

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

## WORKSHOP

**Location:** Red Lion Hotel – SeaTac Airport  
18220 International Blvd, Seattle, WA 98188

**Date:** Wednesday, May 7, 2014

**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  
WaterFurnace International

### Continuing Education Credit

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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 the importance of proper ground loop installation and groundwater protection
- 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 issues

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**

**Ted Clutter**, Manager- Outreach and Member Services, 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 Utility and Alternative Financing of Geothermal Installations**

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

- Financing and Ownership models
- Exploiting GHP features within Financing Models
- Can these Models be used for Existing Installations?
- Conventional Utilities verses Grid Edge Renewable Electricity Sources
- GHP: Distributed Generation and Demand Management
- Metering Geothermal Systems at the Utility Grid Edge
- Best Practices for creating Third-party Geothermal Utilities

**9:55am – 10:05 Networking Break**

**10:05am – 10:45 Net-Zero Design Principles**

**Paul Bony**, Director of Residential Market Development, ClimateMaster, Montrose, CO

- 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

**10:45am – 11:25 More than a “hole in the ground”- Drilling techniques - Logistics and Grout**

**Kirby Donald**, Lead Account Representative, Baroid IDP, Castel Rock, WA

- 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

**11:25am – 12:05 GHP HVAC Design with Variable Frequency Drive Compressor Geothermal Heat Pumps – Special Considerations**

**Mike Springer**, Texas Territory Sales Manager, WaterFurnace International, Southlake, TX

- How does a VFD compressor GHP work?
- Loop design- Turbulent Flow- Is it still necessary?
- Can VFD GHPs reduce the size of a loop field?
- Duct Sizing and Layout Considerations- The old rules apply, but with new options
- How does the VFD GHP help to balance air flow?
- VFD GHP Application

**12:05am – 1:00 Lunch** (provided on site)

**1:00pm – 1:40 Geothermal System Optimization Using Computer-aided design**

**Dan Bernstein**, President , GAIA Geothermal, Mountain View, CA

- 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?

**1:40am – 2:20 Remediation of a Closed Loop Geothermal Field Using Open Loop Methods**

**Jay Egg, CMC**, President, Egg Geothermal, Tampa, FL

- Why geothermal loops fail? It is not what you think
  - Closed Loops and Open Loops
- Failed System Assessment
  - What data is needed
- Redesign Process – Making it work
- Blending the new loop with the old - What is required?
- Case Study: Sussex County, Delaware - Emergency Operations Center (EOC)

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

**Trey Austin III, PE, CGD**, President/ CEO, Research Engineer, Geo-Energy Services, LLC, Centennial, CO

- 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 Successful Integration of Geothermal Heat Pump HVAC Systems into Commercial Design-Build Projects**

**Trey Austin III, PE, CGD**, President/ CEO, Research Engineer, Geo-Energy Services, LLC, Centennial, CO

- How to assemble the D-B team – why is the mix important with GHP HVAC systems?
  - Credentialing and Experience – what does each bring to the process
  - Who should lead the team and why to avoid problems
  - What to look for in the sub-contractor members
- Field Testing prior to designing the internal and external geothermal systems
  - Why the perspective of the testing contractor is important
  - How to turn the cost of testing into Design/Build value.
  - Should the testing contractor be the installation contractor – Do’s and Don’ts
- Case Studies – Lessons learned in the field

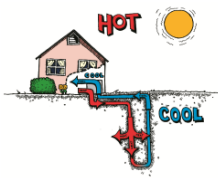
**3:55 – 4:35 pm The Good the Bad and the Ugly – What have we learned from 40 years of GHEX-HVAC projects?**

**John Geyer, CGD**, President, John Geyer & Associates, Inc, Vancouver, WA

- The myths of loop design
- Horizontal verses vertical loop installations
- Sizing geothermal heat pumps to meet conditioning loads
- Conditioned air distribution – Seven deadly sins
- Radiant / Hydronic systems – Storage and distribution issues
- What lies ahead?

**4:35pm – 4:45 Wrap-up and Adjourn**

**"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, May 7th, 2014, Red Lion Hotel – SeaTac Airport  
 18220 International Blvd, Seattle, WA 98188

- ☞ OPTIMIZING NZEB OPERATION AND THE ROLE OF GHPS
- ☞ HOW TO SUCCESSFULLY REMEDIATE A FAILING CLOSED LOOP
- ☞ THIRD PARTY LOOP OWNERSHIP OPTIONS TO REDUCE INITIAL COSTS
- ☞ SUCCESSFUL GHP HVAC SYSTEM DESIGN AND DESIGN-BUILD PROJECTS
- ☞ VFD COMPRESSOR GHP DESIGN OPTIONS TO INCREASE SYSTEM EFFICIENCIES
- ☞ VFD PUMP ENERGY OPTIMIZATION TO MEET SYSTEM PERFORMANCE DESIGN OBJECTIVES

### GEO THERMAL PROGRAM -- REGISTRATION FORM

Wednesday, May 7, 2014 -- Red Lion Hotel – SeaTac Airport, 18220 International Blvd, Seattle, WA 98188

Registration (General)	\$195	<input type="checkbox"/>
Registration (AGWT Members)	\$165	<input type="checkbox"/>
Registration (Government- federal, state, local)	\$165	<input type="checkbox"/>
Registration (Official Representatives of 501(c)(3) Organizations)	\$165	<input type="checkbox"/>
Registration (Full-time Student; ID required)	\$ 90	<input type="checkbox"/>
CD of Presentations (\$75 for non-Registrants)	\$ 30	<input type="checkbox"/>
Exhibit Table (does not include registration)	\$ 200	<input type="checkbox"/>

[Walk-in registration (on day of event) \$225]

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

PAYMENT:  Check [payable to: American Ground Water Trust]  
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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 Red Lion Hotel is holding a limited number of rooms at a special room rate of \$109 for attendees through April 22 under the "American Ground Water Trust" event. Call: 206-246-5535.

Return by mail: American Ground Water Trust, 50 Pleasant Street, Concord, NH 03301

Return by fax: (603) 228-6557 Call to register (800) 423-7748 Register on line <http://www.agwt.org/events>