

# Seminar Agenda

## Overview of Systems to be Covered

Air-source heat pumps  
Condensing boilers and furnaces  
Solar-assisted space heating and domestic hot water  
Ground-source heat pumps  
Pellet-fired boilers

## Heat Pumps Overview

How they work: heat pump process cycle, terminology, measures of performance  
COP (coefficient of performance)  
Performance in cold climates  
Air-source and ground-source heat pumps  
Water-to-air, water-to-water, and air-to-water systems

## Air-Source Heat Pump Performance

Cold-climate air-source heat pumps  
Variable refrigerant flow (VRF) heat pump technology  
Split systems, mini-splits, and ducted systems  
Capacity as a function of outside air temperature  
Air-to-air and air-to-water heat pumps  
Outdoor condenser and indoor terminal equipment  
Examples and case studies  
Proposed improvements to rating metrics for air-source heat pumps  
Regional cold climate system specifications  
Results from air-source heat pump performance studies  
Air-source heat pumps in commercial and residential use  
Lessons learned

## Ground-Source Heat Pump Performance

Ground-source and ground water heat pump configurations for cold climates  
Closed loop, open loop, and standing column heat pump systems  
High-performance equipment options and recent developments  
Water-to-air and water-to-water heat pumps  
Commercial and residential examples and studies  
The importance of controls and control strategies on optimized energy performance  
Lessons learned

## Combustion-Based Heating Systems

Boiler technology fundamentals and operations  
How to optimize heating performance  
Different rules for different boiler technologies  
The importance of resetting water temperatures based upon load  
The importance of right-sizing boiler stages for optimal operation

## Biomass Boilers Performance

Equipment examples  
Modern, microprocessor-controlled wood-pellet boilers  
Equipment and case studies  
Vacuum and auger-fed pellet systems  
Ash management and disposal systems  
Microprocessor-based boiler controls  
Inside the pellet boiler  
Efficiency and the effects of ratings based on higher or lower heating values of fuel  
Case studies and examples for institutional facilities  
Lessons learned

## Solar-Assisted Domestic Hot Water & Space Heating Performance

Solar domestic hot water systems:  
Steam-back, closed loop and drain-back solar thermal system configurations  
Rooftop solar thermal panels, hot water storage and radiant floor heat delivery systems  
New construction - residential solar thermal space heating systems  
Lessons learned

## Round-Up and Review

**Cold-Climate Heat Pumps, Pellet Boilers and Other Renewable Thermal Heating Systems**  
Syracuse, NY - Thursday, April 20, 2017  
Buffalo, NY - Friday, April 21, 2017

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## Learning Objectives

### You'll be able to:

**Discuss** the basics of air and ground-source heat pump systems.

**Explain** split systems and variable refrigerant flow (VRF) technology.

**Understand** the importance of control strategies on optimized energy performance.

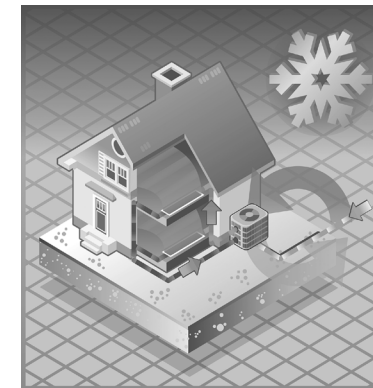
**Evaluate** boiler technologies and learn the importance of resetting water temperatures based upon load.

**Examine** biomass boiler performance, and discuss ash management and disposal systems.

**Assess** solar domestic hot water and solar thermal space heating systems.



# Cold-Climate Heat Pumps, Pellet Boilers and Other Renewable Thermal Heating Systems



**Syracuse, NY**  
Thursday, April 20, 2017  
**Buffalo, NY**  
Friday, April 21, 2017

**Examine** the basics of air-source and ground-source heat pump systems

**Explore** heat pump performance for air-to-air, water-to-water, air-to-water and water-to-air systems

**Study** boiler technology

**Evaluate** biomass boiler performance

**Learn** about solar-assisted hot water and solar space heating systems

### Continuing Education Credits

#### Architects

6.0 HSW Contact Hours  
6.0 AIA HSW Learning Units

#### Professional Engineers

6.0 PDHs

#### Building Performance Institute

3.0 CEUs

#### Contractors

Non-Credit Continuing Ed.



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EDUCATION



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# Faculty

**Bart Bales, PE MSME** *Principal, Professional Consulting Engineer at Bales Energy Associates in Massachusetts*

Mr. Bales provides energy engineering consulting systems for buildings and facilities using a “whole-system,” building science-based approach. Services include energy analysis, design, and implementation of high-performance, energy-efficient and renewable energy systems.

His company, Bales Energy Associates (BEA), is a state-wide provider under the Facility & Energy Manager Program of the Massachusetts Division of Capital Asset Management. BEA is one of four firms providing services under the renewable thermal consultant of the Massachusetts Division of Energy Resources. BEA also provides services for various utility energy incentive programs, as well for private customers.

Mr. Bales has effectively delivered energy engineering and HVAC design services for 29 years. He is a registered professional engineer in Massachusetts, Connecticut, New York, Rhode Island, and Vermont and has a national NCEES PE file. Mr. Bales has Master and Bachelor degrees in Mechanical Engineering from the University of Massachusetts.

His engineering experience includes facility energy studies for efficiency measures, cogeneration systems, solar electric, solar thermal, and windpower systems. Mr. Bales has developed and codified energy analysis methodologies. He has developed trainings on heating systems, solar electric systems, solar thermal systems, daylighting lighting controls, facility energy audits and other subjects.

# About the Seminar

## Thursday, April 20, 2017

Sheraton Syracuse University Hotel  
801 University Avenue  
Syracuse, NY 13210  
(315) 475-3000

## Friday, April 21, 2017

Hyatt Regency Buffalo  
Two Fountain Plaza  
Buffalo, NY 14202  
(716) 856-1234

## Tuition

**\$269** for individual registration

**\$249** for three or more simultaneous registrations. Each registration includes one copy of the seminar manual.

**Receive a reduced tuition rate of \$101** by registering to be our on-site coordinator for the day. For availability and a job description, go online to [www.halfmoonseminars.org](http://www.halfmoonseminars.org).

## Four Easy Ways to Register Today!

Register online at [www.halfmoonseminars.org](http://www.halfmoonseminars.org), mail in registration form to **HalfMoon Education Inc., PO Box 278 Altoona, WI 54720-0278**, fax the form to (715) 835-6066, or call a customer service representative at (715) 835-5900.

## Registration

8:00 - 8:30 am

Morning Session  
8:30 - 11:45 am

Lunch (On your own)  
11:45 am - 1:00 pm

Afternoon Session  
1:00 - 4:15 pm

## Continuing Education Credit Information

This seminar is open to the public and offers up to 6.0 HSW continuing education/contact hours to architects and 6.0 PDHs for professional engineers in all states.

HalfMoon Education is deemed a New York-approved continuing education provider for architects via its affiliation with the American Institute of Architects. HalfMoon Education is an approved continuing education provider for New York engineers (NYSED Sponsor No. 35) and New Jersey engineers (Approval No. 24GP00000700).

The American Institute of Architects has approved this event for 6.0 HSW Learning Units (Sponsor No. J885). Courses approved by the AIA qualify for New Jersey and District of Columbia architects.

HalfMoon Education is an approved continuing education sponsor for architects in Florida. HalfMoon Education is an approved continuing education sponsor for engineers in Florida, Indiana, Louisiana, Maryland, North Carolina, and North Dakota.

The Building Performance Institute has awarded 3.0 CEUs for the completion of this seminar.

This event offers a non-credit continuing education opportunity to construction contractors, but it has not been approved by any state with a continuing education requirement for contractors.

Attendance will be monitored, and attendance certificates will be available after the seminar for most individuals who complete the entire event. Attendance certificates not available at the seminar will be mailed to participants within fifteen business days.

**Cancellations:** Cancel at least 48 hours before the start of the seminar, and receive a full tuition refund, minus a \$39 service charge for each registrant. Cancellations within 48 hours will receive a credit toward another seminar. You may also send another person to take your place.

# Testimonials

**Here's what past attendees have to say about the program and presenter Thomas E. Barnard:**

“Nice job with useful information.” – *Engineer*

“Would recommend to others.” – *Architect*

“Good working knowledge of subject matter...”  
– *Professional Engineer*

“Bart did a good job presenting and addressed questions well.” – *Civil Engineer*

# Webinar Series

## Residential Solar, Community Solar and Solar Batteries

### • Community Solar

Wed., April 5, 11:00 AM - 2:15 PM CDT

### • Introduction to Residential Solar

Wed., April 12, 11:00 AM - 2:15 PM CDT

### • Solar Battery Management Systems

Wed., April 19, 11:00 AM - 2:15 PM CDT

### • Design Your Solar Roof

Wed., April 26, 11:00 AM - 2:15 PM CDT

## Retaining Wall Design and Slope Stabilization Techniques

### • Retaining Wall Basics

Thurs., April 6, 11:00 AM - 12:00 PM CDT

### • Geosynthetics and Retaining Walls

Thurs., April 6, 12:30 - 2:30 PM CDT

### • Slope Stability and Geosynthetics

Fri., April 7, 11:00 AM - 12:30 PM CDT

### • Slope and Retaining Wall Failures, Fixes and Prevention

Fri., April 7, 1:00 - 2:30 PM CDT

For more information visit:

[www.halfmoonseminars.org/webinars/](http://www.halfmoonseminars.org/webinars/)

# Registration

## Cold-Climate Heat Pumps, Pellet Boilers and Other Renewable Thermal Heating Systems

Syracuse, NY - Thursday, April 20, 2017; Buffalo, NY - Friday, April 21, 2017

## How to Register

### Online:

[www.halfmoonseminars.org](http://www.halfmoonseminars.org)

### Phone:

715-835-5900

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### Mail:

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PO Box 278, Altoona, WI  
54720-0278

### Complete the entire form.

Attach duplicates if necessary.

## Registrant Information

Name: \_\_\_\_\_

Company/Firm: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Occupation: \_\_\_\_\_

Email: \_\_\_\_\_

Phone: \_\_\_\_\_

### Additional Registrants:

Name: \_\_\_\_\_

Occupation: \_\_\_\_\_

Email: \_\_\_\_\_

Phone: \_\_\_\_\_

Name: \_\_\_\_\_

Occupation: \_\_\_\_\_

Email: \_\_\_\_\_

Phone: \_\_\_\_\_

Email address is required for credit card receipt, program changes, and notification of upcoming seminars and products. Your email will not be sold or transferred.

( )  I need special accommodations. Please contact me.

## Tuition

( ) **I will be attending the live seminar.** Single Registrant - **\$269.00**. Three or more registrants from the same company registering at the same time - **\$249.00** each.

( ) Syracuse, NY - Thursday, April 20, 2017

( ) Buffalo, NY - Friday, April 21, 2017

**Checks:** Make payable to HalfMoon Education Inc.

**Credit Card:** *Mastercard, Visa, American Express, or Discover*

Credit Card Number: \_\_\_\_\_

Expiration Date: \_\_\_\_\_ CVV2 Code: \_\_\_\_\_

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