears when something changes such as adding a furnace, humidifier, lawn sprinkler system, set-back thermostat, or insulating the attic. Sometimes the problem is obvious, other times it is more subtle. Come and learn about what tools and techniques and building science are used to troubleshoot a variety of issues in homes.
Paul Morin, The Energy Conservatory

Building to Meet ZERH w/Multiple Layers of Foam Board: Lessons Learned (French River Room)
At Rochester Area Habitat for Humanity, we have built three homes since we started to build to the ZERH (Zero Energy Ready Home) standard. What have we learned? What would we do differently? How easy/difficult is it? How will we continue to design and build more energy-efficient homes in the future? Is ZERH our best option? In this session, we'll cover the details of how we've approached the ZERH. We strive to build more affordable homes. With ZERH standards, the affordability over the long haul is built in at the beginning for overall lower monthly cost of ownership.
Brian Wimmer, Rochester Area Habitat for Humanity

The Ecologists' House: Case Study of a Zero Net Energy Home in Duluth (Gooseberry Falls Room)
What does it take to achieve zero net energy in Duluth? This presentation dives into the motivation, the design and the outcome. Robust (but reasonable) design and occupant behavior led to net zero energy in the first year of operation. The levels of insulation and air tightness are well beyond code, but quite a bit short of Passive House standards. The 6.6 kW rooftop solar array is smaller than what is often featured in "net zero" homes. Mechanical systems are fairly conventional. The most unique feature is an attached solar greenhouse that contributes additional space heating and year-round growing space.
Rachel Wagner, Wagner Zaun Architecture

High Performance Glazing and the Building Envelope (Harborside 302)
Windows are typically named the "weakest link" in the building envelope; to have the biggest impact on the overall building performance, window specifications should be carefully considered. This session will focus on the most effective strategies for improving window and door performance, including the use of insulated frames, selective glazing by orientation, compression rather than sliding seals, window-to-wall ratios, and occupant considerations such as comfort, and access to natural lighting and ventilation. The session also will include a discussion of best-practice installation methods and considerations for Duluth's local climate.
Mike Florence, DUXTON Windows & Doors; Paul Kellner, Heritage Window & Door

1:00–2:30 pm

Lessons Learned from New Energy Code Testing (Harborside 203)
This session will give an overview of the Minnesota Energy Code and the testing required to pass code. Over the past year, Ross Anderson has worked with several builders and HVAC contractors to help them understand what it takes to pass the new testing requirements under the new Minnesota code. He will include examples of air sealing methods that have worked and some that have not. In addition, a detailed explanation will be given focusing on how to perform the testing that is required for both the home and its ductwork.
Ross Anderson, The Energy Network

Under the Belly of the Beast—A Closer Look at Energy Use in Manufactured Homes (Harborside 204)
The manufactured home market offers an affordable housing option. Residents of manufactured homes tend to be low income in comparison to other single family home residents; energy costs may comprise a larger portion of monthly expenses. Our study takes a closer look at the existing stock of a Midwestern state's manufactured homes to identify energy-saving potential and help inform energy efficiency programs that will save residents money. We conducted telephone surveys and visited 100 homes to perform a detailed audit including duct leakage testing and interviews. This session will share results, provide recommendations for utility programs, and offer insight into potential energy efficiency savings.
Jeannette LeZaks and Scott Pigg, Seventhwave

Super Energy Efficient Homes Should Always Be the Goal: Case Study of an Affordable, Low Tech, High Performance Home in an Urban Environment (French River Room)
The case for energy efficiency: achieve real energy resource reduction while keeping it affordable, simple and a total "no brainer."
Case study: Minneapolis SFD Near NetZero home LEED Platinum (expected).

This case study will include the following lessons learned. 1. Process of understanding: procedures used in design/build of an affordable, net zero home that is exceeding expections. 2. Knowing all strategies and thinking outside of the box. 3. Focus on the free sun, wind, and light while creatively reducing energy needs in tight spaces. 4. Simple elements that can be used in new/retrofitting/renovations; no brainer construction methods. 5. Show the homeowner's retirement investment scheme (ROI beyond traditional 401K). 6. Dynamic/optimal living with super energy efficiency and experiencing the "living house" 7. Focus on how these types of houses need to be experienced to understand value.
Kitrina Stratton, SunWindLight

Passive House: Residential New Construction—The "Nordeast Nest" (Gooseberry Falls Room)
The session showcases a residential new construction project—the Nordeast Nest—from planning through construction and completion. Learn about the design, assemblies, materials and systems, as well as the challenges and opportunities, for an urban infill project to meet the Passive House standard on a budget in Minneapolis, Minn.

Session Descriptions—Wednesday, February 22

1:00–2:30 pm cont'd

TE Studio designed the first certified Passive House in Wisconsin and the first certified cold climate Passive House retrofit (EnerPHit) in the world. Learn more at testudio.com
Tim Eian, TE Studio, Ltd.

Aerosols—Seek and Seal Envelope Leaks (Harborside 302)
An aerosol sealing process has been developed that reduces envelope leakage by 60 to 95 percent. Animations and videos will illustrate how an aerosol duct sealing technology has been adapted to seal envelope leaks. Pre/post air leakage measurements will be presented from three new construction and three existing multifamily buildings that were sealed for a State of Minnesota funded research project. Also, preliminary results will be presented for a DOE Building America project to develop procedures to easily integrate the aerosol sealing technique into standard construction practices and reduce the cost compared to less-effective conventional sealing.
Dave Bohac, Center for Energy and Environment (CEE)

3:00–4:30 pm

Emerging Technologies for Cold Weather Residential Heating (Harborside 203)
This session will update research projects on two emerging technologies focusing on improving residential space heating with forced-air systems. Discussion will cover installation, operation, and energy savings based on preliminary field data from occupied Minnesota homes. First, the Transport Membrane Humidifier (TMH) improves the efficiency of standard residential furnaces. TMH saves energy by recovering water vapor and waste heat from flue gas to preheat and humidify inside air. Second, advancements in cold-climate air source heat pumps (ASHP) focusing on ductless heat pump technology and improvements on the typical operating practices to improve the cold climate heating performance of these systems.
Josh Quinnell and Ben Schoenbauer, Center for Energy and Environment (CEE)

Pre- and Post-Retrofit Assessments and Inspections (Harborside 204)
For an energy-efficent retrofit to be truly successful, pre- and post-construction assessments and inspections must be performed. Simple walk arounds and a blower door test at the end aren't giving us the results we're after. See what seemingly obvious and hidden factors are commonly found in existing homes. What questions need to be asked of the owner and the potential contractor? How often does work need to be inspected? It might surprise you. Learn how building science and product knowledge affect the end result. And when did we stop reading the directions?
Bill McAnally, McAnally Consulting

When Sustainability and Affordability Meet—Lessons from a High-Performance Habitat for Humanity Neighborhood Development (French River Room)
In 2012, St. Croix Valley Habitat for Humanity embarked on a four-year project to develop an 18-home community of sustainable, high-performance affordable homes. Completed in 2016, River Falls Eco Village has gained national and international recognition, including a 2014 Home of the Year Award from Green Builder magazine. An ongoing monitoring program provides data on home performance and helps in evaluating the impact of design features. This session explores the process of creating Eco Village and lessons learned.
Jim Cooper, St. Croix Valley Habitat for Humanity

The Clean Energy Community Awards Program: Recognizing Community Efforts (Gooseberry Falls Room)
The Clean Energy Community Award program honors Minnesota communities that have furthered the state's clean energy goals through programs, policies, and technologies that encourage energy efficiency, conservation, and clean energy. The program recognizes efforts in the areas of planning, efficiency in public and private buildings, public infrastructure efficiency, transportation, and clean energy generation. In November 2016, the Minnesota Department of Commerce, with support from 10 agencies and organizations, presented 5 Minnesota communities with achievement awards and 3 communities with planning awards. This presentation will describe the program, profile the winning applicants, and encourage communities to apply for the 2017 awards.
Terry Webster, Minnesota Department of Commerce; Patrick Shea, City of St. Cloud, MN; Fernando Nacionales, 133 Airlift Wing, MN Air National Guard; John Paulson, City of Hutchinson, MN

Fundamentals of Door Installation (Harborside 302)
This hands-on demonstration will feature a mock construction wall with rough opening, along with an attached weather resistive barrier. A door will also be available for installation and instruction. The instructor will use these materials to illustrate presentation content regarding installation concerns, noting level, plumb, square and true, and to explain the barrier system. The demonstration materials will also be used to present methods of installation, and to discuss substrates and material choices for sealants and flashings and how they interface with the wall. Manufacturer recommendations for sealants and flashing products will be discussed. Recommended procedures to cut the weather resistive barrier (WRB) and apply sill pan flash will be demonstrated. The five types of flashings will be introduced, including an explanation of their importance to water management. Current general installation guidelines will be followed.
Eric Klein and Erick Filby, Marvin Windows and Doors