

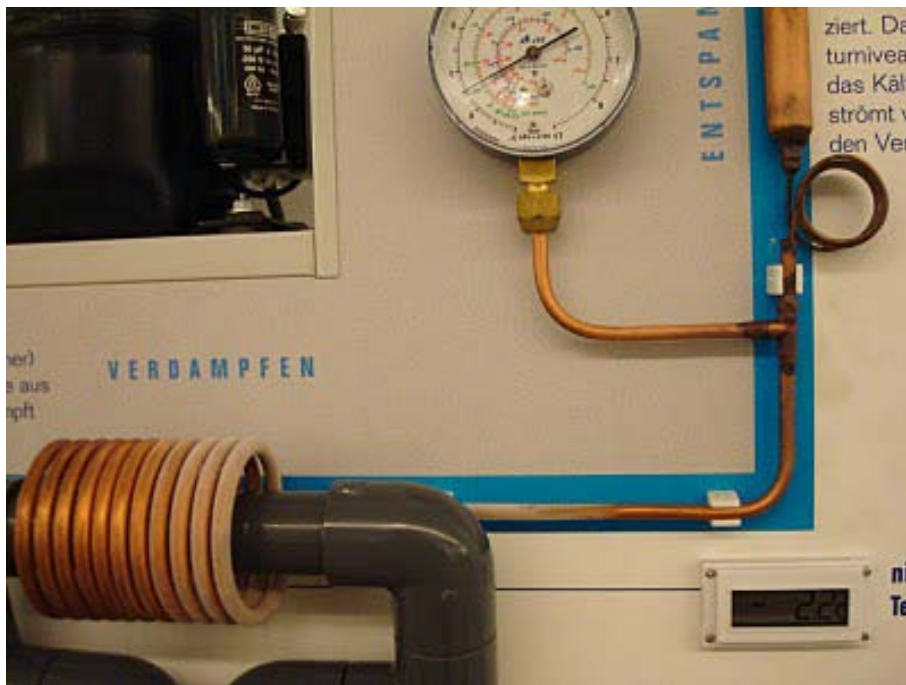


Geothermal Academy: Focus Center for Data Collection, Analysis, and Dissemination

May 18, 2010

Principal Investigator
Dr. Masami Nakagawa
Colorado School of Mines

Ground Source Heat Pumps – Data Gathering
and Analysis



Geothermal Academy: Focus Center for Data Collection, Analysis, and Dissemination

**Dr. Masami Nakagawa – Principal Investigator
Colorado School of Mines**

Project Timeline

- January 29, 2010 – January 28, 2011
- Estimated Completion: 20%

Project Budget

- Total project funding: \$336,877 (FY10)
- DOE share: \$245,797
- Awardee share: \$91,080

Barriers Addressed

- Lack of the availability of objective, relevant data to support consumers in decision-making and policy-makers who regulate the use of GSHPs

Partners: None

- Geothermal heat pumps have the potential to produce tremendous economic, environmental, and social benefits, but are not yet widely used.
- Oak Ridge National Lab reports that the technology critically suffers from a lack of “independent, statistically valid, hard data on the costs and benefits of GHPs.”
- Lack of good data produces several deployment challenges:
 - Individual home/building-owner uncertainty
 - Electrical cooperative uncertainty
 - PUC unwilling to use regulatory discretion in absence of adequate record
 - Poor quality control in GHP industry

- Overcoming these challenges requires the provision of objective, relevant data to consumers, designers/installers, and policy makers who regulate the use of GHPs.
 - Integrated resource planning considerations
 - Higher rates of return for GHP base rate investments
 - Requirements for IOUs regarding adoption of “loop tariff structures” (may require legislative action in some states).
- The stronger the evidence, the stronger the policy. A policy backed by weak data is easily challenged by entrenched utilities in hearings and (later) in court as lacking an adequate factual basis.
- Such data can have additional incidental benefits with respect to:
 - The GHP industry
 - Rural Electric Cooperatives
 - Individual home/building owners

- Our objective is to develop a sufficiently robust data collection and analysis framework to:
 - Accommodate many different kinds of GHP systems and environments.
 - Adequately capture economic, ecological, and socio-economic benefits of GHP systems in “policy-level” metrics according to a “triple bottom line” framework.
 - Provide policymakers with greater understanding of GHPs, to spur pro-GHP policy development.
 - Provide the GHP industry with objective benchmarking information to improve technologies and practices industry-wide.

- ✓ Project Formation & Start-Up
 - Form project steering committee comprised of GHP industry, academic, and engineering experts
 - Identify relevant experts and stakeholders for inclusion in working groups, preliminary research
- Framework Requirements Definition
 - ✓ 2-day conference
 - Working groups for economic, environmental, and socio-economic performance metrics development
 - Participants: Industry, academic experts, policy/de-facto policy makers, building designers, developers, community reps, etc.
 - Expected Output : Preliminary analysis goals and data collection requirements
 - Additional focused working groups/sessions for detailed requirement development (based on preliminary requirements)

- Framework Analysis and Design
 - Integrate working group results into coherent data collection and analysis frameworks.
- Data Collection and Framework Testing
 - Test frameworks on existing GHP projects, using sensitivity analysis to refine models.
- Platform and Process Design
 - Determine requirements and necessary actions to incorporate frameworks in actual database and delivery system (possible future work).
- Project Report Development and Dissemination
 - Final report containing finalized data collection and analysis framework.
 - Meta-critique of finalized framework.

Project Steering Committee

- Ambient Energy Consultants – Consultants to Colorado Governor's Energy Office on High Performance Building Program
- Paul Bony – Director of Residential Market Development, ClimateMaster
- John Kelly – Executive Director, Geothermal Heat Pump Consortium
- Paul Leef – Director of Planning, Design and Construction, CU-Boulder
- John Lund – Director of Geo-Heat Center, Oregon Institute of Technology
- Jack Major – President of Major Geothermal
- John McCartney – Assistant Professor, Dept. of Civil, Environmental, and Architectural Engineering, CU-Boulder
- Tom Williams – NREL Laboratory Program Manager for Geothermal Technologies

Project Team Leads

- Adam Reed – Project Technical Lead; Research Fellow and Attorney at Center for Energy and Environmental Security, CU-Boulder
- Joanne Schlafer – Project Manager; Principal, Certified Green Consulting

2-Day Requirements Summit Conducted

- National attendance with diverse representation, including:
 - National Geothermal Exchange Organization, Environmental Protection Agency, Oak Ridge National Laboratory, National Renewable Energy Laboratory, Colorado Governor's Energy Office, Colorado Public Utilities Commission, Colorado GEO Energy Association, Habitat for Humanity, Southwest Energy Efficiency Project
 - Prominent installers, drillers, architects, mechanical engineers, developers, community representatives
- Working sessions focused on triple bottom-line perspectives
 - MicroEconomic: e.g. cost-savings, payback/return
 - Environmental: e.g. environmental benefits, greenhouse gas emissions
 - SocioEconomic: e.g. customer satisfaction, community economic growth
- Preliminary set of analysis goals and data collection requirements gathered from each session
- Team is currently refining and consolidating results, which will be documented in Preliminary Requirements Document

Project Management/Coordination

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Project Formation & Start-Up	*1		*2										
Framework Requirements Definition				*3		*4	*8						
Framework Analysis & Design							*6	*9	*10				
Data Collection and Framework Testing						*5	*7			*11			
Process & Platform Design										*12			
Final Report Development & Dissemination												*13	*14

Key Milestones

1. 01/19/2010 - Steering Committee Kick-Off Meeting	8. 07/30/2010 - Version 1 Requirements Document
2. 03/12/2010 - Key stakeholders/subject-matter experts identified	9. wk of 08/09/2010 - Omnibus Design Review
3. 04/15-04/16/2010 - Requirements Summit Meeting	10. 09/30/2010 - Version 1 Design Document
4. 06/04/2010 - Preliminary Requirements Document	11. wk of 10/25/2010 - Omnibus Review of Test Results
5. 06/30/2010 - GHP projects identified	12. 10/29/2010 - Platform Recommendation Document
6. 07/02/2010 - Preliminary Design Document	13. wk of 12/06/2010 - Preliminary Report Review
7. 07/09/2010 - Testing Plan in place	14. wk of 01/03/2010 - Final Report in Publication

- The design of the data collection and analysis framework will be completed and made available for implementation in a database system.
- The implemented system will be able to collect data from a wide variety of GHP systems across the US and Europe.
- Once sufficient data is collected, it will be aggregated into objective statistics on the performance of GHP systems and made available to policy-makers for use in controlling energy consumption and greenhouse gas emissions attributable to the building sector.
- Analytical tools and statistics will also benefit end-consumers, designers and installers.

- A very successful “Requirements Summit” was delivered, with broad stakeholder representation.
- The summit results are being compiled and finalized in a Requirements Document, which will become the basis of the design for the data collection and analysis framework.
- The project is on schedule.
- We have a strong steering team that is providing ongoing guidance and critical review.

Supplemental Slides

What is a “Policy-level” Metric?

