

# GEOHERMAL HEATING AND COOLING INNOVATIONS: DESIGN, FINANCING AND REGULATION

## WORKSHOP

**Location:** Holiday Inn St. Paul East  
2201 Burns Avenue, St. Paul, MN 55119-6667  
**Date:** Wednesday, September 11, 2013  
**Time:** 8:00am to 4:45pm

Convened by the:  
**American Ground Water Trust**  
Concord, NH  
501(c)(3) Education Organization



## SPONSORS



### In cooperation with:

International Ground Source Heat Pump Association  
Minnesota Geothermal Heat Pump Association  
Minnesota Groundwater Association  
Minnesota Water Well Association

### Continuing Education Credit

Architect Credits - 7.25 LUS (FOR HSW), AMERICAN INSTITUTE OF ARCHITECTS (PROVIDER G521)(COURSE # GS1308)  
MN Architects, Engineers and Geologists - 7.25 CEUs Available Through the Minnesota Board of AELSLAGID)(Self-certification)  
MN Licensed Well Contractors – 4.0 CEU credits through the MN Dept of Health  
WI Architects - 7.25 CEUs through AIA course approval above per WI Board of Safety and Professional Services guidelines  
WI Engineers - Up to 7.25 CEUs Available Through the WI Board of Safety and Professional Services (Self-certification)  
WI Licensed Well Contractors - 2.0 CEU credits through the WI Dept of Natural Resources  
IGSHPA Accredited Installers – 0.75 CEU's  
Call for details about other professions - 800-423-7748

### WHO SHOULD ATTEND?

This program is geared to potential end-users and to professionals who design, install, inspect, maintain, approve, recommend or regulate geothermal systems. Geothermal is the technology of choice among those considering "green energy" options for commercial or residential installations.

Energy company engineers, architects, planners & conservation commissioners, building code inspectors, environmental health professionals, home inspectors, water well contractors, HVAC professionals, real estate agents, home builders and developers, town officials (Conservation, Zoning, Planning), water testing specialists etc. should not miss this opportunity to get up to speed with this technology.

## WHAT IT IS ALL ABOUT

Geothermal heating and cooling technology is advancing rapidly as implementation becomes more wide-spread and accepted in the HVAC market. These systems are appropriate to virtually all types of space-conditioning applications, including, office buildings, schools, historic structures, low income housing, hospitals, and ice rinks to name a few examples. This workshop covers new innovations in system design, financing options and regulation that are lowering initial costs and increasing savings during operation.

### Workshop Objectives:

- Define the “state of the art” in terms of design options and economic payback
- Explain financing-entity ownership , tax-breaks, incentives and subsidies available for installing geothermal
- Demonstrate the environmental and strategic benefits of the technology
- Explain industry-accepted installation, operation and maintenance practices.
- Explain the importance of proper ground loop installation and groundwater protection
- Explain Net-Zero design and system integration principles
- Illustrate the environmental scalability of GHP HVAC systems to continuously reduce carbon footprint.
- Demonstrate the essential connection between subsurface conditions and system design and operation and how to get the right information
- Describe the special steps and importance of geothermal system commissioning
- Provide an update on state, local and federal regulatory oversight

The program draws on the experience & expertise of industry and agency professionals and will provide a unique opportunity for exchange of information among policy makers involved in energy issues and specialists involved with the design, construction and permitting of ground source geothermal systems for cooling and heating. Geothermal has the potential to become the technology of choice among those considering “green energy” options for commercial or residential installations. This one-day program is an incredible opportunity to learn from experienced professionals who are on the forefront of geothermal innovation. Geothermal will be coming to buildings near you!

# Program

**7:30am – 8:00 Registration (Coffee and Donuts)**

**8:00am – 8:35 Resource Sustainability and Geothermal Heating and Cooling Concepts**

**Garret Graaskamp, PG, AI**, Hydrogeologist, American Ground Water Trust, Concord, NH

- Water and Energy – The Sustainability Nexus
- Geothermal Heating and Cooling Fundamentals
- Installations to ensure Groundwater Protection

**8:35am – 9:15 Status of the Geothermal Industry**

**Doug Dougherty**, Executive Director, Geothermal Exchange Organization, Washington DC

- What is GEO?
  - The Geothermal Exchange Organization
- Geothermal Heat Pump Market Perspectives
  - National Overview • Residential / Commercial • Potential Drivers
- Market Barriers and Incentives for Geothermal Heat Pumps
- Legislative Efforts to Grow the Industry
  - GEO’s Work at the Federal and State Levels

**9:15am – 9:55 Financing Innovations for Geothermal Installations**

**David Neale**, VP of Marketing and Business Development, EnergyWise Partners LLC. Rochester, NY

- What is a GHP HVAC system financing-entity ownership model?
- System Leasing versus Thermal Purchase Agreements
- What type of energy monitoring is needed to document BTU usage?
- How does monitoring enhance system support and warranty?
- Can this model be retrofitted to existing installations?
- How does the financing-entity method work to increase GHP HVAC system sales?

**9:55am – 10:10 Networking Break**

**10:10am – 10:50 Geothermal System Optimization Using Computer-aided design**

**Dave Henrich**, Vice President, Thermal Dynamics, Inc., Maple Plain, MN

- Principles of Computer Design and project examples
- Is there a standard procedure that a designer should follow?
- Which system variables have the most impact (sensitivity analysis) on the design outcome?
- What are the advantages and possible pitfalls of using Computer-aided design software?
- How does a designer know if the computer output is the “best” design for the project?

**10:50am – 11:30 More than a “hole in the ground”- Drilling techniques - Logistics and Grout**

**Jeff Rustad**, Lead Account Representative, Baroid IDP, Princeton, MN

- Criteria for selecting a drilling contractor for geothermal projects
- Matching the drilling equipment and drilling methods to the geological and site conditions
- Geothermal Design – What geologic data is needed – what is not?
- Installing the vertical loop into the drilled bore – Do’s and Don’ts that cost money
- Grouting material properties and options for geothermal projects
- Techniques of grout placement to meet geothermal design specifications

**11:30am – 12:10 Designing with Variable Frequency Drive Compressor Geothermal Heat Pumps – Special Considerations**

**Jeff Petersen**, MN Regional Sales Manager, WaterFurnace International, Lino Lakes, MN

- How does a VFD compressor GHP work?
- VFD GHP Applications
- Loop design- Turbulent Flow- Is it still necessary?
- Can VFD GHPs reduce the size of a loop field?
- Conditioned Space Zoning Options and System Control Requirements

**12:10pm – 1:00 Lunch** (Provided on-site)

**1:00pm – 1:40 Hybrid systems - Innovative GHP/GHEX System Design**

**Kurt Krawczyk**, Regional Manager, ClimateMaster, Allen, TX

- Advantages of hybrid for summer and winter demands
- Costs and life-cycle benefits
- Tax incentives and cost benefits of hybrid systems
- Case study example of a 750 ton installation
- Design Comparison of GHPs v. Variable Speed compressor Air-to-Air HPs

**1:40pm – 2:20 Net-Zero Energy Building Design Principles**

**David Williams, PE, LEED-AP O+M**, Senior MEP Engineer and Sustainability Specialist, LHB, Inc., Duluth, MN

- How is Net-Zero defined: cost, emissions, site, source
- Why are GHPs the best HVAC system choice for a Net-Zero building?
- Design concepts that optimize Geothermal Heat Pumps with Solar Thermal and PV
- Energy Demand Reduction Strategies and Management Systems

**2:20pm – 3:00 Designing Geothermal HVAC Systems - Pump Energy Optimization Using Variable Frequency Drives**

**Mark Brengman, PE, LEED AP**, President/ Principal Engineer, Steen Engineering, Minneapolis, MN

- System Piping Arrangements – Do’s and Don’ts
- System Balancing and Important Decisions
- Equipment Selection – HVAC System Type and Integration
- Calculating energy savings using VFD pumps
- Energy Management System Controls - Interface and Operational Considerations

**3:00pm – 3:15 Networking Break**

**3:15pm – 3:55 Commissioning GHP Systems – Achieving Anticipated Performance**

**Mark Brengman, PE, LEED AP**, President/ Principal Engineer, Steen Engineering, Minneapolis, MN

- How is a GHP HVAC system “Commissioned?”
- Design and Installation Mistakes – Where do they hide?
- What observations and measurements cannot be overlooked?

**3:55 – 4:35 Monitoring Geothermal Systems**

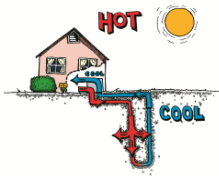
**Dave Henrich**, Vice President, Bergerson-Caswell, Inc., Maple Plain, MN

- The Geothermal HVAC system – The Value of System Assessment
- What’s important, and to whom?
- What is the difference between Monitoring and Metering?
- Performance Metrics – What should be measured?
- Case study example

**4:45 pm Wrap-up and Adjourn**

- Further Questions and CEU sign-out

**"Best one-day program on GEOTHERMAL"**



Another Education Program from:  
**American Ground Water Trust**  
 50 Pleasant Street (Suite 2)  
 Concord, NH 03301



# GEO THERMAL

Get CEUs

## Innovations: Design, Financing and Regulation

Wednesday, September 11, 2013 ~ Holiday Inn St. Paul East  
 2201 Burns Avenue, St. Paul, Minnesota

- ☞ VFD GHP COMPRESSER INNOVATIONS
- ☞ GEOTHERMAL COMMISSIONING METHODS
- ☞ NET-ZERO BUILDINGS - HOW TO GET THERE
- ☞ THERMAL PURCHASE AGREEMENTS & LOOP LEASING
- ☞ SYSTEM MONITORING & PERFORMANCE INTEGRATION

### GEOTHERMAL PROGRAM -- REGISTRATION FORM

Wednesday, September 11, 2013 ~ Holiday Inn St. Paul East, 2201 Burns Avenue, St. Paul, MN 55119-6667

- Registration (General)**[All walk-in registrations on event day \$225] **\$195**
- Registration for Special Members (see below)** **\$165**   
 (AGWT, MN Water Well Assoc., MN GeoHP Assoc., MN Groundwater Assoc.)
- Registration (Government- fed, state, local)** **\$165**
- Registration (Official Representatives of 501(c)(3) Organizations)** **\$165**
- Registration (Full-time Student) (ID required)** **\$ 90**
- CD of Presentations (\$50 for non-Registrants)** **\$ 20**
- Exhibit Table (does not include registration)** **\$200**

TOTAL \$ \_\_\_\_\_

**PAYMENT:**  Check [payable to: American Ground Water Trust]  
 AMEX  Visa  MasterCard  PO

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#### CANCELLATION POLICY

- Cancellations received in the AGWT office by 5 pm EST 5 days prior to event will receive a full refund less \$25.
- For cancellation 4-2 days prior to the there is a 50 % refund.
- Cancellations one day prior to the start of the event or on the day of the event are considered "No Shows" and no refund will be made - (substitutions gladly accepted).
- The Trust will not cancel a program because of bad weather conditions. Except that, as the result of an event cancellation resulting from, (but not limited to) circumstances such as a state mandatory evacuation or a fire at the program facility, the Trust will reschedule the event and honor registrations as payment for the new event.

#### SPONSORSHIP & EXHIBITS

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 Call 800 423-7748 or visit web-site

The **Holiday Inn – St. Paul East** is holding a limited number of rooms at a **special room rate of \$92 (single)** for attendees through August 30 under the "American Ground Water Trust" event. Call: 651-731-2220.