

Energy Storage 201

Taking off from last year's look at energy storage and Hartley Nature Center, this class highlights the improvements in renewable energy systems that include advanced energy storage. Find out how these systems work with or without the grid, when they are appropriate, and why energy storage is the biggest advancement in renewable energy systems since low module costs. See how customers at the residential and especially the commercial level can profit with the addition of advanced energy storage systems. Find out how utilities can profit as well. We will cover system designs at the residential, commercial and utility scales.

Christopher LaForge, Great Northern Solar

Aerosol Envelope Sealing for Residential New Construction

Many building envelopes are notoriously leaky with unintended flows between spaces that result in additional heating and cooling. Only recently has sealing become a requirement. Current air sealing methods are manual and can produce highly variable results with limited opportunity for feedback. The aerosol technology is an automated method that is capable of exceeding high-performance standards for building envelopes. The process involves pressurizing the building while applying an aerosol sealant "fog." The technology is capable of simultaneously measuring, locating, and sealing leaks, improving quality control and reducing costs. The Center for Energy and Environment has expanded testing from multifamily buildings to residential new construction. This presentation will focus on the new work with this sector.

Ben Shoebauer, Center for Energy and Environment

Asbestos—Yes, It's Still Around

The Minnesota Department of Health is developing an update to rules. These rules will either already be in effect at the time of the conference or soon thereafter. Additionally there are federal developments that may bring about a ban on many or even all asbestos. These developments will significantly affect the residential and commercial construction industries. Using our interactive "bedroom" cut-away display 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.

Opening Keynote: The Art, the Science, and the Business of High-Performance Homes

We keep asking more and more of our homes: use less energy, use less water, last longer, be safer, use fewer materials. It's a really tall order. Here is what is needed for truly high-performance homes:

- They must be crafted, beautiful, and of high quality.
- They must last a long time and be based on real science.
- They must be valuable and valued (you can't build a high-performance home if you can't sell it).

We can integrate all this, convincing our customers that we can deliver and that they deserve high-performance homes.

Peter Yost, BuildingGreen, Inc.

High-Performance Homes Bring New Challenges for Mechanical Systems

Many older mechanical solutions are simply not a good fit for the modern, high-performance enclosure. This session will focus on mechanical strategies, systems, and equipment for high-performance homes that have the potential for low or no energy bills. While solar energy systems can be bolted on later, it is not as easy to change the efficiency of the building enclosure or its HVAC equipment. This makes it critical to find cost-effective approaches to get the loads low and the efficiencies high. It is also important to find mechanical solutions that are adaptive to a renewable energy system—today or in the future.

Patrick Huelman, University of Minnesota Extension

EEBA Houses That Work™ (Part 1 of 4)

This session will address home performance elements that exist as a system and are part of energy efficient homes. The fundamentals of building science - air, heat and moisture flow - will be applied to help participants make better choices with respect to construction materials and methods. Participants will learn important information about indoor air quality and cost-effective strategies to be able to offer healthier environments. Attendees will gain a thorough understanding of how to build better attics, walls and foundations, how to choose HVAC systems that integrate properly into their homes, and how these principles improve their marketing position.

Andy Oding, Building Knowledge Canada

Smart Buildings Improve Your Bottom Line

Employing a smart solution in your building enables predictive HVAC, which can greatly improve energy efficiency while driving thermal comfort and employee productivity. So how do you, as a professional facility director or building owner, curb excessive waste and improve your bottom line? You can do so by addressing one of the biggest money hogs, HVAC. Accounting for 40 percent of your building's energy costs, reducing this significant number will contribute to your bottom line and your sustainability objectives. Within a smart system, air quality will also be improved, leading to happier customers and more productive employees.

Bob French, 75F

Building Zero Energy Ready Homes: Improvements and Moving to Remodeling, Plus the Fortified Build

Four houses into building to the Zero Energy Ready Home (ZERH) DOE standard, we now have a rater ready to certify our first home as we shift gears toward "affordable" lot/homes. What have we learned so far and what tweaks will we make on new homes in the future? How will we move into remodeling existing homes to meet ZERH standards? We're on track toward getting to net zero by 2030. This means new and existing remodels to meet ZERH at a minimum.

Brian Wimmer and Lou Behrens, Rochester Area Habitat for Humanity

Achieving a Moisture Balance Within the Home!

This presentation will discuss how high or low relative humidity (RH%) can be an issue in existing and new housing stock. Changes that were implemented in the 2015 MN Energy Code have affected the balance of RH% within the home. Learn corrective solutions and ways to manage your RH% year round. Mike has been working with builders, HVAC contractors and homeowners on moisture-related problems for over 30 years and will share his firsthand experiences.

Mike Wilson, Dakota Supply Group

Advancing the Last Frontier—Reduction of Commercial Plug Loads

Plug load energy use in commercial buildings has increased, especially in contrast to the decrease in other more regulated areas such as heating, ventilation, and air conditioning (HVAC) and lighting. This session presents the results of a recent study that evaluated plug load energy usage in office buildings in Minnesota in order to determine the extent of the problem. By combining a characterization study, field measurements of several reduction strategies, and user satisfaction interviews, the session presenters have identified effective plug load approaches to decrease plug load usage in new and existing office buildings.

Rick Carter, LHB; Christopher Plum, Center for Energy and Environment

Choosing Insulation: So Many Options, So Little Time, and So Much Need For Information

It's really hard to keep up with all of the options for insulation, both cavity and exterior. And the building science/performance of each option when combined in a building assembly makes it that much tougher. Using BuildingGreen's 3rd Edition: Guide to Insulation, Peter will work his way through tried-and-true as well as newly-introduced insulation options. We will discuss all assemblies--foundation, walls, roof—as well as the full range of characteristics: R-value, airtightness, vapor permeability and installation conditions.

Peter Yost, BuildingGreen, Inc.

Zeroing In

For high-performance, Zero Energy Ready Homes (ZERH), it is critical to get the building enclosure and mechanical systems right. While renewable energy can be added or acquired later, it is not easy to change the efficiency of the building enclosure or its HVAC equipment. It is essential to identify cost-effective approaches to get the loads low and the efficiencies high. But it really is about system optimization—not spending too much in one area and too little in another—all with the goal of keeping the cost of a renewable energy system, today or in the future, more affordable.

Patrick Huelman, University of Minnesota Extension

EEBA Houses That Work™ (Part 2 of 4)

This session will address home performance elements that exist as a system and are part of energy efficient homes. The fundamentals of building science—air, heat and moisture flow—will be applied to help participants make better choices with respect to construction materials and methods. Participants will learn important information about indoor air quality and cost-effective strategies to be able to offer healthier environments. Attendees will gain a thorough understanding of how to build better attics, walls and foundations; how to choose HVAC systems that integrate properly into their homes; and how these principles improve their marketing position.

Andy Oding, Building Knowledge Canada

Smart Remodeling

You have recently finished a remodeling project and the homeowner calls with complaints related to moisture, air quality or carbon monoxide. What is your next step? Was this issue caused by something you did to the home or is it completely unrelated? How well did you document the home before the remodel started? This session will talk about the potential consequences that adding larger exhaust fans, new heating equipment, humidifiers or air tightening and insulating can have on a home. We will also discuss some practical methods of predicting what will happen when you make these changes.

Paul Morin, The Energy Conservatory

Residential Foundations: The Dos and the Don'ts According to the Codes (Must attend entire session, 1:00-4:30, to receive credits)

We will cover and discuss residential buildings and their foundation systems, including what to look for in both plan review and inspections as they pertain to MN Rules Chapter 1322 and the adoption of the 2012 International Energy Conservation Code (IECC), as amended by the state of Minnesota.

Don Sivigny, Minnesota Department of Labor and Industry

Session Descriptions—Tuesday, February 20

EEBA Houses That Work™ (Part 3 of 4)

This session will address home performance elements that exist as a system and are part of energy efficient homes. The fundamentals of building science—air, heat and moisture flow—will be applied to help participants make better choices with respect to construction materials and methods. Participants will learn important information about indoor air quality and cost-effective strategies to be able to offer healthier environments. Attendees will gain a thorough understanding of how to build better attics, walls and foundations; how to choose HVAC systems that integrate properly into their homes; and how these principles improve their marketing position.

Andy Oding, Building Knowledge Canada

Tools and Best Practices for City Energy Planning

Local energy development, once the exclusive concern of communities with fossil fuel resources, is now an opportunity and risk for every Minnesota community. This session presents the Local Government Project for Energy Planning (LoGoPEP), which provides tools to help planners and decision-makers understand local energy resources and plan for their future. Proper planning requires understanding existing conditions, identifying desired conditions, and creating a trajectory to achieve the desired conditions over the planning horizon. This session will describe best practices for each of these plan elements and demonstrate how to use the LoGoPEP toolkit to develop an energy plan or energy component of a comprehensive plan.

Becky Alexander, LHB; Brian Ross, Great Plains Institute

If These Walls Could Talk

This designer still bangs her head against the wall in the quest for high performance. Wall design can be complicated and risky. We'll look at the "least complicated and least risky" solutions for cold climate wall assembly for both new and retrofit work when the goals are durability and energy performance well beyond what code would suggest. The appropriate solution can vary depending upon existing conditions, goals for performance, and the type of foundation planned. This session dives deep, using current and past work done in our region, and with reference to current research and practice by respected professionals.

Rachel Wagner, Wagner Zaun Architecture

Customer First—Let's Remember the Family is No. 1 When Making Construction Decisions

When we make design and construction decisions, we need to remember a family may be living for generations in our finished product. Decisions made looking at short-term payback, "prettys" or speed are a disservice to our craft. Healthy conditions, durability, safety, and, of course, energy efficiency, must remain foremost in our projects. By following product directions and building codes, a cost effective, net zero ready home will keep the family happy and safe for many years to come.

Bill McAnally, McAnally Consulting

Residential Foundations: The Do's and the Don'ts According to the Codes (Must attend entire session, 1:00-4:30, to receive credits)

Continuation of 1:00 pm session.

We will cover and discuss residential buildings and their foundation systems, including what to look for in both plan review and inspections as they pertain to MN Rules Chapter 1322 and the adoption of the 2012 International Energy Conservation Code (IECC), as amended by the state of Minnesota.

Don Sivigny, Minnesota Department of Labor and Industry

EEBA Houses That Work™ (Part 4 of 4)

This session will address home performance elements that exist as a system and are part of energy efficient homes. The fundamentals of building science—air, heat and moisture flow—will be applied to help participants make better choices with respect to construction materials and methods. Participants will learn important information about indoor air quality and cost-effective strategies to be able to offer healthier environments. Attendees will gain a thorough understanding of how to build better attics, walls and foundations; how to choose HVAC systems that integrate properly into their homes; and how these principles improve their marketing position.

Andy Oding, Building Knowledge Canada

Session Descriptions—Wednesday, February 21

Recommended Window Installation (Hands-On Demonstration)

The hands-on installation demonstration will feature a mock-up construction wall with a rough opening, along with an attached weather-resistive barrier. A window 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.

Types of windows will be reviewed relative to installation followed by a window installation demonstration. The class will be asked to walk through the steps of centering, leveling, squaring, and shimming the window unit. There will be opportunities for questions and audience interaction during hands-on demonstrations.

Erick Filby and Eric Klein, Marvin Windows and Doors

The American Dream Renewed—Passive House for Everyone

This lecture illustrates how to create ultra-low carbon, sustainable residential buildings, which support the 2000-Watt Society metrics with the help of the Passive House building energy standard. Tim Eian has over a decade of experience with passive house design in cold climates. His firm TE Studio/Intep designed the first certified passive house building in North America.

Tim Eian, TE Studio, Ltd.

Energy-Efficient Options for Residential Water Heating

High performance building and remodeling is reducing the space conditioning loads in Minnesota. This trend has increased the importance of water heating as a percentage of home energy use. Many residential buildings still use minimum efficiency products. This presentation will look at the current state of residential water heaters and high performance options. This presentation is based on several projects, including the measurement and analysis of over 50 real Minnesota homes with innovative water heating products. The presentation will highlight the performance and energy savings potential of both electric and gas water heaters and discuss emerging options for efficient distribution and control.

Ben Schoenbauer, Center for Energy and Environment

Wrenshall Residence: A Passive Solar, Low-Energy House Put to the Test

The architect/owner of a passive solar, low-energy home in Wrenshall, Minn., presents the hard data on a year's worth of energy use. Elden Lindamood will outline the building assemblies and systems, and discuss the factors that led to those design decisions and selections. He'll also discuss the human side of living in the house and reveal whether the realities have met his expectations.

Elden Lindamood, Wagner Zaun Architecture

Multifamily Green Building Programs

Chris Johnson will lead an open discussion through four projects: LEED, ICC 700, Passive and ENERGY STAR® certified high-performance multifamily projects. This breakout is sectioned into five main categories: Design and Development Team, the Envelope, the Mechanical, the Construction and Outcomes. This is a great opportunity for attendees to get engaged using their own experience and for the beginner taking on a project. These four projects consist of 500-plus units, three construction companies and three different owners. We will discuss the factors that play into each decision throughout the projects.

Chris Johnson, Johnson Environmental

Practical Methods of Conducting Lead-Safe Remodeling, Repair and Painting Activities

Our interactive presentation uses a bedroom cut-away 12 feet wide and 6 feet deep within which we demonstrate methods to establish a lead-safe work area per the EPA lead rules that apply to remodeling, repair and/or painting in dwellings and child-occupied facilities built before 1978. The Minnesota Department of Health is also implementing rules that will apply to these activities. Our "bedroom" and accompanying demonstrations will explore different methods that are used in a variety of situations. This presentation will be of value to contractors not yet certified as lead-safe and to those certified that would benefit from a review of the requirements and most up-to-date methods.

Bob Rogalla, Lake States Environmental, Ltd.

Introduction to Solar

This session will introduce solar technologies with a concentration on solar electric (photovoltaics). We will introduce the basics of various solar technologies and applications, the policies that are encouraging growth in the solar industry, and programs from around the region that are incentivizing deployment. Complementary technologies, such as storage will be introduced, while current events affecting markets will also be explored.

Paul Helstrom, Minnesota Power

Home of the Future: Automated, Electric, and Renewable

An overview of where we are on several key components of our energy future. This session will include lightning round presentations/panel discussions on solar-ready home construction, the growth of solar in Minnesota, planning for EV infrastructure, battery and end-of-life options for EVs, and ZNE home overview. This session is intended to provide basic information to general audiences.

Terry Webster and Stacy Miller, Minnesota Department of Commerce

EEBA: High-Performance Mechanicals (Part 1 of 4)

This course is a midlevel session for 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. We 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 homes. Compelling opportunities to simultaneously optimize comfort, durability, safety and health, efficiency and cost will be identified.

Andy Oding, Building Knowledge Canada

What You Need to Know About Furnaces and Air Conditioners if You're NOT an HVAC Professional

Confused about the choices for a new furnace or air conditioner? This session will cut through the marketing hype and help you understand the key options for residential furnaces and air conditioners. 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 for maximizing comfort and minimizing heating and cooling bills. This will be a lively, practical and jargon-free session using an interactive audience polling system: test your knowledge and bring your questions!
Scott Pigg, Seventhwave

It's All in the Details!

What's scary about building a net zero ready home? Nothing! Just follow the directions and pay attention to the details. In this case study of building a 2012 International Energy Conservation Code compliant home that also meets ENERGY STAR® standards, we'll discuss how to keep quality construction foremost while also holding the reins on the budget. Building science, indoor quality and homeowner safety drove this project. The owner was VERY demanding! (But fun too!)
Bill McAnally, McAnally Consulting

Multifamily Residential Passive House Prototypes and Net-Zero Energy Potential in Cold Climates

The passive house standard is gaining popularity across the country and in Minnesota. This session examines the potential for passive house design in a cold climate for three multifamily housing prototypes: townhome, low-rise, and mid-rise. The prototypes were modeled using three different software packages—WUFI Passive compliance software, IES-VE, and the Home Energy Rating System (HERS)—to validate performance results and compare current practice to passive house. Energy consumption was compared to the capacity for energy generation with roof-mounted photovoltaic panels to determine the plausibility of net-zero energy buildings and resilience in the case of power outages.

Rolf Jacobson and Elizabeth Kutschke, Center for Sustainable Building Research University of Minnesota

Commissioning of Homes: What is it? Is it Needed?

Building commissioning is common for commercial buildings but can we translate this process to residential homes? The basic form of commissioning is the systematic process of verifying that building systems are designed, installed, tested and capable of being operated as an integrated whole system. By using this system with our residential customers, we can avoid call-back problems and ensure a comfortable, healthy, and energy-efficient home.

Mike Wilson, Dakota Supply Group

Self-Build Zero-Energy Homes: Two Minnesota Case Studies

This session will outline two net-zero-ready projects recently built in Minnesota. Each project was constructed by the homeowners and designed collaboratively with architect Lucas Alm. The Abrahamson home, constructed in 2015–2016, is a model for low-energy living designed to fit in an established residential neighborhood in St. Paul. It features a robust building envelope and a PV array offsetting yearly energy use. The Peterson homes, constructed in 2016–2017 in Cannon Falls, are designed based on principles of affordable low-energy construction, envisioned as a prototype for long-term sustainable habitation. A single-story and flexible floor plans foster intergenerational living and community.

Lucas Alm, ALM Design Studio; Bill Peterson, Friends of San Lucas; Muffi Abrahamson, Tim Abrahamson

Renewable Energy and Resiliency

Today's big buzzword in renewable energy (RE) design is "resiliency." From keeping the lights on and the building warm to maintaining lines of communication, solar electric systems with storage provide a level of resiliency that outperforms all others. With its fuel delivered each day when the sun rises—at no cost—these systems offer stability in increasingly chaotic weather extremes.

This session will outline the designs, options, and applications for using RE systems to provide clean, stable energy sources that withstand utility power outages and other forms of disruption to daily life.

Christopher LaForge, Great Northern Solar

EEBA: High-Performance Mechanicals (Part 2 of 4)

This course is a midlevel session for 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. We 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 homes. Compelling opportunities to simultaneously optimize comfort, durability, safety and health, efficiency and cost will be identified.

Andy Oding, Building Knowledge Canada

Ultra-Efficient Housing—The Solution for a Sustainable Future

This lecture illustrates the path to ultra-efficient multifamily housing in a number of case studies which showcase the benefits of high-performance architecture for new construction and retrofits. Leveraging the power of the passive house building energy standard and carbon accounting, ultra-efficient housing leads the way toward a sustainable future.

Tim Eian, TE Studio, Ltd.

Efficient Solar Photovoltaic Deployment

Solar photovoltaic has seen significant growth in recent years. The success has been due in some part to incentives, awareness of non-CO2 generation and economy of scale. At each crossroad, solar photovoltaic continues to challenge conventional wisdom in both costs and reliability. This presentation will cover efficient deployment of solar as we approach higher and higher percentages of solar penetrations. Solar plus storage will be shown as a way to evolve into the next phase.

Mouli Vaidyanathan, SolarPod Mouli Engineering

EEBA: High-Performance Mechanicals (Part 3 of 4)

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Andy Oding, Building Knowledge Canada

Performance and Applications of Cold-Climate Air Source Heat Pumps

Significant recent advancements in heat pump technology allow for cold-climate air source heat pumps (ASHP) to deliver heat to a home at temperatures at and beyond minus 13 F. This presentation will present results for one of the first field studies into the performance of these systems in very cold climates. The study consisted of six high efficiency cold-climate ASHPs installed with detailed monitoring equipment to assess the improved capacity, reduction in energy use, and reduced reliance on back-up heating. The presentation will also discuss applications for ASHPs in Minnesota, including replacement applications.

Ben Schoenbauer, Center for Energy and Environment

EnerPHit—Retrofitting with Passive House Tools

Learn about a renovation and addition for a family of five and the first certified very cold climate passive house retrofit (EnerPHit) on the planet. At TE Studio we are fortunate to attract some pretty incredible people. With this project, we were commissioned by a couple from South Minneapolis to bring their 1930s home into the 21st century of performance. This project became the first certified Passive House Retrofit (EnerPHit) in a cold climate, and the first certified passive house in the Twin Cities, and—most importantly—a beautiful home for a family of five, a flock of chickens, and two dogs.

Tim Eian, TE Studio, Ltd.

Electric Cars and Buildings: What Should Real Estate Owners and Building Industry Professionals Know About Charging? (With Electric Vehicle Owners' Panel)

There are over 650,000 plug-in vehicles (PEVs) on U.S. roads every day, and the sales numbers are increasing every month. Owners will charge their PEVs mainly at home, but PEV charging infrastructure will be needed in other locations like 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 how real estate owners and building professionals should approach this. For more information, visit www.multiphasingcharging.com and www.Workplacecharging.com

Jukka Kukkonen, PlugInConnect

Advancements in Solar Electric Design and Equipment

Learn about new solar electric designs and equipment with this review of the latest issues in PV design and installation. As the PV world evolves, the availability of lower cost equipment can bring PV design down. At the same time, NEC code changes can require new equipment that can bring the cost back up! With changes in incentives on the horizon and a better understanding of the "true value of solar," an overall understanding of the way systems work and how they will be built is more important than ever. Join us for a discussion of where solar electricity is going with plenty of time for questions by participants.

Christopher LaForge, Great Northern Solar

EEBA: High-Performance Mechanicals (Part 4 of 4)

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Andy Oding, Building Knowledge Canada

Visit our website for general conference information and to register online.

www.DuluthEnergyDesign.com

Questions? Call (218) 355-3070 or email EnergyDesignConferenceExpo@mnpower.com