

Agenda

Presented by Don Steeby

Geothermal Heat Pumps and Indoor Thermal Comfort

Understanding the refrigeration cycle
The effect of air flow and insulation
How comfort is measured
Understanding efficiency

Understanding Earth Loop Systems

Architecture of closed loop systems
• Horizontal ground loops
• Vertical ground loops
Applications for open loop systems
• Single well • Two-well systems
Evaluating topography
Measuring soil conductivity
Environments for ground-loop systems:
beneath yards, fields, parking lots, and buildings

Designing Geothermal Systems

Determining loop type
Making heat loss calculations
Sizing the unit
Sizing the loop
Alternate geothermal designs

Choosing System Components

Basic components of geothermal heat pump systems:
pump, compressor, heat exchanger
Forced air systems
Hydronic systems
Domestic hot water options

Evaluating the Benefits of Geothermal Systems

Incentives to use geothermal
Measuring performance
Calculating savings and cost
Environmental benefits
Tax credits, incentives and rebates

Geothermal Case Studies

Geothermal Heating and Cooling:
Technology and Applications
Livonia, MI - Thursday, September 12, 2019



HalfMoon Education Inc.
PO Box 278
Altoona, WI 54720-0278

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Learning Objectives

You'll be able to:

Understand the operation of ground-source heat pumps, and explore the factors that impact indoor thermal comfort.

Define the appropriate applications for open and closed loop systems.

Learn how to make heat loss calculations and how to size geothermal units and loops.

Evaluate basic system components and materials.

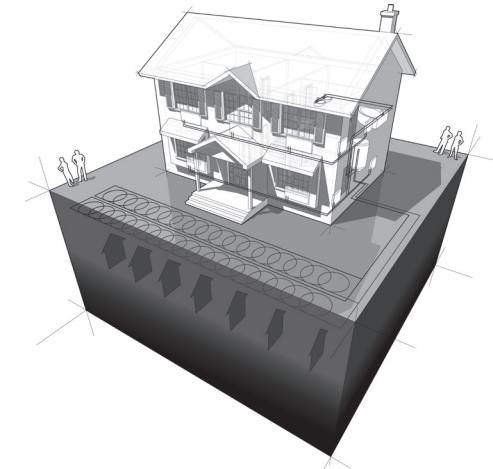
Measure the performance of a geothermal system, taking into consideration cost, savings, environmental benefits, and tax credits, incentives and rebates.

Apply what you have learned to real world case studies.



Geothermal Heating and Cooling: Technology and Applications

Livonia, MI - Thursday, September 12, 2019



Explore the components of indoor thermal comfort, and understand heating and cooling efficiency

Explore vertical and horizontal loop geothermal heating and cooling systems

Learn how to determine the loop type and how to size geothermal units and loops

Understand how to choose system components and materials

Discuss geothermal case studies

Continuing Education Credits

Professional Engineers

6.5 Continuing Ed. Hours

Architects

6.5 HSW CE Hours

6.5 AIA LU|HSW

Contractors

Non-Credit Continuing Ed.



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Faculty

Don Steeby is an associate professor of Heating, Air Conditioning and Refrigeration at Grand Rapids Community College and has taught full time with GRCC since 2007. He has also taught as an adjunct professor for Ferris State University in Construction Management. He received his bachelor of science degree in HVAC/R Applied Technology from Ferris State University, and his master's degree in Career and Technical Education also from Ferris State University.

Mr. Steeby has worked in the HVAC field since 1985. He has held positions in many areas of the industry including installation, service, sales, and project management. Mr. Steeby has worked for a local manufacturer of HVAC equipment for over five years, and he was employed by Honeywell for 11 years.

He holds a mechanical contractor's license with the State of Michigan, and he has several nationally-recognized certifications including installation and service of geothermal equipment with North American Technician Excellence (NATE). He is also a certified trainer and installer of geothermal heat pumps through the International Ground Source Heat Pump Association (IGSHPA). Mr. Steeby has been actively involved in the geothermal industry for many years including writing software to size loop links and working on several commercial geothermal installations. In 2011, he published his book *Alternative Energy – Sources and Systems* through Cengage Learning which includes chapters on geothermal systems.

Seminar Information

Livonia Marriott
17100 Laurel Park Drive North
Livonia, MI 48152
(734) 462-3100

Registration
8:00 - 8:30 am
Morning Session
8:30 am - 12:15 pm
Lunch (On your own)
12:15 - 1:15 pm
Afternoon Session
1:15 - 4:30 pm

Tuition

\$289 for individual registration
\$269 for three or more registrations.

Each registration includes a complimentary continental breakfast and printed seminar manual.

Receive a reduced tuition rate of \$101 by registering to be our on-site coordinator for the day. For availability and job description, please visit www.halfmoonseminars.org.

How to Register

- Visit us online at www.halfmoonseminars.org
- Mail-in or fax the attached form to 715-835-6066
- Call customer service at 715-835-5900

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 or the self-study package. You may also send another person to take your place.

Continuing Education Credit Information

This seminar is open to the public and offers 6.5 continuing education hours/PDHs to professional engineers and 6.5 HSW continuing education hours to architects in most states. Educators and courses are not subject to pre-approval in Michigan.

This course has been approved by the American Institute of Architects for 6.5 LU|HSW (Provider No. J885). Only full attendance can be reported to the AIA/CES. Visit www.halfmoonseminars.org to view complete AIA information under this course listing.

This seminar offers contractors a non-credit continuing education opportunity. It has not been approved by any state contractor licensing entity with a continuing education requirement.

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.

Additional Learning

Webinar Series

Shallow Foundations

- **Evaluating Building Sites**
Thurs., July 25, 2019, 11:00 AM - 12:30 PM CDT
- **Shallow Foundation Design**
Thurs., July 25, 2019, 1:00 - 2:30 PM CDT
- **Special Considerations in Foundation Design and Construction**
Fri., July 26, 2019, 11:00 AM - 12:30 PM CDT
- **Soil Improvement and Foundation Diagnosis and Repair**
Fri., July 26, 2019, 1:00 - 2:30 PM CDT

Foundation Damage and Repair

- **Science of Structures and Soils**
Tues., July 30, 2019, 11:00 AM - 12:30 PM CDT
- **Foundation Design and Construction**
Tues., July 30, 2019, 1:00 - 2:30 PM CDT
- **Diagnosing Foundation and Slab Damage and Evaluating Repair Methods**
Wed., July 31, 2019, 11:00 AM - 12:30 PM CDT
- **Diagnosing Basement Wall Damage and Evaluating Repair Methods**
Wed., July 31, 2019, 1:00 - 2:30 PM CDT

Off-grid Master Class

- **Off-grid Master Class, Part I**
Thurs., August 1, 2019, 11:00 AM - 2:15 PM CDT
- **Off-grid Master Class, Part II**
Fri., August 2, 2019, 11:00 AM - 2:15 PM CDT

Stormwater Infiltration

- **Infiltration and Soil: Water Science**
Thurs., August 8, 2019, 11:00 AM - 12:30 PM CDT
- **Infiltrating Stormwater and Maximizing Infiltration**
Thurs., August 8, 2019, 1:00 - 2:30 PM CDT
- **Improving Infiltration with Low Impact Development Techniques**
Fri., August 9, 2019, 11:00 AM - 12:30 PM CDT

For more information visit:
www.halfmoonseminars.org/webinars/

Can't Attend? Order the Manual and Audio from the Live Seminar as a Self-Study Package!

Audio recordings of this seminar are available for purchase starting at \$269. See registration panel for more information and please refer to specific state licensing rules or certification requirements to determine if this learning method is eligible for continuing education credit.

Registration

Geothermal Heating and Cooling: *Technology and Applications*

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How to Register		Registrant Information
Online: www.halfmoonseminars.org		Name: _____ Company/Firm: _____ Address: _____ City: _____ State: _____ Zip: _____ Occupation: _____ Email: _____ Phone: _____
Phone: 715-835-5900		Additional Registrants: Name: _____ Occupation: _____ Email: _____ Phone: _____
Fax: 715-835-6066	Code:	Name: _____ Occupation: _____ Email: _____ Phone: _____
Mail: HalfMoon Education Inc., PO Box 278, Altoona, WI 54720-0278		Name: _____ Occupation: _____ Email: _____ Phone: _____
Complete the entire form. Attach duplicates if necessary.		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 - **\$289.00**. Three or more registrants from the same company registering at the same time - **\$269.00** each.

() **I am not attending.** Please send me the self-study package:

- Downloadable MP3 Audio/PDF Manual for **\$269.00**.
- CD/Manual Package for **\$289.00**.

(Please allow four weeks from seminar date for delivery)

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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City: _____ State: _____ Zip: _____

Signature: _____

Email: _____