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WISCONSIN STATE LEGISLATURE ... PUBLIC HEARING - COMMITTEE RECORDS

2011-12

(session year)

Assembly

(Assembly, Senate or Joint)

Committee on Natural Resources...

COMMITTEE NOTICES ...

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INFORMATION COLLECTED BY COMMITTEE FOR AND AGAINST PROPOSAL

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 - (**ab** = Assembly Bill) (**ar** = Assembly Resolution) (**ajr** = Assembly Joint Resolution)
 - (**sb** = Senate Bill) (**sr** = Senate Resolution) (**sjr** = Senate Joint Resolution)
- Miscellaneous ... **Misc**

* Contents organized for archiving by: Stefanie Rose (LRB) (August 2013)

Raymond List

CEO
Enlink
July 24, 2009

Introductory Questions

In order to better understand your perspective, I'd like you to describe your area of expertise in the Ground Source Heat Pump (GSHP) Industry. Specifically, what is your role/title today?

I am President and CEO of Enlink, we are an engineering and contracting firm. We built the two biggest projects in California within the last year.

What is your current responsibility and authority regarding GSHPs?

How long have you worked in this, or a closely related field?

I've been in this business for 1.5 years.

Industry Branding

What terminology do you use to describe the industry/your product and why is that your preference?

They use geothermal heat pumps (GHP)

In your experience, do industry participants and consumers use the same terminology when referring to this industry?

There is a major lack of understanding by end users and engineers. The name is just a symptom of a bigger problem.

And within the industry, do you find GSHP industry vernacular to be consistent? If not, is this a problem for the industry in terms of building market adoption?

What terminology do you think would be most appropriate for this industry and why?

How important is standardized nomenclature across all segments of the industry and how could the industry achieve it?

You can call the technology whatever you want but you have to have an underlying understanding of what it is/value of technology.

Industry leaders' perspective on consumer decision-making

Would you describe public awareness of GSHP to be high, low or about where you'd expect it to be given the industry's maturity? Why?

Low – there is a lack of understanding and no grasp of the bigger picture. There is also a lack of leadership in the industry compared to the solar industry. Solar has been big time, out in front for years. It will take a major transfusion to get this going for the GSHP industry.

What do you think are the three most important messages to communicate about GSHP in order to generate positive public sentiment for GSHP systems?

- 1) *Value (economic, environmental, cultural) – it is fundamentally undervalued in the eyes of potential end-users.*

How have your customers become aware of GSHPs/learn of your product?

The way it's being introduced in CA is by opinion leaders. In other places, now it is word of mouth.

What do you think the primary motivation was for consumers who purchased GSHP systems?

Value and a willingness to look at lifecycle costs.

Have you observed any similarities in consumer demographics?

The similarities are: opinion leaders, engineers, architects, people who are willing to look at value.

If you were the head of an industry association, what would you do to increase public awareness of GSHP technology?

I would do everything I could to get geothermal heat pumps into the same place that solar is now. If GHP became eligible for solar incentives – it would create artificial value because it would drop the initial capital cost immediately. It's all about value and economics and that can be fixed.

What are some suggestions that you have to better inform consumers of this industry?

Same answer. The value proposition has to be understood. We need to make it more valuable in the short term by getting incentives to drop the initial cost.

Adoption of Ground Source Heat Pump Technology

As with any industry, there may be certain barriers that interfere with the market adoption of products and services. I'd like to ask you about your perception of barriers, if any, in relation to regulations, awareness and project economics for GSHP.

For both residential and commercial GSHP applications, what barriers, if any, have you encountered because of regulations – both state and local?

Utility incentives. When you look at what's going underground and the life of that, it looks like it ought to belong to a utility rather than a particular owner. It brings up the whole question of what role utilities should be playing in subsidizing or owning, or feed-in-rates.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for residential applications?

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for commercial applications?

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe manufacturers/deliverers of GSHP systems are experiencing?

Technology for in-building stuff is very straightforward. There are 5 manufactures that essentially build the same thing.

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe consumers are encountering?

First cost.

Do you believe that GSHP systems are priced too high, too low, or just right?

When compared to traditional HVAC systems, do you think GSHP systems are priced too high, too low, or just right?

When compared to other alternative energy solutions, do you think GSHP systems are priced too high, too low, or just right?

For both commercial and residential applications, are there other issues besides cost that are a factor in the adoption of GSHP?

(If needed probe for: time, space, and permitting)

The industry is like the wild west – there's no real good standards and the standards that do exist aren't enforced. When you look at the quality of the companies and individuals it is 3rd class on average. There is a lack of professionalism, discipline, and standards. It desperately needs standards, discipline, certifications. There should be further development of certification standards.

How would you characterize the size and growth of the GSHP industry, why, and what would need to happen in order to spur greater growth in this industry?

The industry's size in California is miniscule compared to what it could and should be.

The economic situation has damaged growth, everyone has slowed down. In order to spur growth we need to get the value proposition right and get industry leadership.

Drilling

Would you agree with the statement, "Drilling is the single largest cost component of GSHP systems?" How important do you think it is to reduce the cost of drilling? Do you have any suggestions as to how to reduce drilling costs?

Drilling is probably half of the cost. Everything underground is about half the total cost in general (this is a broader definition than drilling alone).

Do you agree with the statement, "The GSHP industry currently faces a shortage of drillers,"? What changes need to be made in order to attract and retain more drillers to the GSHP industry?

I don't think this is true in California although there is a lack of qualified drillers.

Does the drilling technology currently available meet GSHP industry needs or is there a wish list you have for how the technology could be improved?

How would you characterize the permitting process for the drilling required for GSHP systems? If you are dissatisfied with the process, what suggestions do you have as to how the permitting process could be improved?

Immature. For example for a big project with 500 boreholes, the municipality cannot decide who has jurisdiction then they decide it is the health dU.S. EPartment. They are not sure if they are going to issue one permit or 500 permits @ \$800 per permit. The whole process of licensing geothermal installers and drillers in CA is much behind a lot of other states.

Is there any other information you would like to share about the GSHP industry, or topic that I did not touch upon that would be useful to this survey?

Dave Bisbee, CEM
Project Manager
Customer Advanced Technologies Program, SMUD

August 27, 2009

Introductory Questions

In order to better understand your perspective, I'd like you to describe your area of expertise in the Ground Source Heat Pump (GSHP) Industry. Specifically, what is your role/title today? Tell me a little bit about your involvement or experience with the GSHP industry?

I manage an emerging technologies program we try to test technologies in the field to see if they fit for them. We provide research grants to customers in exchange for the right to monitor the technology.

What is your current responsibility and authority regarding GSHPs?

How long have you worked on GSHP issues?

I came in right as they were winding down the geothermal heat pumps, circa 2001. SMUD had provided subsidies via research grants to test geothermal systems – they did about 200 of them, most with the Sacramento Housing Redevelopment Agency (SHRA). SHRA had a problem with disappearing air conditioning units, people were stealing them, and geothermal units were installed because they could not be stolen.

How would you characterize SMUD's interest in GSHP technology?

SMUD doesn't have much interest in this technology. It doesn't seem to make sense in our climate and the cost can be prohibitive. I personally do not think that the tax credit will have an impact.

Industry Branding

What terminology does SMUD use to describe the industry and why?

Depends on who you talk to. Water source, heat pumps, geothermal, ground source.

In your experience, do industry participants and consumers use the same terminology when referring to this industry?

There is consistency, ground source or geothermal.

And within the industry, do you find GSHP industry vernacular to be consistent? If not, is this a problem for the industry in terms of building market adoption?

What terminology do you think would be most appropriate for this industry and why?

Ground Source Heat Pumps - it is the clearest. Geothermal strikes up the idea of geothermal power plants.

How important is standardized nomenclature across all segments of the industry and how could the industry achieve it?

I don't perceive this as a big problem. The industry should form a committee and agree upon nomenclature and certain standards. They need to get together. More important than nomenclature would be agreeing on rating systems and how to communicate efficiencies.

Industry leaders' perspective on consumer decision-making

Would you describe public awareness of GSHP to be high, low or about where you'd expect it to be given the industry's maturity? Why?

Low - there's relatively few contractors that offer it. Contractors seem to be the number one way that technologies are communicated at the customer level. Usually when a call comes into me it's because a contractor has told them about it.

What do you think are the three most important messages to communicate about GSHP in order to generate positive public sentiment for GSHP systems?

- 1) *Cost Effective - it always comes down to the money.*
- 2) *Reliability - heat pumps have a lot of moving parts when those parts are (compressor) are operating year round there's a lot more to go wrong.*
- 3) *Environmentally friendly*

How have your customers become aware of GSHPs/learn of your product?

- *Contractors.*
- *Utility company was the one who suggested they look at it because of their circumstances.*

What do you think the primary motivation was for consumers who purchased GSHP systems?

Again, cost effectiveness and reliability.

Have you observed any similarities in consumer demographics?

They are technically savvy people. The ones who actually do something tend to be engineering types. Not your average consumer.

If you were the head of an industry association, what would you do to increase public awareness of GSHP technology?

I would nail down the issue of the ground loops better – in terms of cost effectiveness. Then focus on geographic areas that make sense for your market, don't try to reach everyone. Also take into consideration that a 10-year payback is usually the max that people will consider. Most people move before the payback period.

What are some suggestions that you have to better inform consumers of this industry?

Figure out where it makes sense to do business and partner with progressive utilities to hold seminars and workshops. SMUD has an energy & technology center and they have classes. They would probably not do a geothermal because it does not make sense for their service territory. Another way would be to work with the contracting community to get additional contractors on board to be at the home and garden shows.

Adoption of Ground Source Heat Pump Technology

As with any industry, there may be certain barriers that interfere with the market adoption of products and services. I'd like to ask you about your perception of barriers, if any, in relation to regulations, awareness and project economics for GSHP.

For both residential and commercial GSHP applications, what barriers, if any, have you encountered because of regulations – both state and local?

Drilling is an issue, another is geography. Well drillers may change their prices once a project starts due to unexpected soil conditions. Costs are highly variable.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for residential applications?

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for commercial applications?

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe manufacturers/deliverers of GSHP systems are experiencing?

There is a general lack of contractors and market share. You don't want to waste a lot of time on applications in areas that don't make sense so you need to be surgical with your efforts.

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe consumers are encountering?

Engineering costs. A significant amount of engineering needs to go into this vs. "normal" systems, such as where to site the system (especially in a retrofit situation). It begs the question do you align with well drilling and train them for what you need or do you have your own company? Part of what he saw was well drillers not quite sure what you want and padding bids.

Do you believe that GSHP systems are priced too high, too low, or just right?

I think GSHP systems are priced too high and I would like to know why. It would be helpful for the industry to look at that and figure out where they can do better. The industry should look at ways to optimize the process, standardization so you can minimize the customization of each project.

When compared to traditional HVAC systems, do you think GSHP systems are priced too high, too low, or just right?

Too high

When compared to other alternative energy solutions, do you think GSHP systems are priced too high, too low, or just right?

Too high for residential, too high for small commercial, large commercial it depends on the alternatives.

For both commercial and residential applications, are there other issues besides cost that are a factor in the adoption of GSHP?

(If needed probe for: time, space, and permitting)

Yes, the reliability can be a scary thing.

How would you characterize the size and growth of the GSHP industry, why, and what would need to happen in order to spur greater growth in this industry?

From my perspective the industry is stagnant. The core issues have never really been solved – cost effectiveness and reliability.

Drilling

Would you agree with the statement, "Drilling is the single largest cost component of GSHP systems?" How important do you think it is to reduce the cost of drilling? Do you have any suggestions as to how to reduce drilling costs?

Drilling & loop installation – yes. Some projects will give a rough estimate and have contingencies in case they run into problems, and these tend to be deal-busters. Ultimately it comes down to a knowledge of local geology. If the drillers are experienced they will know what they are dealing with.

Do you agree with the statement, "The GSHP industry currently faces a shortage of drillers,?" What changes need to be made in order to attract and retain more drillers to the GSHP industry?

Yes. There needs to be more partnerships with well companies, and the development of independent drillers for multiple companies. Again it comes down to educating and working with the well drillers on making more of an exact science.

Does the drilling technology currently available meet GSHP industry needs or is there a wish list you have for how the technology could be improved?

There could be an improvement in the sharing of information about local geologic conditions. This would give a better understanding of what the local conditions are for various communities, as well as what the options are. An industry association could create and maintain this.

How would you characterize the permitting process for the drilling required for GSHP systems? If you are dissatisfied with the process, what suggestions do you have as to how the permitting process could be improved?

It is one added step. If the project is anything other than the normal stuff – it takes a lot more handholding with local building inspectors. This is a general comment for geothermal and other projects.

Is there any other information you would like to share about the GSHP industry, or topic that I did not touch upon that would be useful to this survey?

I would urge the industry to look at what is cost effective. Figure out where you are cost effective and go after it, don't waste time competing with a standard technology where you don't stand a chance.

Matt Ebejer
Vice President-Health Care, Syska & Hennessy Group, Inc

September 30, 2009

Introductory Questions

In order to better understand your perspective, I'd like you to describe your area of expertise in the Ground Source Heat Pump (GSHP) Industry. Specifically, what is your role/title today?

I am a consulting engineer, I design systems in the field. I currently run a health care group in Los Angeles.

What is your current responsibility and authority regarding GSHPs?

I am a Designer/Specifier.

How long have you worked in this, or a closely related field?

I've worked in this field since 1981.

Industry Branding

What terminology do you use to describe the industry/your product and why is that your preference?

I normally call it geothermal but it depends on the audience. I also use the terms ground source and ground coupled. People seem to be leaning towards ground coupled, but this term leads to closed systems. In some areas of the country we do open systems so Ground Coupled limits the discussion.

In your experience, do industry participants and consumers use the same terminology when referring to this industry?

Everyone calls it a million different things.

And within the industry, do you find GSHP industry vernacular to be consistent? If not, is this a problem for the industry in terms of building market adoption?

What terminology do you think would be most appropriate for this industry and why?

How important is standardized nomenclature across all segments of the industry and how could the industry achieve it?

I don't think that it is a hindrance. I also design buildings and there isn't standard nomenclature within that industry, it differs from the east to west coast.

Industry leaders' perspective on consumer decision-making

Would you describe public awareness of GSHP to be high, low or about where you'd expect it to be given the industry's maturity? Why?

I think it's extremely low. I was doing pump and dump systems and pond systems in the early 80s and I don't consider this a new technology. Part of the problem hindering the industry is that people think that using geothermal is new and it is not. The oldest project in US is in Chicago and it is about 100 years old; Frank Lloyd Wright's Falling Water is geothermal with stream running through the home.

What do you think are the three most important messages to communicate about GSHP in order to generate positive public sentiment for GSHP systems?

- 1) *It is the greenest of all technologies – PV isn't very green, the gas that is released during the manufacturing process will kill you. Also, what do you do with the panels afterwards?*
- 2) *Reliability – It has the greatest reliability compared to conventional system. Furthermore, eliminating cooling towers could save billions of gallons of water a year.*
- 3) *Energy Savings*
- 4) *Lack of noise generation*
- 5) *Lifecycle savings*

How have your customers become aware of GSHPs/learn of your product?

Usually I tell them about it, or Craig at the CEC refers people to him. Generally it is through referrals.

What do you think the primary motivation was for consumers who purchased GSHP systems?

Reliability and overall cost of operation.

Have you observed any similarities in consumer demographics?

I haven't noticed anything like that. They are looking for the reliability as well as comfort and noise reduction. On the commercial side, they are tired of the maintenance staff they have to have on hand for conventional systems. If you can eliminate your boilers you can also eliminate the 5 operators needed to operate it.

If you were the head of an industry association, what would you do to increase public awareness of GSHP technology?

A lot of this work needs to start within. I don't think ASHRE stands behind the technology and promotes it and this is a major problem. In addition, the government right now is pushing PV and wind turbines and they never say anything about GSHP. Even the tax breaks favor the other technologies over GSHP. There need to be comparative tax credits for PV and GSHPs.

What are some suggestions that you have to better inform consumers of this industry?

The things I mentioned in the previous question need to occur first.

Adoption of Ground Source Heat Pump Technology

As with any industry, there may be certain barriers that interfere with the market adoption of products and services. I'd like to ask you about your perception of barriers, if any, in relation to regulations, awareness and project economics for GSHP.

For both residential and commercial GSHP applications, what barriers, if any, have you encountered because of regulations – both state and local?

There are ridiculous permitting fees from local municipalities. I just moved out to CA a year and a half ago and I'm not sure why the drilling costs out here exceed any other state – it makes no sense. Here drilling costs \$15/20 a foot vs. \$6/8 a foot other places. Maybe there is a lack of drillers in California. Based on a few projects I'm working on – available drillers are not there and you have to bring them in from Montana and pay for them to stay in hotels.

Also, when you do projects, you have to prove to cities/counties what you are doing. The dU.S. EPArments need to be educated as to what this stuff really is – the first thing they do is say no.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for residential applications?

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for commercial applications?

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe manufacturers/deliverers of GSHP systems are experiencing?

Again – the drillers.

Another barrier is the income tax in California – businesses have to fork out the income tax to the state, that's hurting them.

Incentives from utilities – other places offer a reduced rate for GSHPs, here that does not exist. They don't have these incentives even though it reduces load on the grid.

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe consumers are encountering?

Financing. I am able to bridge some financing gaps by finding outside funding but most people aren't able to. I've worked with cities where we created utility service districts so that people could get low interest loans. The city would put the infrastructure in and people would pay the city. Sandusky, Ohio – created a redevelopment district, it would create 50,000 jobs in 10 years.

Lake Tempe, AZ

Do you believe that GSHP systems are priced too high, too low, or just right?

Horizontal systems don't work on commercial buildings.

Land is a premium so it is hard to get enough room for a horizontal system. There's quite a few jobs out there that have been bad jobs – engineers say they know what they are doing but they do not. Furthermore, it is hard to s.U.S. EPA rate the drilling from the system! Much of the cost revolves around the drilling. It's very expensive but it still pays back in California due to the high costs of electricity here.

When compared to traditional HVAC systems, do you think GSHP systems are priced too high, too low, or just right?

When compared to other alternative energy solutions, do you think GSHP systems are priced too high, too low, or just right?

The economics doesn't work for PV that's why they give a 30% tax credit.

Even with the high price, GSHP projects have payback of 2 -7 years.

For both commercial and residential applications, are there other issues besides cost that are a factor in the adoption of GSHP?

(If needed probe for: time, space, and permitting)

Space and the geology of the ground because that effects the efficiency. There are a lot of issues that can be addressed by using ponds. If you have very little land, a little pond or fountain can do wonders. You can use your swimming pool can heat and cool your house no problem. I'm working on a project where it will take 9 acres of field to accomplish what a 1-acre pond can do for a ¼ of the cost.

How would you characterize the size and growth of the GSHP industry, why, and what would need to happen in order to spur greater growth in this industry?

In California the industry is not very big – compared to other states it is a fraction of other states. California compared to MI, probably has 1/10 of the projects that Michigan has going on. California probably has 1% of projects going on in Nebraska. If there are 5-6 projects going on at a time, that's a lot.

In order for the industry to grow, drilling prices and awareness/education, and the state coming out and doing programs and tell people about it are the main components. Even with drilling costs where they are at, it discourages the industry but the technology still pays back.

Those that even do it here, they get a job – but they're not really pushing it. Geothermal is not just about energy savings, it's about lifecycle costs (replacement, maintenance, water savings). Not enough people know how to do it.

Drilling

Would you agree with the statement, "Drilling is the single largest cost component of GSHP systems?" How important do you think it is to reduce the cost of drilling? Do you have any suggestions as to how to reduce drilling costs?

Yes. But I don't know how you drive drilling costs down.

Do you agree with the statement, "The GSHP industry currently faces a shortage of drillers,"? What changes need to be made in order to attract and retain more drillers to the GSHP industry?

Does the drilling technology currently available meet GSHP industry needs or is there a wish list you have for how the technology could be improved?

How would you characterize the permitting process for the drilling required for GSHP systems? If you are dissatisfied with the process, what suggestions do you have as to how the permitting process could be improved?

Counties are like little fiefdoms – no one has authority. In a place like Michigan, the state can override the counties but here that is not the case.

Is there any other information you would like to share about the GSHP industry, or topic that I did not touch upon that would be useful to this survey?

Drilling costs are a lot different here in California. We need to shift from PV and wind and realize that there's another thing out there that is more energy efficient.

Phil Henry

Consultant

October 2, 2009

Introductory Questions

In order to better understand your perspective, I'd like you to describe your area of expertise in the Ground Source Heat Pump (GSHP) Industry. Specifically, what is your role/title today?

I've been active within the industry for about 10 years. I started as an engineer with a mechanical contractor firm and then went to a position working as a territory manager with WaterFurnace covering the western U.S. including California. Most recently, I left WaterFurnace to represent a start up manufacturer and in the last few months I've been doing consulting and web-based work within the industry.

What is your current responsibility and authority regarding GSHPs?

[See above]

How long have you worked in this, or a closely related field?

[See above]

Industry Branding

What terminology do you use to describe the industry/your product and why is that your preference?

I use all of the terms depending on the conversation and who I am talking with. If I'm speaking with an engineer and he's talking about the nitty gritty – then I use the term ground coupled heat pump. The most common term is geothermal heat pump or geoexchange.

My preference is to use geoexchange. Part of what I've been doing the past few years is developing the Geothermal Heat Pump Consortium's (GHPC) website and as I've done that I've used the terms geoexchange and geothermal interchangeably to increase search indexing. Just a few days ago as the GHPC Director John Kelly and I were sorting out the directory, we decided to make a switch and use geoexchange exclusively and move to do that site-wide. The sites are indexing so well that the GHPC needs to take a leadership role and move to geoexchange. The federal government is also starting to use geoexchange – although geothermal is in the documents.

In your experience, do industry participants and consumers use the same terminology when referring to this industry?

No.

And within the industry, do you find GSHP industry vernacular to be consistent? If not, is this a problem for the industry in terms of building market adoption?

It is not consistent. Overall, this does limit the industry and the industry has done a poor job of providing a common front e.g. having multiple terms to refer to the same technology. Commercial reps work predominately with engineers and that consumer has a different level of sophistication. On the open consumer side, it's mostly contractors and dealers and they typically call it geothermal.

What terminology do you think would be most appropriate for this industry and why?

How important is standardized nomenclature across all segments of the industry and how could the industry achieve it?

One way is for the association/organizations in a leadership role (like IGSHPA and GHPC) to adopt a term and then use that term throughout their marketing programs. If IGSHPA and GHPC use the terms geoexchange instead of ground source that would be a help. It would also be very helpful if the manufacturers referred to it as geoexchange. Similarly one-way to accelerate the change is the continued use of geoexchange instead of geothermal in government documentation.

Industry leaders' perspective on consumer decision-making

Would you describe public awareness of GSHP to be high, low or about where you'd expect it to be given the industry's maturity? Why?

In California – low. Its where I'd expect it to be for the industry in CA – it's off the bottom of the chart compared to where it could be/should be. As an industry we've done an abysmal job of promoting the industry in this state. Given the size of California's economy and the overall opportunity, it amazes me that there hasn't been more of a concerted effort in the state. With that said I understand that you go for the low hanging fruit and California has some challenges – its moderate climate being one. That's part of the reason the uptake has been a bit slower.

What do you think are the three most important messages to communicate about GSHP in order to generate positive public sentiment for GSHP systems?

- 1) *The technology is the most efficient way to actively heat and cool any building anywhere on the planet. It is available and has been around for a long time (20-30 years) – it is a mature technology.*
- 2) *Demand side reductions should be our focus in terms of energy usage in our state as opposed to supply side management. That will run afoul of the solar stuff. GSHP offers permanent demand side reduction without lifestyle change.*
- 3) *This is your best solution if you are heating and cooling. If you are interested in being part of the solution to our state becoming sustainable then there's no greater area for you to impact your energy consumption. 60% of energy goes into heating and cooling in a building.*

How have your customers become aware of GSHPs/learn of your product?

The geo consumer is a different animal; part of this is due to sustainability/green component and the other is the large expense. The overall sales process for geo is quite long term – months up to years. There's quite a bit of research that that consumer does. Direct interaction between contractors and the consumer is how many people find out about the technology. I'm a huge advocate of home shows. They work.

What do you think the primary motivation was for consumers who purchased GSHP systems?

If you're talking about the residential consumer – in California particularly, you do have some early adopters but the lion's share of the work has been with the mega-mansions. There you have a lot of keeping up with the Jones' and trying to do the right thing as well. Then you have folks like one of my best friends who put it in cause he wanted to do the right thing. This is the market segment that is the baby boomers.

Have you observed any similarities in consumer demographics?

The similarities are: wanting to do the right thing balanced with economics and what makes sense. One of the drawbacks/issues in CA is less awareness and the need for more availability of the parts and pieces to get an install done in a reasonable time/cost.

If you were the head of an industry association, what would you do to increase public awareness of GSHP technology?

I would make sure that the association's web presence was state of the art and top in the industry. This would be first and foremost. Then I would make sure that web presence provided the means for the industry players to reach the consumer in that specific area. This is one of the things that is intrinsic to the geo purchaser as a whole – they do their research. Putting the right tools out there – making them available - is the first step. Then I would provide the right certification for the industry and training and

sales and marketing training to the players in the industry. Currently if done it is done by manufacturers.

What are some suggestions that you have to better inform consumers of this industry?

Getting folks like our sitting governor up to speed on geo and having him talk about it when he talks about sustainability. I would apply that to the rest of the California legislature. Then certainly the CEC could take a more active role in how it treats the industry and the State's Architect's office could also get involved.

Adoption of Ground Source Heat Pump Technology

As with any industry, there may be certain barriers that interfere with the market adoption of products and services. I'd like to ask you about your perception of barriers, if any, in relation to regulations, awareness and project economics for GSHP.

For both residential and commercial GSHP applications, what barriers, if any, have you encountered because of regulations – both state and local?

One of the greatest barriers is the Title 24 issue. Title 24 specifies that any building that is going to be put into service has to meet certain energy consumption guidelines. There has to be a Title 24 certificate of compliance and there are various types of software that are available to do this that are approved by the CEC. Last I heard there are some changes to this, at least in draft, but essentially a designer/mechanical engineer cannot show Title 24 compliance if they are putting geo into a client's home w/o manipulating the software. They are comfortable doing that because they know the performance will far surpass the minimums so they do it. But the issue remains that Title 24 statues and compliance software give short shrift to geo. They make it very easy to deploy a supply side management tool. This is a very big issue.

On the positive side – you have a states architect's office that is pro geo.

However, local ordinances are all over the map and this is potentially a huge impediment. Most recently there was a California courthouse in Susanville that was going to go Geo but it unwound because of local ordinances.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for residential applications?

Every day we experience this government-wise. There was a huge number of schools being built in last few years and almost none of them are going geo.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for commercial applications?

[See above]

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe manufacturers/deliverers of GSHP systems are experiencing?

There's essentially 3 main players in the industry and there's a 4th emerging: ClimateMaster, WaterFurnace, FHP Bosch Group and the current federal incentives for geo are almost completely due to the efforts of one industry player. In the industry we are still faced with the fact that no one wants to pay for lobbying efforts. There isn't an unlimited amount of money – they are not running at monster margins – and there's not enough money from manufacturers going into increasing public awareness and lobbying efforts.

I think that other stakeholders need to take more of an active role – starting with the contractors. The GHPC site is set up to facilitate that. The folks in the industry, earning their living off of it need to be more active. Additionally, the heretofore unheard of major stakeholders are the utilities. We need to find a way legislatively and from a federal perspective to facilitate the embracing of the demand side management issues by the utilities. They're the ones that should be in the thick of this and they're not.

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe consumers are encountering?

Assuming that everyone wants to do the right thing, it'd be very difficult to justify spending an extra 10-15-20-30k on an heating and cooling system if the break evens are not reasonable. It needs to make sense beyond just doing the right thing. In a lot of our climate they don't make very much sense because they are out too far. Drilling costs and costs of doing business in the state are high. Furthermore, profit ticking and risk mitigation – increases the drilling price – they charge more due to this.

Do you believe that GSHP systems are priced too high, too low, or just right?

That's a question that only the individual that is going to write the check can answer. The market should drive that. If they were cheaper there would be more deployment.

When compared to traditional HVAC systems, do you think GSHP systems are priced too high, too low, or just right?

When compared to other alternative energy solutions, do you think GSHP systems are priced too high, too low, or just right?

I'd say too low and the reason is the break evens are better than solar and the life is much longer. With PV systems, by definition they have limited life. The batteries are not going to last very long and the break even at a subsidized price for solar PV is up in the low teens and that's also the time the panels start increasing degradation. We achieve the 10-12 payback range w/o subsidies. When looked at in terms of value – you send the money once and the loop is done. That is a fixed asset.

For both commercial and residential applications, are there other issues besides cost that are a factor in the adoption of GSHP?

(If needed probe for: time, space, and permitting)

Virtually any subdivision has a driveway and you can tear up the driveway, put the loop in the same space and put the driveway back.

How would you characterize the size and growth of the GSHP industry, why, and what would need to happen in order to spur greater growth in this industry?

Size: very, very small.

Growth: prior to incentives 20%+ per year

The price of oil needs to go up for greater growth. Or, there needs to be a greater wiliness on the part of our leaders to get us out of oil dependence. If we just let the market drive it then we're just going to run out of time.

Drilling

Would you agree with the statement, "Drilling is the single largest cost component of GSHP systems?" How important do you think it is to reduce the cost of drilling? Do you have any suggestions as to how to reduce drilling costs?

Yes. It is very important to reduce drilling costs. In order to do so we need, education, improved comfort level with the technology on behalf of drillers, lower the cost of doing business, and improve regulatory issues.

Do you agree with the statement, "The GSHP industry currently faces a shortage of drillers,"? What changes need to be made in order to attract and retain more drillers to the GSHP industry?

Yes. In order to retain more drillers we need continued education of water well drillers, continued active liaison with folks with NGWA and the drillers association. Stepping up those sorts of efforts is

what is needed. Also, if you can ease the cash flow of the driller that is certainly helpful. If you look at an install, most are done by relatively small contractors (residential) – you have a heat pump that have parts and pieces that aren't a whole lot different from air source heat pumps. That business is comfortable/able to manage the cash flow of those types of projects. To go into geo – it is a whole different animal. Part of the risk mitigation on the part of the drillers is – am I going to get paid and who's going to pay me? If there is a way to ease that risk that would help – lower price and greater comfort zone with new drillers to the industry.

Does the drilling technology currently available meet GSHP industry needs or is there a wish list you have for how the technology could be improved?

How would you characterize the permitting process for the drilling required for GSHP systems? If you are dissatisfied with the process, what suggestions do you have as to how the permitting process could be improved?

It's all over the map. It really needs to be streamlined. It needs to be like it is for having a heat pump put in your house or having a septic tank. It needs to be straightforward and mainstreamed. A related issue and huge problem, is education! Permitting agencies just don't understand it so they error on conservative side and try not to do something that will jeopardize their job.

Is there any other information you would like to share about the GSHP industry, or topic that I did not touch upon that would be useful to this survey?

No.

Jim Piasecki

Regional Manager
CETCO Drilling

Introductory Questions

In order to better understand your perspective, I'd like you to describe your area of expertise in the Ground Source Heat Pump (GSHP) Industry. Specifically, what is your role/title today?

SW Regional Manager for manufacturer of drilling fluids, well rehabilitation, water well monitoring and GSHPs.

What is your current responsibility and authority regarding GSHPs?

How long have you worked in this, or a closely related field?

35 years in MN and ND doing any kind of drilling application, grouting, etc.

Industry Branding

What terminology do you use to describe the industry/your product and why is that your preference?

"Geothermal Loops" "Geothermal Little Loops" = small footprint; Big G vs. Little G

In your experience, do industry participants and consumers use the same terminology when referring to this industry?

It's all over the map – Big G/Little G

And within the industry, do you find GSHP industry vernacular to be consistent? If not, is this a problem for the industry in terms of building market adoption?

Some.

What terminology do you think would be most appropriate for this industry and why?

Industry needs to include language about earth's renewable resource, no greenhouse gases and no or low maintenance when describing geothermal.

How important is standardized nomenclature across all segments of the industry and how could the industry achieve it?

It's very important; I believe IGSHPA is driving standardization and nomenclature for the industry.

Industry leaders' perspective on consumer decision-making

Would you describe public awareness of GSHP to be high, low or about where you'd expect it to be given the industry's maturity? Why?

Low - no one has ever really promoted industry; never made it into political debates

What do you think are the three most important messages to communicate about GSHP in order to generate positive public sentiment for GSHP systems?

- 1) *Cost Savings/immediate payback*
- 2) *Environmental Impact*
- 3) *Ease of installation/ease to convert*

How have your customers become aware of GSHPs/learn of your product?

Local marketing by contractors, e.g., home & garden shows, water wells national expo

What do you think the primary motivation was for consumers who purchased GSHP systems?

Cost savings - most customers can live with 5-7 year pay back

Have you observed any similarities in consumer demographics?

Opinion leaders, engineers, architects

If you were the head of an industry association, what would you do to increase public awareness of GSHP technology?

National campaigns, e.g., Oprah; conversion of public buildings, e.g., schools; traditional media out of date.

What are some suggestions that you have to better inform consumers of this industry?

Increase conversion of public buildings such as schools to help build awareness.

Adoption of Ground Source Heat Pump Technology

As with any industry, there may be certain barriers that interfere with the market adoption of products and services. I'd like to ask you about your perception of barriers, if any, in relation to regulations, awareness and project economics for GSHP.

For both residential and commercial GSHP applications, what barriers, if any, have you encountered because of regulations – both state and local?

Same for residential and commercial - CA is lax on regulations, one out of state contractor screwed it up for all (cited example of out of state contractor for Santa Rosa Jr. College that screwed up project and then left town for locals to fix).

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for residential applications?

CA has a big problem with counties charging anywhere from \$300 to \$15,000 for permitting residential installations. Permitting costs are not included in incentive reimbursements.

Hard to find the contractors – have to rely on word of mouth which is not getting the job done...how do you find the 3 different contractors needed??

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for commercial applications?

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe manufacturers/deliverers of GSHP systems are experiencing?

N/A

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe consumers are encountering?

Consumers not inclined to pay for preventive improvements.

Do you believe that GSHP systems are priced too high, too low, or just right?

Just right for equipment; too high for contractors and permitting.

When compared to traditional HVAC systems, do you think GSHP systems are priced too high, too low, or just right?

[See above]

When compared to other alternative energy solutions, do you think GSHP systems are priced too high, too low, or just right?

For both commercial and residential applications, are there other issues besides cost that are a factor in the adoption of GSHP?

(If needed probe for: time, space, and permitting)

All the contractors needed - 3 major contractors; out of state water well drillers are cheaper (\$7-10 ft vs. \$20/ft in CA) but will leave home owners high and dry if something goes wrong with project because they are not local.

Need standards for the whole installation.

How would you characterize the size and growth of the GSHP industry, why, and what would need to happen in order to spur greater growth in this industry?

Contractors need to take responsibility for entire project. Industry is missing the boat on conversion. Utilities should take a major role in marketing. Drillers not investing to drive demand.

Drilling

Would you agree with the statement, "Drilling is the single largest cost component of GSHP systems?" How important do you think it is to reduce the cost of drilling? Do you have any suggestions as to how to reduce drilling costs?

No. Do away with permitting charges and reduce workman's compensation and liabilities. There is too much checking up on everyone, e.g., emissions rules one equipment, C-57 status.

Do you agree with the statement, "The GSHP industry currently faces a shortage of drillers,"? What changes need to be made in order to attract and retain more drillers to the GSHP industry?

It's not as complex as water well drilling...you're just a hole puncher.

Does the drilling technology currently available meet GSHP industry needs or is there a wish list you have for how the technology could be improved?

Build smaller, fuel-efficient drill equipment; technology otherwise more than adequate: "you're a hole puncher."

How would you characterize the permitting process for the drilling required for GSHP systems? If you are dissatisfied with the process, what suggestions do you have as to how the permitting process could be improved?

Too much checking up on everyone - 3 contractors so there's three visits by inspector.

Is there any other information you would like to share about the GSHP industry, or topic that I did not touch upon that would be useful to this survey?

Justification through climate is harder to do in CA.

Andy Fracicia
Marketing Director
WaterFurnace

Introductory Questions

In order to better understand your perspective, I'd like you to describe your area of expertise in the Ground Source Heat Pump (GSHP) Industry. Specifically, what is your role/title today?

Director of Marketing

What is your current responsibility and authority regarding GSHPs?

How long have you worked in this, or a closely related field?

Been in HVAC industry for 30 years last 2 ½ years in Geothermal. First 15 years sold – worked for one company selling GSHP.

Industry Branding

What terminology do you use to describe the industry/your product and why is that your preference?

Geothermal is not the smartest term – they can't get past how it works. Better term is "Geoexchange" but it's less well known.

In your experience, do industry participants and consumers use the same terminology when referring to this industry?

No.

And within the industry, do you find GSHP industry vernacular to be consistent? If not, is this a problem for the industry in terms of building market adoption?

It is not consistent. Never heard of Big G/Little G.

What terminology do you think would be most appropriate for this industry and why?

How important is standardized nomenclature across all segments of the industry and how could the industry achieve it?

It's OK to be different across building types. ¾" for residential and 1 ¼ for commercial. In the US there are 3 major businesses: in Florida, there's Waterloo which services condos and apartments; Climate Master does commercial boiler towers; and Water Furnace does ground loop heat sink.

Industry leaders' perspective on consumer decision-making

Would you describe public awareness of GSHP to be high, low or about where you'd expect it to be given the industry's maturity? Why?

Low - replacement occurs as a result of an emergency; not a lot of planning and research.

What do you think are the three most important messages to communicate about GSHP in order to generate positive public sentiment for GSHP systems?

- 1) *Most efficient system*
- 2) *Reduces greenhouse gases*
- 3) *Reduces carbon footprint*

How have your customers become aware of GSHPs/learn of your product?

Need to market directly to customers. Pull marketing - provide ads to dealers to use in their local markets.

What do you think the primary motivation was for consumers who purchased GSHP systems?

Return-on-investment, ultimately will save money; payback is wrong message.

Have you observed any similarities in consumer demographics?

Customers are highly educated, have already done their homework, they want to know how it works before they care benefits, air to air vs. air to ground. Household income is \$70K plus, age is 35 to 55 years however changing to a wider age bracket of 30 to 65 years - getting older clientele who want to manage their monthly expenses in retirement.

If you were the head of an industry association, what would you do to increase public awareness of GSHP technology?

Have the utilities install loop and lease back to house for 20 years; don't do national campaign, let local reps sell it.

What are some suggestions that you have to better inform consumers of this industry?

It's like a refrigerator, you need it and don't look for a payback.

Adoption of Ground Source Heat Pump Technology

As with any industry, there may be certain barriers that interfere with the market adoption of products and services. I'd like to ask you about your perception of barriers, if any, in relation to regulations, awareness and project economics for GSHP.

For both residential and commercial GSHP applications, what barriers, if any, have you encountered because of regulations – both state and local?

Regulations are not a problem.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for residential applications?

The drilling cost of vertical loops for small footprint lots, especially finished yards.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for commercial applications?

For all, the right sized loop!

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe manufacturers/deliverers of GSHP systems are experiencing?

N/A.

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe consumers are encountering?

Biggest barrier is cost of loop-half life of 100 years; unnecessary costs from not using right sized loop: vertical, horizontal, pond.

Do you believe that GSHP systems are priced too high, too low, or just right?

For new construction you can finance the cost into the mortgage and it's an easier sell. You might pay \$30 more per month on your mortgage but save \$60-70 in utilities.

When compared to traditional HVAC systems, do you think GSHP systems are priced too high, too low, or just right?

When compared to other alternative energy solutions, do you think GSHP systems are priced too high, too low, or just right?

For both commercial and residential applications, are there other issues besides cost that are a factor in the adoption of GSHP?

(If needed probe for: time, space, and permitting)

Loop skews payback; extra investment includes soft cost quantification such as GSHP is the most comfortable, little temperature fluctuation, kicking on and off, dehumidifies and is quiet.

How would you characterize the size and growth of the GSHP industry, why, and what would need to happen in order to spur greater growth in this industry?

First cost loops are biggest barrier. Next is consumer education - how it works and how it saves money. The industry will grow faster if you take first costs from consumer.

Drilling

Would you agree with the statement, "Drilling is the single largest cost component of GSHP systems?" How important do you think it is to reduce the cost of drilling? Do you have any suggestions as to how to reduce drilling costs?

Biggest barrier is cost of loop - half life of 100 years; average life of furnace is 15 years vs. 24 years for geothermal. The driving factor is the amount of land you have to work with and the kind of equipment you need to service it.

Do you agree with the statement, "The GSHP industry currently faces a shortage of drillers,"? What changes need to be made in order to attract and retain more drillers to the GSHP industry?

There is a shortage - you need to educate drillers that they can make \$\$\$. Making connections requires additional certifications.

Does the drilling technology currently available meet GSHP industry needs or is there a wish list you have for how the technology could be improved?

There's always room for improvement but we have what we need.

How would you characterize the permitting process for the drilling required for GSHP systems? If you are dissatisfied with the process, what suggestions do you have as to how the permitting process could be improved?

Most contractors understand the process - not an issue.

Is there any other information you would like to share about the GSHP industry, or topic that I did not touch upon that would be useful to this survey?

You don't see geothermal so it's not sexy.

Greg Schillianskey
Owner
All Year Heating and Cooling
October 14, 2009

Introductory Questions

In order to better understand your perspective, I'd like you to describe your area of expertise in the Ground Source Heat Pump (GSHP) Industry. Specifically, what is your role/title today?

I am the owner of All Year Heating and Air and my expertise is in residential large homes, up to 25,000 square feet.

What is your current responsibility and authority regarding GSHPs?

How long have you worked in this, or a closely related field?

My company has been doing geo since about 1994-95 primarily in the Sacramento area.

Industry Branding

What terminology do you use to describe the industry/your product and why is that your preference?

We use "geothermal" mostly because when people are starting to search online for the technology that seems to be where the most information is. I prefer "geoexchange" because "geothermal" can get confused with geysers and "geoexchange" makes it easier to S.U.S. EPA rate. However, for the search engines you have to include "geothermal".

In your experience, do industry participants and consumers use the same terminology when referring to this industry?

All over the board.

And within the industry, do you find GSHP industry vernacular to be consistent? If not, is this a problem for the industry in terms of building market adoption?

Yes, it is a problem because it gets mixed up with geysers.

What terminology do you think would be most appropriate for this industry and why?

Geoexchange for the reasons mentioned above.

How important is standardized nomenclature across all segments of the industry and how could the industry achieve it?

Awareness is what is going to standardize the technology. The biggest hurdle we have is utilities and once we can get electricity at a cheap rate then probably the utilities would start marketing geothermal/geoexchange. It's the people who have green blood, they are the ones that are seeking out the alternative technologies.

Industry leaders' perspective on consumer decision-making

Would you describe public awareness of GSHP to be high, low or about where you'd expect it to be given the industry's maturity? Why?

We've done it for so long, but I thought we would be doing a lot more than we are presently. The problem is that the contractors are out there for the quick buck. With traditional HVAC systems, you can make \$3-4k in a day or 2 days vs. \$8-10k in two weeks with a geothermal system. What's polluting the industry are the guys that think there's big money in doing it but don't have much experience - they want to get a job under their belt and they screw the job up - this creates bad press for the industry and is a poor reflection on the technology.

What do you think are the three most important messages to communicate about GSHP in order to generate positive public sentiment for GSHP systems?

- 1) *No outdoor equipment*
- 2) *Reduces Carbon Footprint - this presents an opportunity to perhaps tie carbon footprint to utility rates and create something like a "green power rate".*

How have your customers become aware of GSHPs/learn of your product?

The home shows have done a pretty good job. The television show "This Old House," they do a great job of consumer education re: new things that are out there. We did a job for This Old House back in 96/97 and we still get calls from people back east or all over wanting to talk about geo. There was a geo job on the TV show "Dirty Jobs" - after that episode things picked up. Then we've got the internet. Once they see it on the home shows or TV, they search online. We pay a lot of money each month to have those key words that they search for come up on our website.

What do you think the primary motivation was for consumers who purchased GSHP systems?

I think it is a mixture of things: they are a little bit green, want to save as much energy as they can, and they want bragging rights.

Have you observed any similarities in consumer demographics?

I've done it for everyone: young, old, rich, not so rich. There's not a true demographic there. A problem some of our customers encounter is that the banks sometimes will not front the money. The banks say that heating and cooling should be 3% of the total cost of the building, whereas geo is 10% and as a result, the banks won't front the money. Mortgage loans can also hold up the spread of geo.

There are some programs out there that help, for example, SMUD has financing for replacing heating and air-conditioning. They will finance the job at a reasonable interest rate for 10 years. Maybe there could be a state bank that lends money for these green types of projects/low carbon footprint projects. Clearly, there's people out there who want to do it but cannot get hands on money.

If you were the head of an industry association, what would you do to increase public awareness of GSHP technology?

I would probably be subsidizing some of the home shows – almost like infomercials. The problem that you run into with rebates is that it starts becoming a subsidy.

Building dU.S. EPArments are not much help either – the inspection of the bores are done by the health dU.S. EPArments and there is one for every county. When the bores go in, one of the things you have to do is grout the bores. The geo system won't function unless the bores are grouted. Some dU.S. EPArments want to see you grout each hole because they are afraid that the straw you put in the ground is going to pollute the aquifer. This leads to some pretty high dollar inspections – you have to drill hole, call someone, come out and inspect before the driller can drill the next bore. Sometimes we might have \$5-10k more on a job just for inspections.

What are some suggestions that you have to better inform consumers of this industry?

The California Energy Commission, they should feature the technology on their website, perhaps on a page for new technologies. Websites like that might be a big help.

Adoption of Ground Source Heat Pump Technology

As with any industry, there may be certain barriers that interfere with the market adoption of products and services. I'd like to ask you about your perception of barriers, if any, in relation to regulations, awareness and project economics for GSHP.

For both residential and commercial GSHP applications, what barriers, if any, have you encountered because of regulations – both state and local?

Mostly the health dU.S. EPArTments. On the last job we did in Monterey, they made us put cement plugs on the top 50 feet of the bore because they don't understand that we are digging 3, 4, 5 feet down and then tying all the bores together so there's no open straw to the surface. When you put the plugs on, you are compromising the integrity of the system because you have concrete around plastic pipe that will expand and contract depending on the season.

Plumas – Sierra has the best process – they've embraced it and they are doing a lot of it.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for residential applications?

We used to belong to an association that was being subsidized by the DOE or something AEEES – when you went to get a permit in a county that had no experience with the technology, you could say "call AEEES," and they would send someone to the dU.S. EPArTment to educate them. Counties used to have someone they could call. Contractors belonged to it – AEEES would get grant money – and they would put on the one-day seminars for different building dU.S. EPArTments.

There has to be something in the state apparatus to deal with it – a ground source dU.S. EPArTment. It's all about liability – no one wants to be liable.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for commercial applications?

See above.

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe manufacturers/deliverers of GSHP systems are experiencing?

All manufacturers are doing pretty good economically. I don't know if there is something out there that measures the growth of the industry but the equipment – there's enough being sold where it is fairly affordable and at a fair price.

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe consumers are encountering?

High first cost, availability of financing from banks. Maybe there could be an Energy Commission bank that gave 2% loans for low carbon or green systems – and listed acceptable green systems. There are areas where geo is going to be impossible, it's not like every homeowner in the state is going to go for it – you need to have the space.

Do you believe that GSHP systems are priced too high, too low, or just right?

They are priced fairly.

When compared to traditional HVAC systems, do you think GSHP systems are priced too high, too low, or just right?

When compared to other alternative energy solutions, do you think GSHP systems are priced too high, too low, or just right?

Our niche is high efficiency. When we get into the PG&E service area you have to get creative to find the lowest way to heat and cool a house. Sometimes doing PV and a conventional heat pump makes more sense than doing a geo unit. It depends on your circumstances.

For both commercial and residential applications, are there other issues besides cost that are a factor in the adoption of GSHP?

(If needed probe for: time, space, and permitting)

Having the space is one issue. People have experimented in different areas with neighborhood systems (suburbia), they've hooked into the domestic water supply and you can take the water run it through the geo unit and send it back to the water line. There's a lot of dreaming about ways for geo units to be put in ways that are less costly. I just did a duplex down by the Sacramento zoo and we have one bore field there on two sU.S. EPArate units for the duplex – mom lives downstairs, son lives upstairs. Using common bore fields could lower costs.

How would you characterize the size and growth of the GSHP industry, why, and what would need to happen in order to spur greater growth in this industry?

Size – small and slow; to spur greater growth – cheap electricity.

Drilling

Would you agree with the statement, "Drilling is the single largest cost component of GSHP systems?" How important do you think it is to reduce the cost of drilling? Do you have any suggestions as to how to reduce drilling costs?

Yes. Reducing the cost of drilling is very important but you also have fuel costs connected to drilling. When diesel is \$3-4.00 a gallon and it takes \$50 per borehole, the hard costs are expensive.

No suggestions as to how to reduce drilling costs. I don't think the drillers are gouging in any way.

Do you agree with the statement, "The GSHP industry currently faces a shortage of drillers? "What changes need to be made in order to attract and retain more drillers to the GSHP industry?"

I don't have any problem finding drillers. Our driller has done our work since 94-95. He's been burnt a lot of times about people who haven't paid him. I know that sometimes he won't even take people on because he doesn't know anything about them.

Does the drilling technology currently available meet GSHP industry needs or is there a wish list you have for how the technology could be improved?

There's no way for me to get a license to be able to drill holes – it takes a certain contractor license. If there was a S.U.S. EPA rate drill for geo units maybe you could make the technology better.

How would you characterize the permitting process for the drilling required for GSHP systems? If you are dissatisfied with the process, what suggestions do you have as to how the permitting process could be improved?

It's a piece of cake for us only because of who we've worked with in the past. We've done a lot of them.

Is there any other information you would like to share about the GSHP industry, or topic that I did not touch upon that would be useful to this survey?

We love doing geothermal systems. It's so different than our regular work that it's almost an escape for us. The people that want this type of work are great people to work for.

The biggest hurdle we got is cheap money – it'd be nice if drilling were cheaper. It might be a little cheaper if we could drill our own.

The Federal Tax Credit – that's helped a lot, 30% off the total install is huge. The only thing they did wrong is not including water-to-water units and they are supposed to change that in the next month or so. We can use less equipment with water-to-water units which make them more cost effective.

Sharon Schwilling
Ground Source Heat Pump Program Administrator
Sierra-Plumas Rural Electric Cooperative
October 14, 2009

Introductory Questions

In order to better understand your perspective, I'd like you to describe your area of expertise in the Ground Source Heat Pump (GSHP) Industry. Specifically, what is your role/title today?

I am the Ground Source Heat Pump Program Administrator at Sierra-Plumas REC.

What is your current responsibility and authority regarding GSHPs?

I run the entire program at Sierra-Plumas REC.

How long have you worked in this, or a closely related field?

Since 1996 – 13 years

Industry Branding

What terminology do you use to describe the industry/your product and why is that your preference?

I used to use "geoexchange" but I prefer "ground source heat pump". "Geoexchange" is branding and doesn't make sense.

In your experience, do industry participants and consumers use the same terminology when referring to this industry?

No.

And within the industry, do you find GSHP industry vernacular to be consistent? If not, is this a problem for the industry in terms of building market adoption?

Yes, people don't understand what geoexchange is.

What terminology do you think would be most appropriate for this industry and why?

If the industry wants it to make sense they need to call it GSHP.

How important is standardized nomenclature across all segments of the industry and how could the industry achieve it?

No clue. The issue is who to start with? Possibly the GSHP consortium – but they do not touch the public, that is part of the problem with the industry, they do not touch the public. No TV ads, media etc. There is untapped potential.

Industry leaders' perspective on consumer decision-making

Would you describe public awareness of GSHP to be high, low or about where you'd expect it to be given the industry's maturity? Why?

It is about where I'd expect it to be, because the government focuses on solar and wind and there is no publicity for GSHP. You've got to really look to find it.

What do you think are the three most important messages to communicate about GSHP in order to generate positive public sentiment for GSHP systems?

- 1) *Environmentally friendly*
- 2) *Cost efficient to run*
- 3) *No CO emissions*

How have your customers become aware of GSHPs/learn of your product?

The builders, we educate them and then they educate the customers. We also have resources on our website. Customers can call in to have a packet mailed to them and in that you get a CD along with PDF.

What do you think the primary motivation was for consumers who purchased GSHP systems?

Cost savings on heating bills. The loop lease is attractive to a lot of people (there is a cap on it for \$15,000 and it is non-transferrable).

Have you observed any similarities in consumer demographics?

They are mostly retired folks, older. We also see work in subdivisions that are high end. I'd say the breakdown is primarily affluent people and around 30% normal guys.

If you were the head of an industry association, what would you do to increase public awareness of GSHP technology?

Again, touch the public somehow and we are not doing that.

What are some suggestions that you have to better inform consumers of this industry?

Everyone watches TV. This is the best way to touch them.

Adoption of Ground Source Heat Pump Technology

As with any industry, there may be certain barriers that interfere with the market adoption of products and services. I'd like to ask you about your perception of barriers, if any, in relation to regulations, awareness and project economics for GSHP.

For both residential and commercial GSHP applications, what barriers, if any, have you encountered because of regulations – both state and local?

We don't have any barriers – we have a great county (Plumas) and 90% of our GSHP systems go in there. I've directed other counties in our service area to Plumas because they have been doing this for years.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for residential applications?

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for commercial applications?

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe manufacturers/deliverers of GSHP systems are experiencing?

The systems are priced too high. The literature out there says that GSHP systems are 10-20% higher than traditional system, but I've found them to be higher than that.

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe consumers are encountering?

I don't have a lot of commercial – we did a 17-ton animal shelter, 40-ton golf course. They've got the money, so there are not really barriers in that regard but they also took advantage of our loop lease program. They took barriers away by covering part of it with the loop lease.

Do you believe that GSHP systems are priced too high, too low, or just right?

When compared to other alternative energy solutions, do you think GSHP systems are priced too high, too low, or just right?

It's cheaper to go GSHP – solar is more expensive and wind is more expensive. This could be why the manufacturers are pricing higher. I think the tax credit will help a ton.

For both commercial and residential applications, are there other issues besides cost that are a factor in the adoption of GSHP?

(If needed probe for: time, space, and permitting)

Lack of education; lenders don't get it.

How would you characterize the size and growth of the GSHP industry, why, and what would need to happen in order to spur greater growth in this industry?

Get the word out and start educating people. Solar and wind are natural to the public and ground source is not. They don't get it. We need advertising.

Drilling

Would you agree with the statement, "Drilling is the single largest cost component of GSHP systems?" How important do you think it is to reduce the cost of drilling? Do you have any suggestions as to how to reduce drilling costs?

No, I do not agree. It's a big chunk but we have been able to secure the low per foot cost and maintain this for a long time with the promise of consistent work for our drillers. We have a competitive per foot price due to the fact that we do bulk drilling and coordinate subdivisions to economize the drillers. We have set up our loop lease pay back with that in mind. Basically our cap is at a 6-ton system – and customers have to pay any overages. Technique and experience in doing that particular kind of

drilling is important. It's not that hard of a technology, if they understand it. Some drillers come in thinking that this is a chance to gouge people and this is part of the problem.

Do you agree with the statement, "The GSHP industry currently faces a shortage of drillers?"
What changes need to be made in order to attract and retain more drillers to the GSHP industry?

For me there's not a shortage but I don't know about other areas. I know there are a lot of them but some don't want to have anything to do with residential.

Does the drilling technology currently available meet GSHP industry needs or is there a wish list you have for how the technology could be improved?

Having an experienced driller is more important than the technology

How would you characterize the permitting process for the drilling required for GSHP systems? If you are dissatisfied with the process, what suggestions do you have as to how the permitting process could be improved?

We have a great county.

Roy MacBrayer
Deputy State Architect
State of California
October 19, 2009

Introductory Questions

In order to better understand your perspective, I'd like you to describe your area of expertise in the Ground Source Heat Pump (GSHP) Industry. Specifically, what is your role/title today?

I am the Deputy State Architect for the State of California. My primary focus is school construction in California. Secondarily, I am the program manager for the Governor's Green Building Program which focuses on state building construction and improving the performance of state building.

What is your current responsibility and authority regarding GSHPs?

See above

How long have you worked in this, or a closely related field?

I've been with the state of California for about 7 years.

Industry Branding

What terminology do you use to describe the industry/your product and why is that your preference?

I've been using Ground Source Heat Pumps and the reason is because that's the way it was introduced to me.

In your experience, do industry participants and consumers use the same terminology when referring to this industry?

I hear a lot of the use of the term "geothermal" – and a lot of the people who are using that term don't discriminate between GSHP and the extraction of geothermal energy from the earth. There's a lack of knowledge about the GSHP technology.

And within the industry, do you find GSHP industry vernacular to be consistent? If not, is this a problem for the industry in terms of building market adoption?

It is not consistent and it is a problem for market adoption.

What terminology do you think would be most appropriate for this industry and why?

I don't know. To me, GSHP is very descriptive but people in CA may associate the term "heat pump" with less efficient, less cost effective technology. I have known some people to react against the term heat pump.

How important is standardized nomenclature across all segments of the industry and how could the industry achieve it?

I think it's important to the extent that it would give people a way to recognize what this technology is. Branding it with the right terminology would be good so it doesn't get confused with geothermal extraction and heat pumps.

Industry leaders' perspective on consumer decision-making

Would you describe public awareness of GSHP to be high, low or about where you'd expect it to be given the industry's maturity? Why?

I think it is low in this part of the country and I don't know why. I don't know that there's been as much an effort to penetrate the market here. The construction industry is sort of balkanized and sluggish to accept new technologies. They tend to follow historical patterns and they're not all that easy to change. This is poised to change if it's not changing already.

What do you think are the three most important messages to communicate about GSHP in order to generate positive public sentiment for GSHP systems?

- 1) Efficiency – to me GSHPs operate at a more consistent efficiency. The fact that a GSHP can operate efficiently in high ambient temps, even when you have spikes in temp, has a lot of implementations in terms of equipment longevity. GSHPs also lower long term ownership costs and lead to more predictable level of performance. One of the things that needs to be understood about this technology is that it gives you more predictable energy and ownership costs.*
- 2) A message that would focus on disputing any misconceptions that people might have about the ground loop portion of the system. The other side of the system is pretty much standard technology that people understand – the compressor and all that. However, there are misconceptions about the ground loop and boreholes. There are concerns about leakage and the piping failing as well as the longevity/durability of that part of the system.*

I don't see a lot of information on how to remediate problems with this part of GSHP systems out there. I just don't think a lot of people really understand what that part of the system is – how it works. Issues such as seismic instability, rock formation, geology, some of those may have an effect on the performance of the system, and there's not a good understanding of all of that. People are familiar with the problems with cooling towers and know how to deal with it whereas GSHPs have a lot of unknowns associated with it. I think there needs to be more information that is put out about these wells and how they perform and how to mitigate issues. This will help people evaluate it in terms of other alternatives.

How have your customers become aware of GSHPs/learn of your product?

I became aware after being approached by a GSHP company, they came in and gave a presentation and I went out and did some research on my own. There isn't a lot out there, you don't hear a lot about the technology unless it is a result of some marketing effort on a project or something, and my sense is that a lot of people are oblivious to it.

What do you think the primary motivation was for consumers who purchased GSHP systems?

I think that there may be a number of motivations in play. The promises of system efficiency is the #1 item I think. The long-term lower cost of ownership and management also might be a consideration. The renewable aspect/green aspect is also attractive to people – government and schools place value on this aspect.

Have you observed any similarities in consumer demographics?

I don't know enough of the installations to really know. It seems to me that school districts seem to be very amenable because they have the landmass typically on a school site to support it. That seems to be one group that is more positive.

If you were the head of an industry association, what would you do to increase public awareness of GSHP technology?

The obvious thing of getting it in front of the public so that they understand what it is, the branding of it, so that people can understand why these systems perform better. Secondarily, early adopter installations – school districts, and give tours of the installations. It would be good to have those tangible installations in communities where they are working to demystify the technology. In a sense I almost compare this to what was going on in the plumbing industry over the discussion about plastic piping – vs. copper. There was a mythology about plastic pipe and its lack of performance and it took quite a while to get over that. The use of plastic pipe changed the economics of projects. A lot of what made that possible

is the lack of information. I see a parallel here in the sense that you have industries geared in a certain way and for them to accept new systems/designs they have to get over some phobias.

What are some suggestions that you have to better inform consumers of this industry?

Adoption of Ground Source Heat Pump Technology

As with any industry, there may be certain barriers that interfere with the market adoption of products and services. I'd like to ask you about your perception of barriers, if any, in relation to regulations, awareness and project economics for GSHP.

For both residential and commercial GSHP applications, what barriers, if any, have you encountered because of regulations – both state and local?

The only barriers regulation-wise that I have been aware of are the issues with getting the wells permitted. However, it seems to me that there may not be enough in the way of incentives from utilities. These systems have a huge potential to address the problems that utilities are facing – you'd think they'd get behind it more than they have. It could be the kind of system that would warrant special targeting by utilities. These types of systems are serious efforts to deal with peak load.

As to Title 24, in general, it would seem to me that Title 24 could be more helpful than it is. The whole emphasis on improving Title 24 and developing new green building code has been kind of a forced effort – it causes the California Energy Commission (CEC) to grab the quickest, easiest solution. If they were to take this on as a more reasoned or deliberative effort you might see this problem be less of an issue. Sometimes the CEC tends to grab a solution almost at the exclusion of others that are almost as good because they get overlooked. Educating that group in particular would be very good.

What barriers, if any, have you experienced due to lack of awareness of GSH technology for residential applications?

I just don't think it comes up – people are so oblivious to it. If I had known about GSHPs when I bought my home 12 years ago – I had enough landmass to put in a decent ground loop. I would have been friendly towards the technology if someone had been out there marketing.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for commercial applications?

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe manufacturers/deliverers of GSHP systems are experiencing?

I think anytime the first cost is higher it creates a problem because even though there's been a lot of change in terms of looking at lifecycle costs, the industry still seems to be dominated by first cost mentality.

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe consumers are encountering?

High first cost.

Do you believe that GSHP systems are priced too high, too low, or just right?

I don't know. I didn't understand why the mechanical side of the system was priced so high, although this was probably due to the volume of production with manufacturers. It did seem to me like it was a little bit of a problem, why should the mechanical part cost more when in fact you could economize that part of the system? It doesn't have to be quite as robust as traditional systems.

When compared to traditional HVAC systems, do you think GSHP systems are priced too high, too low, or just right?

When compared to other alternative energy solutions, do you think GSHP systems are priced too high, too low, or just right?

Solar is the big paradox – it really isn't very cost effective and there are many things you can do that would give you a better Return on investment than PV systems. With PV you barely get ROI by time systems wear out. One of the reasons people get them is the visual factor; you wonder if you were to get into the walls of the house if there were other things have they done that would be less costly like insulation etc.

For both commercial and residential applications, are there other issues besides cost that are a factor in the adoption of GSHP?

(If needed probe for: time, space, and permitting)

It gets back to a general lack of understanding. The issue for a potential retrofit – particularly where you have a small lot (a commercial building w/o a lot of useful land) people don't have a feel for what you can realistically do with these systems. I heard about a system that was installed in a guy's

driveway. He had a typical tract home on a postage stamp lot but yet they installed a system by drilling through his driveway. I didn't realize you could do that. A key element is what size of a ground loop do you need and how could it be integrated into an existing building? DMV field offices might be good candidates for a retrofit but I don't really know – what would a typical system really look like and does that make sense? Visual examples of what the systems may look like in different types of facilities it would give it a more tangible understanding. There is the perception out there that we need open land for this but we don't really know what we need.

If there was a way for people to tap into some kind of a quick calculator or model that people could run to see what kind of system was appropriate for them, that could be really helpful.

How would you characterize the size and growth of the GSHP industry, why, and what would need to happen in order to spur greater growth in this industry?

It's my understanding that there are areas in the Midwest where it is growing at a fairly stable rate but out here it is just emerging. We need better awareness and more visible support from the utilities – people look to the utilities as litmus test. We also need think tanks like the Western Cooling Efficiency Center at UC Davis promoting this technology.

Drilling

Would you agree with the statement, "Drilling is the single largest cost component of GSHP systems?" How important do you think it is to reduce the cost of drilling? Do you have any suggestions as to how to reduce drilling costs?

I don't know – I presume so. I would rate that fairly important because that might be an area with a great potential to reduce costs with different technologies.

Do you agree with the statement, "The GSHP industry currently faces a shortage of drillers?" What changes need to be made in order to attract and retain more drillers to the GSHP industry?

I have heard is that they are so far removed as an industry from the traditional HVAC industry that it is really an issue; people out there drilling wells are far removed from HVAC installers. To integrate across the industries is important. To me the drilling industry is a thing all its own centered on water and oil – how do you bridge the two? I've heard about this being a challenge.

Does the drilling technology currently available meet GSHP industry needs or is there a wish list you have for how the technology could be improved?

How would you characterize the permitting process for the drilling required for GSHP systems? If you are dissatisfied with the process, what suggestions do you have as to how the permitting process could be improved?

I don't know – I would characterize it as being fraught with a lot of local idiosyncrasies based a lot on experiences people have had with drilling. A lot of people may have perceptions that the drilling industry is not a very sophisticated industry, a dirty industry.

Is there any other information you would like to share about the GSHP industry, or topic that I did not touch upon that would be useful to this survey?

The state has no projects where GSHPs are an active component. I'm looking for opportunities to incorporate it into retrofit projects – DMV field offices might be potential candidates if we could ever bundle it just right. We have to get over the hump with the federal stimulus money that is focused on retrofits – quick paybacks will be the first projects. However, the State Architect is very familiar with the technology and we talk it up with school districts, as they are good candidates.