



***Geothermal Heat Pumps
Utility & Consumer Market Review
Colorado Geothermal Working
Group***

April 8, 2008

Paul Bony

Manager, Marketing & Member Services

Delta-Montrose Electric Association

(970) 240-1278

pbony@dmea.com



The “Market”

★ The new energy “market”:

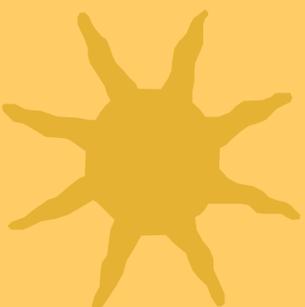
- Fossil fuel price shocks (\$3.00 + propane)
- Climate change (CO₂) becoming the issue
- Customer and government focus on renewable energy, energy efficiency and CO₂ reduction
- Fuel switching from propane/natural gas to electric resistance heating (plug-in and installed)
- Rising electric rates driven by increasing demand and rising generation costs, carbon “tax” on the way?
- Restrictions on new coal generation (if any?)
- Green generation coming on line.





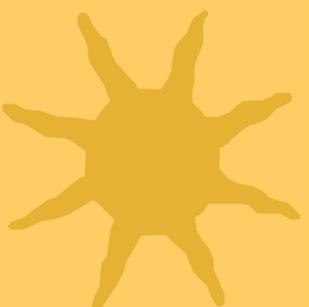
Geothermal Heat Pumps

- ★ Are a market proven technology.
- ★ Cut total heating & cooling bills.
- ★ Offer the highest lifecycle value of all fuels.
- ★ Provide consumers immediate positive cash flow.
- ★ Tap renewable solar energy from the earth.
- ★ Have low power requirements that can be provided by zero carbon renewable sources!
- ★ Can be “bolted” on to a gas heating system.





Geothermal Heat Pumps



- ★ Offer dispatchable demand side management.
- ★ Have a great load factor
- ★ Allow dual fuel applications
- ★ Can meet gas DSM program requirements
- ★ Can provide net carbon savings



Geo for Utilities

★ Focus is:

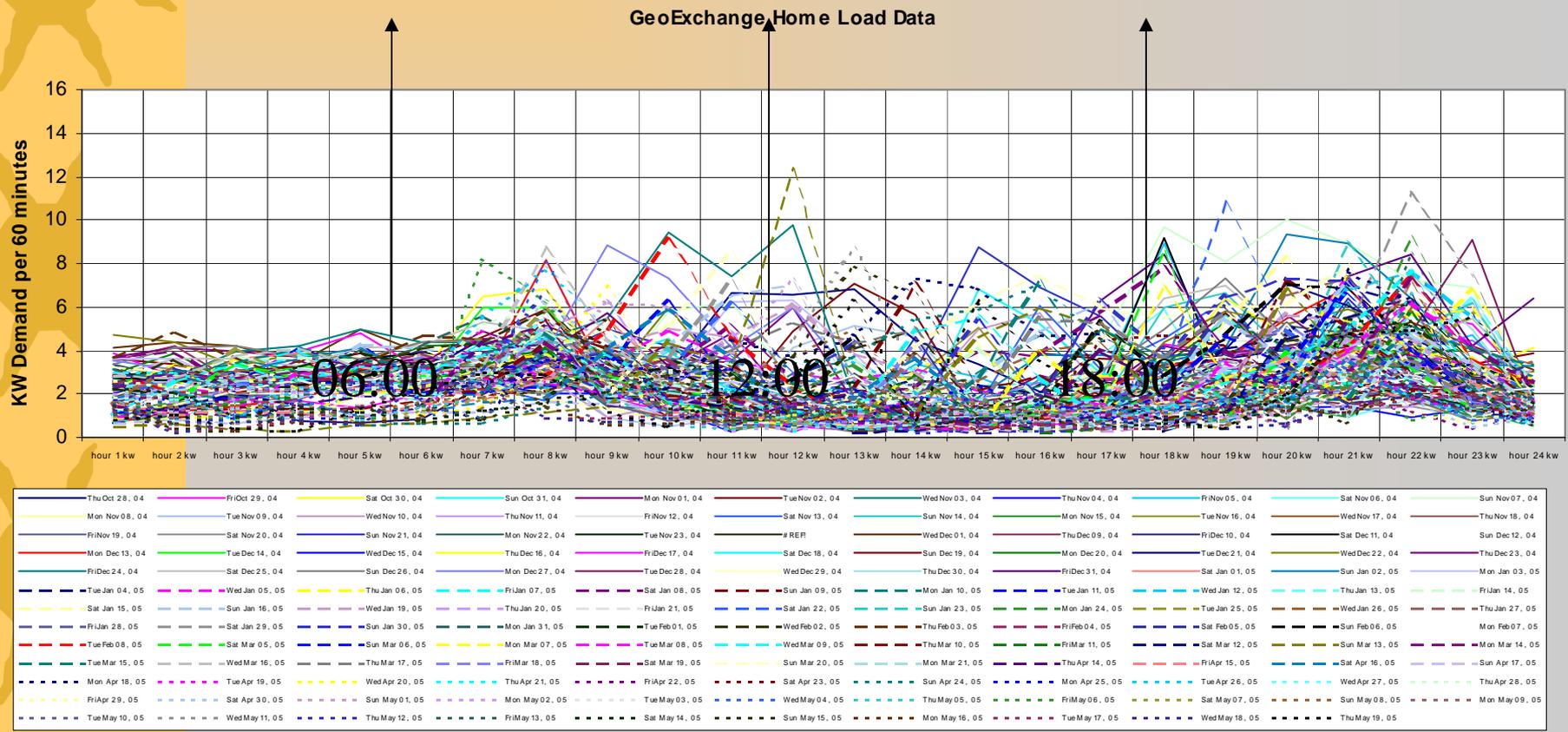
- Improving system load factor
- Providing DSM, peak-time pricing and load control programs to meet efficiency/DSM/green/ carbon mitigation requirements





Geo for Utilities

DMEA's Geo value analysis based on load data



Geo for Utilities

DMEA CDA Winter Peak Results

Segment or Customer	Square Footage	Heating Mode				
		Usage in Winter Peak Month (Jan.-Dec.) kWh	Coincident Winter Peak (Jan.-Dec.) kW	Coincident Winter Peak Load Factor	Site-Specific Winter Peak (Jan.-Dec.) kW	Site-Specific Winter Peak Load Factor
Segment 7 [†]	1,997	856.2	1.75	0.66	-	-
Carron	2,673	1,638.6	2.17	1.01	2.75	0.80
Kintz*	3,000	1,988.5	2.18	1.23	10.37	0.26
Pistor	2,053	1,569.4	1.77	1.19	3.86	0.55
Unit A	1,906	798.6	2.02	0.53	3.76	0.29
Unit B	1,516	401.6	0.67	0.80	2.08	0.26
Unit C	1,601	1,270.4	1.58	1.08	2.52	0.68
Unit D	1,750	1,417.0	2.31	0.82	7.22	0.26
All Geoexchange	-	9,084.0	12.71	0.96	-	-

Notes:

[†] 81% of the customers with electric heat have non-electric backup system

* Kintz winter peak based only on 4 near-peak days in January (December data stops on 12/5/2000)



Geo for Utilities



Value to DMEA



- ★ Installed loop costs \$6,000 (retail).
 - = Premium over high end gas equipment with AC.
- ★ Generates \$410.64 in annual margins.
 - \$12,319 total revenue over 30 years.
 - An IRR of 5.45%.
- ★ DMEA's return on poles & wires.
 - 2004 ROI 3.8%.
- ★ We have tested several “financing” tools and are now piloting a “loop tariff.”





Geo for Utilities



★ Utility Loops

- Utility owns and recovers the cost of the loop, interest expense, and program costs.
- Utility gains positive load factor incremental electric sales.
- System load factor is even better with load control.\
- Utility installs or contracts out loop construction.
 - Controls system design and installation quality
 - Future carbon credits may stay with the utility



★ Consumers Get:

- Lower total energy bills.
- Utility grade service and reliability





Geo for Consumers



Value to Consumers



- ★ Piece of mind
 - Less volatile heating & cooling costs
 - Utility grade customer service
- ★ Annual energy savings of \$250+ to \$2,000 +
 - Immediate positive cash flow with financing
- ★ They are doing their part for the environment





Geo for Consumers

70 degree heating and cooling

Electric Resistance

\$2640

(100% radiant/convactor zoned system with 13 SEER A/C)

Propane

\$2474

(91% condensing system with 13 SEER A/C)

Natural Gas

\$1021

(91% ignitor condensing system with 13 SEER A/C)

GeoExchange

\$724

(350% efficient system with horizontal ground loop)

Assumes:

- *Typical 2,000 sq foot home (48,000 Btu/hr heating load & 20,000 Btu/hr cooling load)*
- *Average temperature design data for Montrose, CO*
- *Energy costs: Electricity @ \$.093/kWh; Propane @ \$1.96/gallon; Natural Gas @ \$.76/therm*

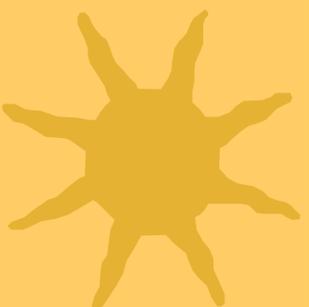
DMEA member value





Geo for Society

- ★ Geothermal heat pumps produce the lowest carbon dioxide emissions, including all source effects, of all available space-conditioning technologies (EPA, 1993).
- ★ A GeoExchange systems saves CO₂ on par with an equivalent investment in solar PV.
 - Based on Colorado's average electricity carbon load and DMEA's weather data.
 - This value will vary by utility (and will probably be better).



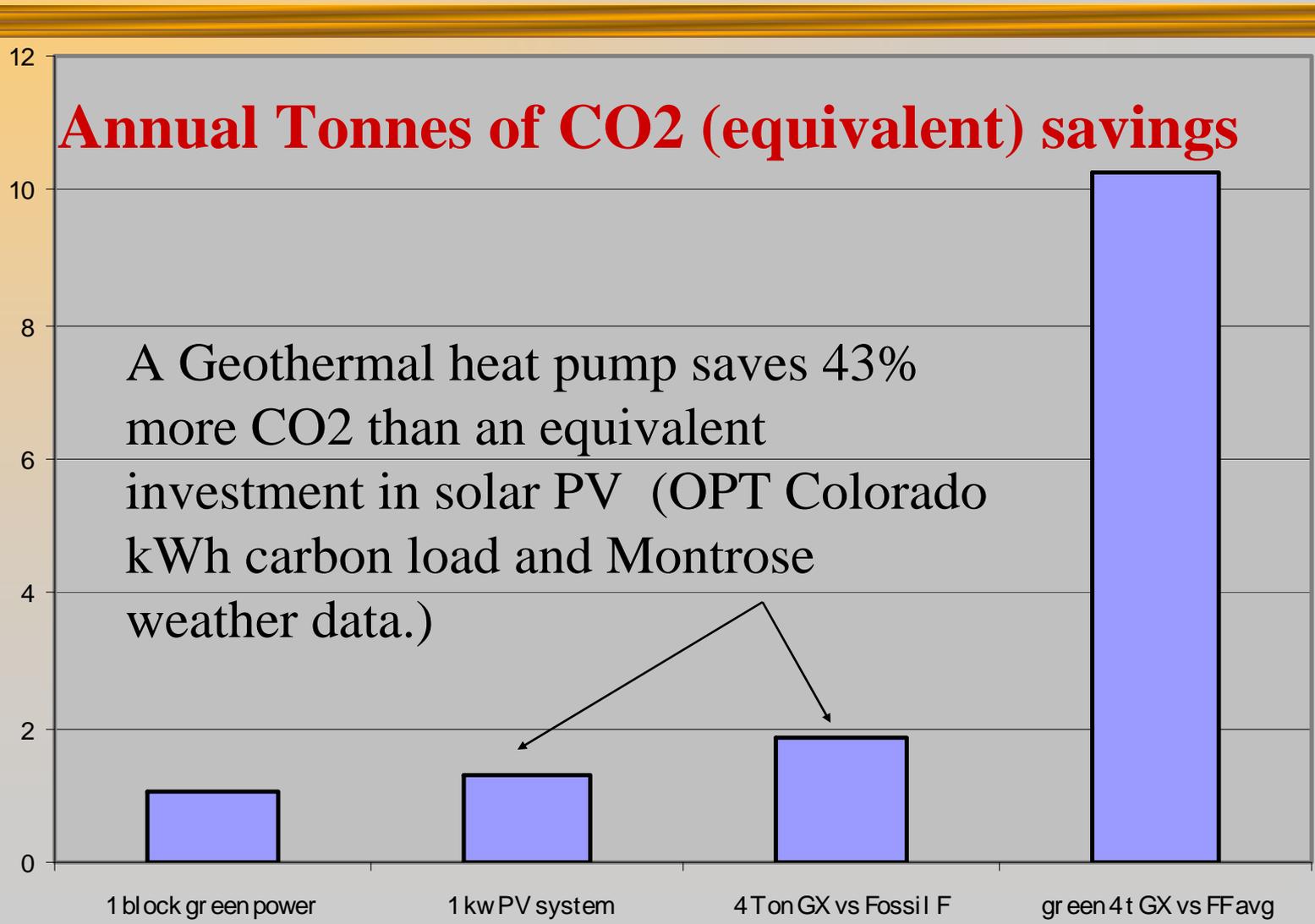
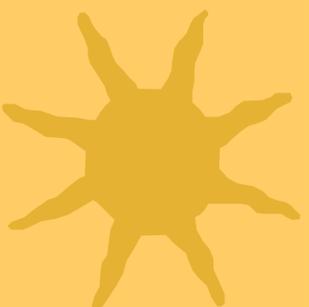


Geo for Society



- ★ DOE is working to officially designate GSHPs as a renewable energy resource.
- ★ Being recognized as a renewable energy source will should allow GSHPs to qualify for CO2 savings credits.

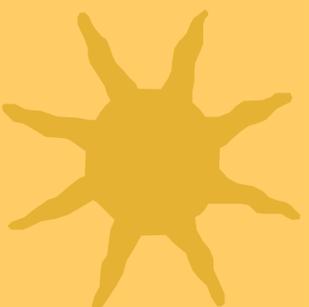
Geo for Society





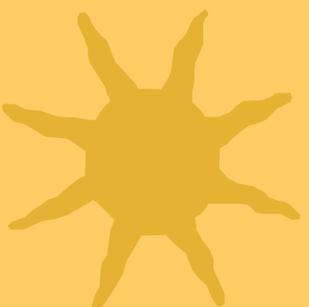
Geo for Society

- ★ Many states and cities are establishing emission reduction targets.
 - Boulder, Colorado has adopted the Kyoto target of a 7% reduction of greenhouse gases from 1990 levels by 2012.
- ★ California has set reduction targets of lowering emissions to 2000 levels by 2010, to 1990 levels by 2020 and 80% below 1990 levels in 2050.





Geo for Society

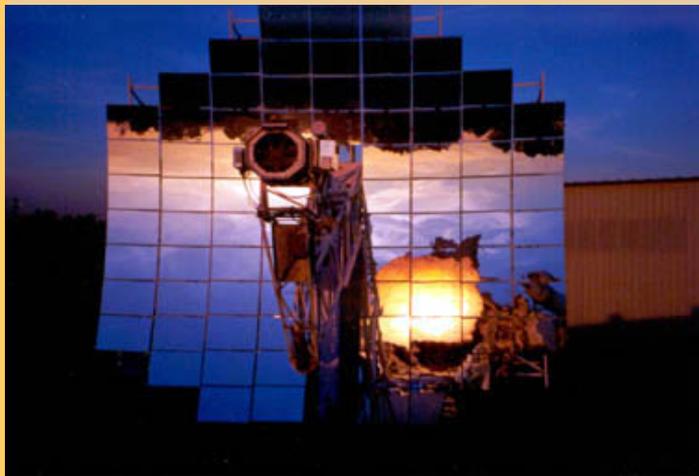


- ★ In the Northeast, the Regional Greenhouse Gas Initiative (RGGI) is being developed to introduce a carbon dioxide cap-and-trade program for utilities in participating states; the program will begin in 2009.
- ★ In the West, six states and two Canadian provinces are committed to cut greenhouse gases 15% by 2020 from 2005 levels. Participants include Oregon, Washington, California, New Mexico, Arizona, Utah, British Columbia and Manitoba



Geo for Society

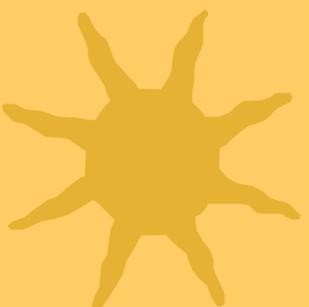
Geothermal Heat Pumps are a natural fit for using Green Electricity for Heating, Cooling & Water Heating





Geo for Society

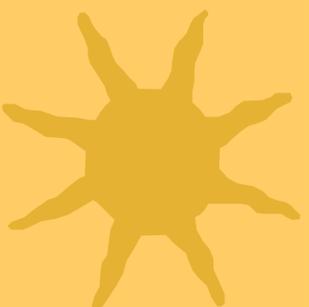
- ★ An average residential ground source heat pump will save 10 Tonnes of CO₂ per year using all green power when replacing conventional gas/propane heating & cooling (DMEA weather).





Geo for Cooperatives

- ★ The RUS is working to get GSHP loops into their standard loan program.
 - The GSHP loops become utility plant.
 - Loops look like street lights for billing.
 - New margin opportunity (earnings on plant).
 - Instant first cost savings for your members.
 - Drives positive cash flow cash flow for members.
 - Long term utility relationship and member satisfaction.





Geo for Cooperatives

★ H.R.2419

★ Food and Energy Security Act of 2007
(Engrossed Amendment as Agreed to by
Senate)

– SEC. 6108. ELECTRIC LOANS TO RURAL
ELECTRIC COOPERATIVES.

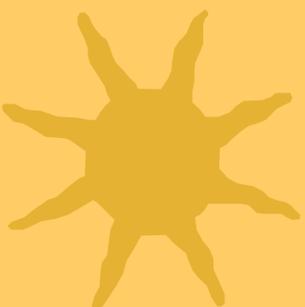
– “The committee notes that assistance is
authorized for renewable energy including
geothermal ground loops”



Geo for Consumers

Geothermal Heat Pump Development Act of 2007 (Introduced in Senate as 2314 IS).

- ★ To amend the Internal Revenue Code of 1986 to make geothermal heat pump systems eligible for the energy credit and the residential energy efficient property credit, and for other purposes.
- ★ section 48(a)(3) of the Internal Revenue Code of 1986 is amended by adding equipment which uses the ground or ground water as a thermal energy source to heat a structure or as a thermal energy sink to cool a structure.



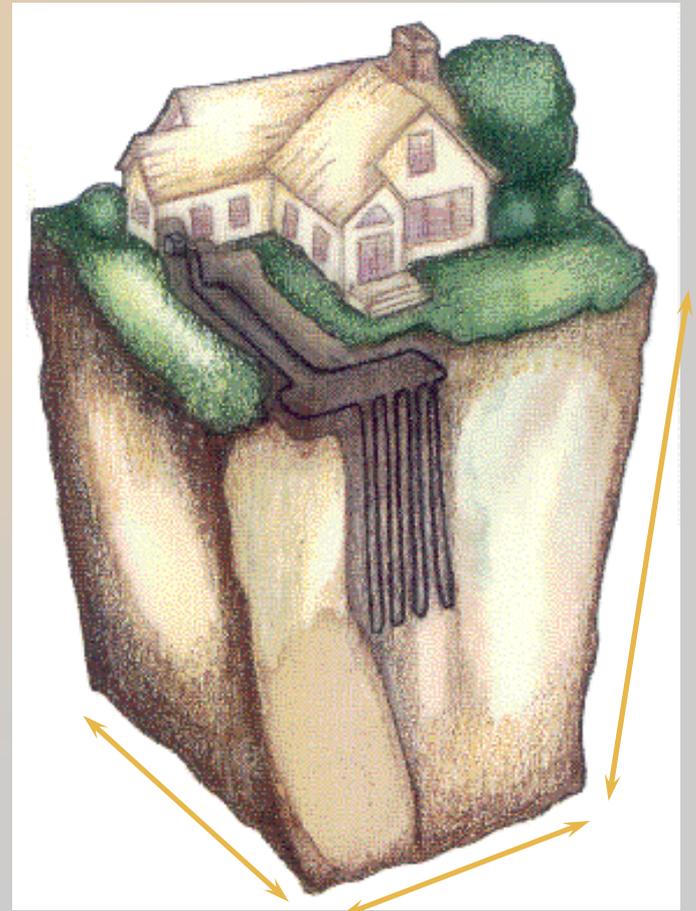


The GSHP “Market”

Needed: Mass market development for geo heat pumps

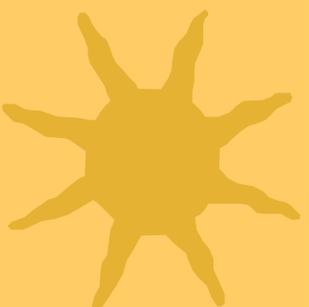
GreenHeat

heating & cooling a different world
with renewable energies





The GSHP “Market”

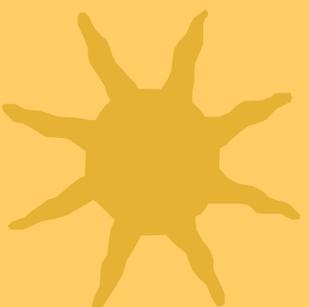


- ★ The national residential market for HVAC is 6.4 million “units” per year
 - Geo sales are a small component of this market
- ★ New home starts are down (a lot)
- ★ Retrofits and builder competition will be drivers
 - When folks are lined up to buy homes, efficiency does not matter.
 - \$3,000 propane bills hurt, a lot.
 - Natural gas prices are increasing



The GSHP “Market”

-
- ★ Making GSHPs a mass market technology will require:
 - Government support (federal, state, & local)
 - HVAC industry commitment
 - Adequate drilling contractors (backhoes don’t work in the suburbs)
 - Focused media/marketing
 - Utility support (preferably with financial help)
 - Consumer desire and confidence





Thank You For Your Attention! Questions?



**If you ever need a hand
you can reach me at:**

Paul Bony

pbony@dmea.com

970-240-1278



www.dmea.com

