Remember Denver 2010?

Positioning; not Marketing
A VISION FOR GSHP

Without a vision the people perish; that is, to go their own way.

Without a vision the association members VANISH; that is, to go their own way.

Have you heard a member say “they don’t do anything for me”? 
The Failures

Everyone went their own way!
To many to mention but perhaps we need to review the designs, energy, and ground load processes.
Perhaps we should stop chiding and start encouraging each other.
OUR FAILURES ARE NOT THE INSTALLS THAT DID NOT WORK WELL, OUR FAILURES ARE ALL THE OTHER SYSTEMS THAT WERE INSTALLED!
The History:

It (GSHP) costs too much!
Yes that’s it......
The Successes

Worldwide usage for space conditioning. However, is there more?
Who is involved?

IGSHPA

GEO

Members, yes us!

Owners

Utilities

• Gas
• Electric
WHAT IS VISION?

**Definition of vision:**

8. the stated aims and objectives of a business or other organization
WITH A VISION WHAT HAPPENS?

TO:
1. IGSHPA
2. GEO
3. Members, yes us!
4. Owners
5. Utilities
   • Gas
   • Electric
IGSHPA’S VISION

TO:
1. IGSHPA

Section 2. Purpose
The purpose of the International Ground Source Heat Pump Association is to promote the growth of the ground source (also known as geothermal) industry by:

Promoting the efficient use of ground source heat pumps;
Developing and promoting sound industry-related standards;
Supporting the effective marketing of ground source heat pumps;
Identifying and supporting sanctioned affiliate institutions for the purpose of IGSHPA training and industry research;
Developing and distributing internationally recognized training materials;
Enabling its members to have direct input into any published materials;
Providing a forum for information interchange;
Enabling association members to benefit from the advantage of large numbers;
Representing the association in matters of local, state, national, and international interest of members;
The International Ground Source Heat Pump Association is established as an integral part of Oklahoma State University.
GEO’S VISION

1. GEO

**GEO Mission**

The Geothermal Exchange Organization (GEO) is The Voice of the Geothermal Heat Pump Industry in the United States. As a non-profit trade association, we promote the manufacture, design and installation of GeoExchange® systems—the most energy efficient and environmentally friendly heating and cooling technology in the world.

Government affairs and public outreach strategies pursued by GEO are more important than ever to knocking down barriers to industry growth, maintaining progress already won, and securing new opportunities. GEO advocacy successfully increased tax credits for residential geothermal heat pump installations from $300 to 30% of system costs. And through our efforts, geothermal heat pumps are increasingly recognized as a renewable energy technology alongside wind and solar, ensuring an integral role in meeting future government energy and environmental goals.

Our mission is to support our members' business objectives while promoting maximum, sustainable growth of the geothermal heat pump industry through Advocacy, Partnerships, Public Outreach, and Promotion of Quality Standards.
UTILITIES’ VISION

MAYBE ASK THE PUBLIC UTILITIES COMMISSION?

PROVIDE RELIABLE ENERGY AT A FAIR RATE OF RETURN ON APPROVED INVESTMENT(S)
MEMBER’S VISION

Membership:

Make Money
Table 2. Barriers to Expanded Adoption of GHPs and Actions to Address Them

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 2</th>
<th>Tier 2</th>
<th>Tier 2</th>
<th>Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. High first cost of GHP systems to consumers.</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>2. Lack of consumer knowledge and/or trust in GHP system benefits.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>3. Lack of policymaker and regulator knowledge and/or trust in GHP system benefits.</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>4. GHP design and business planning infrastructure limitations.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>5. GHP installation infrastructure limitations.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Actions</th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 2</th>
<th>Tier 2</th>
<th>Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assemble independent, statistically valid, hard data on the costs and benefits of GHPs.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>2. Independently assess the national benefits of aggressive GHP deployment.</td>
<td>x</td>
<td>x</td>
<td>x</td>
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</tr>
<tr>
<td>3. Streamline and deploy nationwide RHC programs to provide GHP infrastructure.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>4. Develop and deploy programs to provide universal access to GHP infrastructure.</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td>x</td>
</tr>
<tr>
<td>5. Develop the data, analysis, and tools enabling lowest-LCC GHP infrastructure.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>6. Expand geographic areas where high quality GHP design infrastructure exists.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>7. Expand geographic areas where high quality GHP installation infrastructure exists.</td>
<td>x</td>
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The Three Spheres of Sustainability

Social-Environmental
- Environmental Justice
- Natural Resources Stewardship
  - Locally & Globally

Environmental
- Natural Resource Use
- Environmental Management
- Pollution Prevention
  - (air, water, land, waste)

Environmental-Economic
- Energy Efficiency
- Subsidies / Incentives for use of Natural Resources

Social
- Standard of Living
- Education
- Community
- Equal Opportunity

Economic
- Profit
- Cost Savings
- Economic Growth
- Research & Development

Economic-Social
- Business Ethics
- Fair Trade
- Worker's Rights

Adopted from the 2002 University of Michigan Sustainability Assessment
Carl Sagan: Pale Blue Dot
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The “sweet spot”

Adopted from the 2002 University of Michigan Sustainability Assessment
To hit the “sweet spot” of sustainability consider:

1. Demand Reduction
2. Load Factor
3. Life
4. Sustainable and Renewable Ground Source (GHEX) meets all the requirements
1) Demand Reduction

Ground heat exchangers (GHEX) coupled to HVAC/R systems, or ground source, reduces power plant demand by 1.1 kW/ton (ONRL Ft. Polk study) or 3753 BTUs per ton.

Power plant fossil fuel input, generation output, and system transmission to consumer/meter losses are 3.23 BTU in at the plant to 1 BTU delivered to the meter (of consumers), or inefficiencies, are removed. (Source: [http://aceee.org/press/2012/01/aceee-report-us-better-thinking-big-](http://aceee.org/press/2012/01/aceee-report-us-better-thinking-big-))

Therefore, for each ton of GHEX installed the U.S. reduces fossil fuel consumption by 3.23 times 1 at 1.1 kW/ton, yielding, 3.23 times 3753 BTUs/ton, which equals 12,122 BTUs of fossil fuel eliminated per installed ton (12,000 BTUs) of ground source. This shift allows fossil fuels to be used for transportation and other generation.

Imagine--a GHEX--eliminates more then it delivers!

Wind and solar PV avoid the use fossil fuels for generation yet increase capital expenses due to redundancy for when the wind is not blowing or the sun is not shining.
2) Load Factor

Heating, ventilation and air-conditioning (HVAC) are critical to maintain productivity and required year round.

The consumer use of ground heat exchangers produces the best of breed in load profiles.

- Power plant load factor is improved.
- Increases in peak demand and fuel switching are avoided.

As a rate based tariff for the GHEX utilities can:
- Electric utilities reduce summer demand and increase winter demand.
- Gas utilities gain summer demand and reduce winter demand.
3) Life

GHEXs last longer than facility.

The GHEX increases in value with time at the IRR.

The GHEX has real salvage value. Competing HVAC/R systems the salvage is the weight of the units.

The GHEX lasts longer than the generation plant or gas fields.

The GHEX has no maintenance.

The GHEX has no power required.

The GHEX has no staff or service technicians required.
4) Sustainable and Renewable

The GHEX hits the “sweet spot” as follows:

Longest life known
Secure and underground at the consumer premises
Future generations can use the GHEX at no additional cost

The GHEX is the only renewable available 24x7x365 and sustainable since a vertical ghex is geothermal energy
The GHEX does not need T&D buildout

Solar and wind only available 46% of the time at best.

The other 54% requires full demand fossil fueled power plant; this increases the capital expenses (capex) since it requires both be funded.

Cost to build per MW for coal plant $2.5 million (a).
Cost to build per MW for solar plant is $2.5 million (b). Total capex is 5.
Cost to build per MW for wind farm is $2.5 million (c).
Total capex is 5.

Cost to build per MW for GHEX is $1 million and additionally reduces demand at 1.1 kW per ton of HVAC. Total capex is $1 per MW ((1.1kW/(12000Btu/3412 BTU/kW) which yields 0.313 kW reduced per kW installed), therefore 0.313 x 2.5 (a of above) is 0.78. So (1-0.78), the reduction in demand, which is $0.22 million/MW actual total cost of a GHEX connected to any fossil fueled electric utility. If the utility has both (a+b, a+c, or a+b+c) then 0.313 x 5 yielding 1-1.565; saving 0.565 $ per MW of GHEX.
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\[
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\]
In April of 2011 in the afternoon a tornado hit this day care center in Goldsby, Oklahoma
The slab was all that was left after the tornado; the children were underground and safe!
The slab was all that was left (the kids were underground and safe!)
The ground source HVAC unit in the debris
Okay, let’s talk about systems that are sustainable and renewable

Everything, including the slab, except the GHEX was removed to rebuild on the land.
The GHEX was reconnected and went back in service!
Did the GHEX hit the sweet spot?

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Adapted from the 2002 University of Michigan Sustainability Assessment
Thanks

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