

Shaking up the HVAC industry ...

**New Mexico Water and Natural Resources Joint
Committee Meeting**

Eric Austin

Western Farmers Electric Cooperative

September 4, 2014



Thermal Energy

[http://www.youtube.com/watch?feature=player_embedded
&v=y_ZGBhy48YI](http://www.youtube.com/watch?feature=player_embedded&v=y_ZGBhy48YI)

Thermal Energy

- Effective Storage – “Renewable Battery”
- Limitless Therms – Day or Night, Hot or Cold Weather
- Impacts the largest user of energy in home, HVAC. As well as the driver for Utility Peaks, which sets the utilities demand and costs, lowering this demand will reduce Generation and Transmission costs.

How to determine the RECs

- Each Heat Pump has a C.O.P., meaning Coefficient of Performance. They also have an EER rating given to them from the Factory. Both measurements could be used to determine the energy used from the ground. This would allow utilities and homeowners to know the amount of kWhs used/saved by the HVAC equipment and the amount of energy used that was stored in the ground.
- The kWhs used from energy storage would be the ones receiving the REC.
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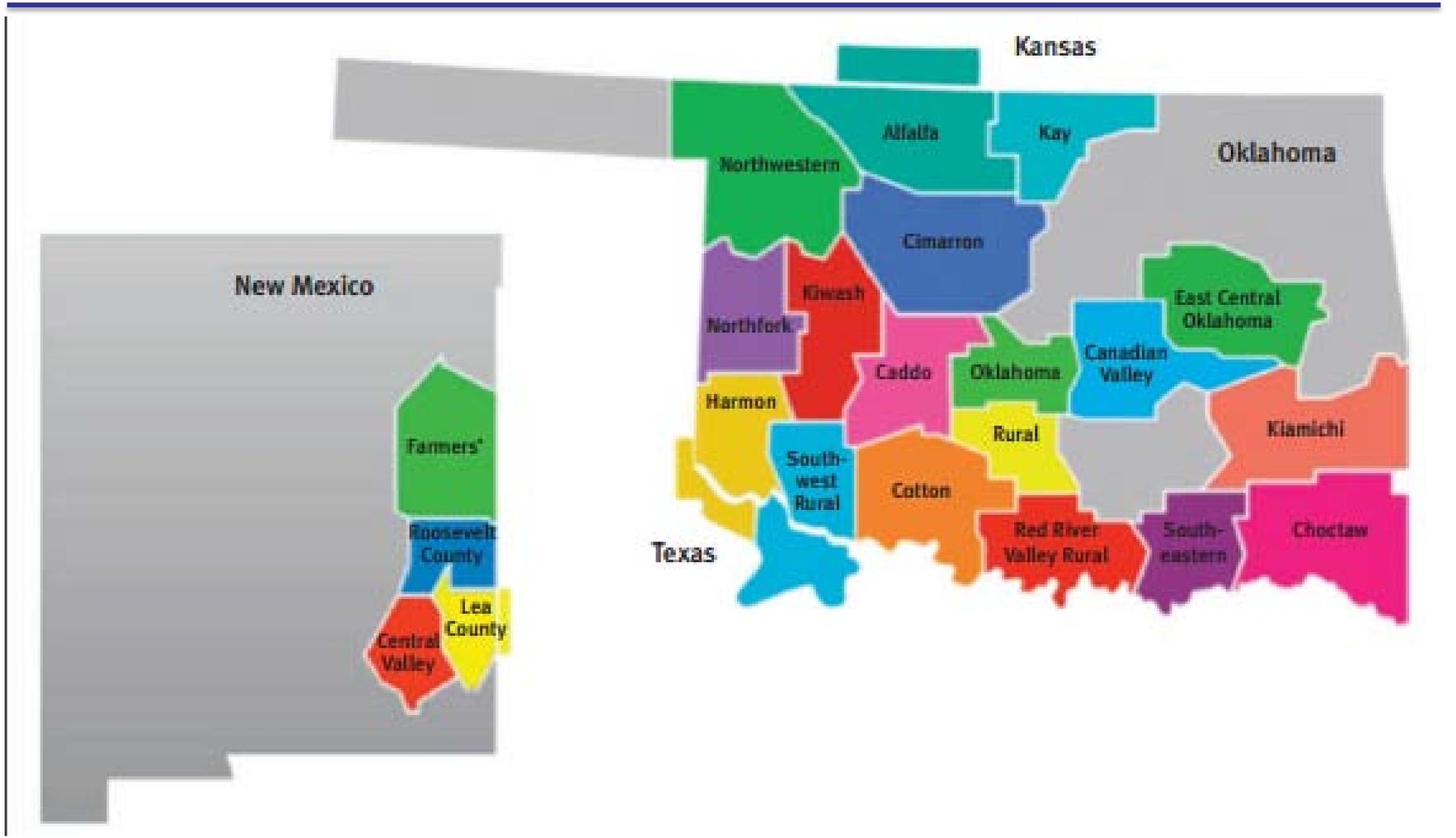
Maryland Energy Credits

- May 22,2012 the state of Maryland became the first state to make the energy generated by ground source heat pumps eligible for Renewable Portfolio Standards, as a tier one renewable source.

Western Farmers Geo Validation Study

- Western Famers wanted to begin a geothermal heat pump program in part of an exciting demand management and renewable energy program.
- We found that geothermal heat pumps made a perfect fit for our desired programs based on printed documentation from the HVAC industry, we used this validation study to ensure the numbers were accurate and the program would fit all of our goals when implemented.

WFEC Family ...



Geo Validation Project Overview

- Co-Sponsors

Bosch

ClimateMaster

Cooperative Research Network (CRN)

- 22 retrofits in two different states (17 in OK & 5 in NM)
- Sub-metering installed Jun 2013 to “baseline”
- All 22 retrofitted week of July 29 – Aug 2
- Sub-metering to continue through Oct 2014
- Lots of information and data to Validate ...

So what is being Validated?

- Consumer Perspective – Energy savings
- Customer Satisfaction – (immediate, end of year & final)
- Co-op Perspective – Demand Savings
- Average Loop Cost
- Average Retrofit Cost
- Loop temperatures – Validate adequate sizing
- Loop BTU Transfer – RPS requirements
- Carbon Reduction Potential
- Manufacture Software Projections

CRN's Role

CRN article to be published this quarter

This is the second in the series of three articles validating our results!

Prepared for Brain Sloboda at CRN by:

Peter May-Ostendrop (Xergy Consulting)

Laura Moorefield (Moorefield Research & Consulting)

- 1. Introduction to the program and scope of the project*
- 2. Focused on the results for the Summer 2013*
- 3. Focused on Winter Results 2014 and Customer Satisfaction & Economics*

Summer Results verified by CRN

Consumer Perspective

41.2 % Energy Savings

Co-op Perspective

	<u>All Homes</u>	<u>Fault Free</u>
Total Reduction (kW)	2.2	2.3
Percentage of Demand Reduction	39%	41%
Reduction per installed ton (kW/T)	0.55	0.59

The Big Picture ... a little can be a lot!

WFEC serves 263,800 residential consumers

$263,800 * 25\% = 65,950$ Homes

65,950 homes @ 4 Tons/home = 263,800 Tons

263,800 Tons @ 0.55 kW/Ton = 145,090 kW

Potential reduction of 145 MW of peaking capacity

At \$1850/kW to build ... this reduction could offset

\$268 million in future capacity

Winter Results – Co-op Perspective

Only 3 of the 22 installations showed any auxiliary heat strip usage during the Monthly CP for Dec - Jan – Feb

Note that none of the three locations had usage for more than one (1) five minute interval in any given peak hour

Thus in effect **no peak contribution** for the Geo installations for the largest winter peaks ever established by WFEC

GHG ... new ruling could be game changer!



Everybody Wins!

- Home Owner – wise investment with rising energy costs
- Distribution Cooperative
 - lowers wholesale cost of power
 - potential new revenue stream (thermal services)
- Co-op Members
 - lower wholesale \$ equates into lower kWh \$ (PCA)
- G&T
 - Lower capacity needs in the future
 - Potential carbon benefits
- Environment

The Proposed Model ...



Thermal Services

- Co-op can own the thermal loop as a utility service
- Just like poles and wires, the thermal service provides useful energy to the end user to use for heating, cooling, water heating and humidity control
- Service fee is collected for the utility service
- Provides a greater opportunity for more people to utilize geothermal heat pumps and offset the upfront costs

Current Cooperatives in New Mexico

- Roosevelt County electric cooperative currently has 20 geothermal units
- Farmers Electric cooperative currently has 10
- Central Valley electric cooperative has their headquarters heated and cooled with Geothermal heatpumps

Education

- Educating members of the benefits of Geothermal heat pumps has proven to be a challenge
- Distributers/ Installers/ Manufactures
- Drillers
- Utilities
- Geo Heat Pumps owners

Marketing Geothermal

- In an effort to get all parties involved in a marketing program, we had to think outside the box, take the numbers to the people and the program should grow.
- Area wide push to show savings on ground source heat pumps
- Fairs, events, annual meetings, relay for life, ect
- All levels of participation

A step in the right direction ...



www.gogogeochallenge.com

Go Go Geo - Energy Savings Calculator



State

Closest City

Conditioned Space sq ft.

Insulation and Air Leakage

HVAC Equipment Age

HVAC Equipment Efficiency

Heating Type

Water Heating Type

Closest City:

Conditioned Space:

Winter Load:

Summer Load:

Hotwater:

	Heating	Cooling	Hotwater	Lighting & Appliances	Total
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Existing Home:

Geothermal System:

Energy Saving:

Estimated Annual Saving:

Heating	Cooling	Hotwater	Lighting & Appliances	Total
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Existing
 Geothermal

Sponsors






Utility Rates

Disclaimer: This is a demonstration of the potential savings and is not an implied promise of actual savings.

Go Go Geo Input Sheet

State	Oklahoma	New Mexico
Closest City	Oklahoma City Tulsa	Albuquerque Clovis Farmington Las Cruces
Conditioned Space		Enter Sq Ft of Home
Insulation and Air Leakage	Poor Average Good Excellent	Circle Best Answer
HVAC Equipment Age	< 3 yrs 3-15 Yrs > 15 Yrs	Circle Best Answer
HVAC Equipment Efficiency	Standard High	Circle Best Answer
Heating Type	Nat. gas Electric resistance Electric Heat Pump Propane Fuel Oil	Circle Best Answer
Water Heater Type	Nat. Gas Electric Propane Fuel Oil	Circle Best Answer



Go Go Geo - Energy Savings Calculator

Closest City: Oklahoma City
 Conditioned Space: 2400sq ft.
 Winter Load: 52950 Btu/hr
 Summer Load: 47800 Btu/hr
 Hotwater: 71 Gal/day

	Heating	Cooling	Hotwater	Lighting & Appliances	Total
Existing Home:	\$ 2749	\$ 743	\$ 907	\$ 947	\$ 5346
Geothermal System	\$ 506	\$ 376	\$ 405	\$ 947	\$ 2234

Energy Saving: 58 %
Estimated Annual Saving: \$ 3112

State:

Closest City:

Conditioned Space: sq ft.

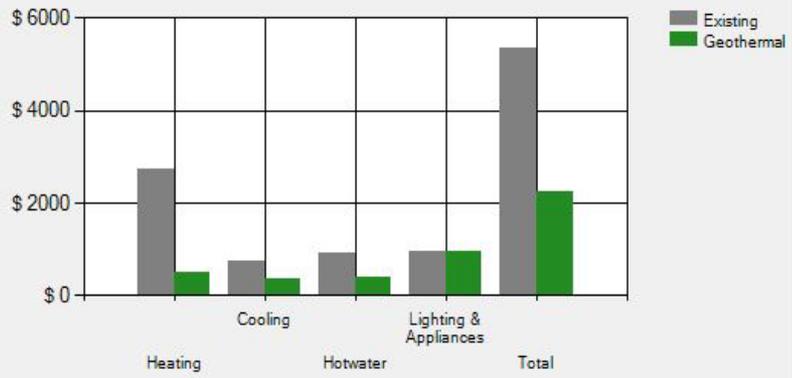
Insulation and Air Leakage:

HVAC Equipment Age:

HVAC Equipment Efficiency:

Heating Type:

Water Heating Type:



Sponsors



BOSCH



Utility Rates for Oklahoma

	Winter	Summer	
Electricity	\$ 0.105	\$ 0.115	kWh
Natural Gas	\$ 1.08	\$ 2.22	Therm
Propane	\$ 2.73	\$ 2.54	Gallon
Fuel Oil	\$ 3.87	\$ 3.6	Gallon

Disclaimer: This is a demonstration of the potential savings and is not an implied promise of actual savings.

Grand Prizes



Program Goals

Primary Goal

25,000 home owners to take the “Challenge”



Secondary Goal

To get as many as possible to retrofit their home to Go Geo before the tax credits expire.



Questions