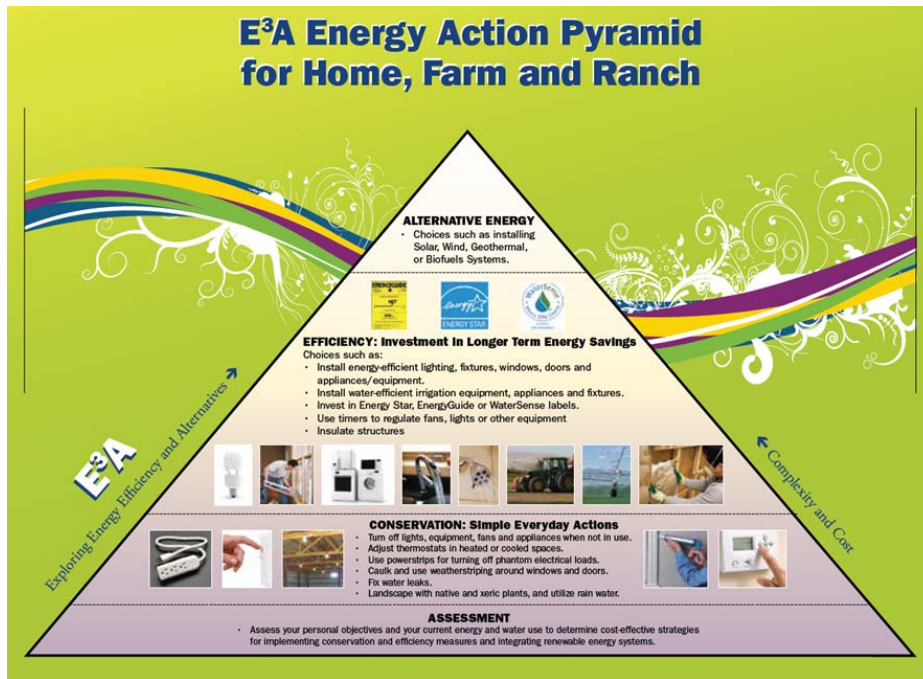


A Pyramid for Action

<http://renewables.uwyo.edu>

Milton Geiger – (307) 766-3002 or mgeiger1@uwyo.edu



Incentives:

Residential

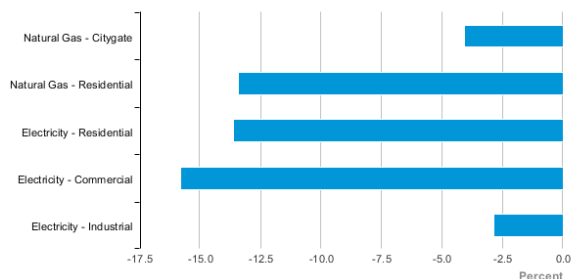
- Federal Tax Credit (2016)
 - 30% for solar, geothermal, and wind
 - Energy efficiency expired (2013)
- State
 - Net metering
 - Sales tax exemption expired (2012)
- Utility
 - Numerous for energy efficiency
 - Some for heat pumps

Commercial

- Federal Tax Credit (2016)
 - 30% for solar and wind, 10% for geothermal
- Accelerated depreciation (2016)
 - MACRS (6-year rapid) on renewable energy equipment
- USDA Rural Development Rural Energy for America Program (REAP)
 - 25% on renewable energy and energy efficiency equipment
- USDA NRCS (Ag only)
 - Environmental Quality Incentives Program (EQIP) and others

Context:

Wyoming Price Differences from U.S. Average, Most Recent Monthly



Heating and cooling with renewable energy

<http://renewables.uwyo.edu>

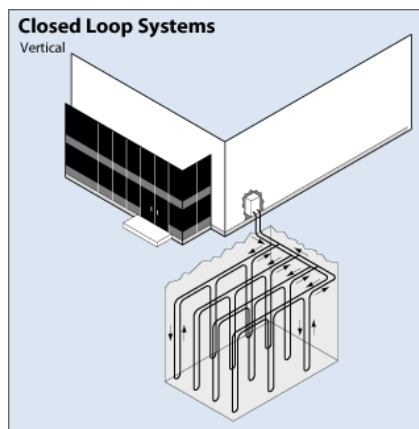
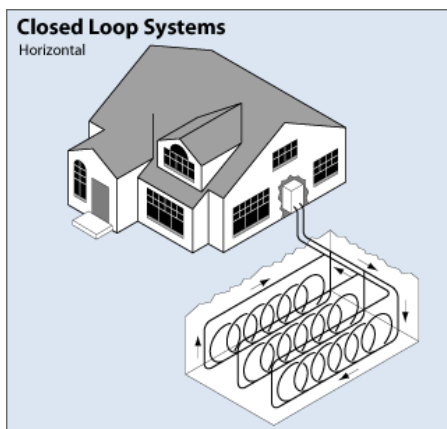
Milton Geiger

mgeiger1@uwyo.edu

307-766-3002

The take home – “Eat the bigger piece of the pie.”: The ½ to ⅔ of household energy use that is used to heat water and condition living space.

Typical Geothermal Heat Pump (aka Ground Source or Geoexchange) Design



GSHP Details:

How

- Use relatively constant temperature of the earth
- Heat pump is like your refrigerator

What

- Heats and cools structure with the potential to heat domestic hot water

Where

- Adequate space for horizontal, pond, or vertical loop field
- Most cost effective in new construction or where expensive alternative (electric or propane) exists

Why

- Very efficient: 3-6 CoP (1 unit of electricity yields 3-6 units of heating/cooling)
- Safe, durable, and low operating cost

Why not

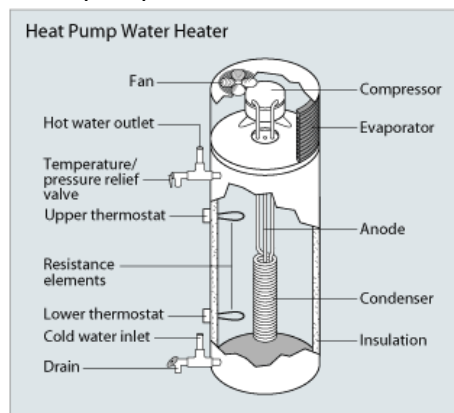
- High upfront cost, require ground disturbance, not suitable for all heating types (e.g. hot water boiler)

How much:

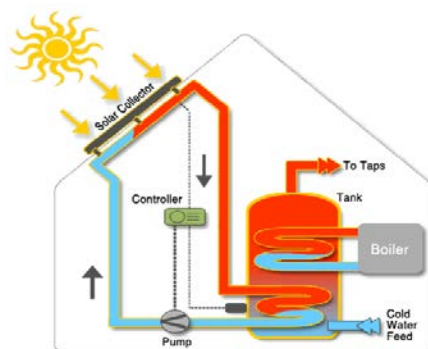
- NREL estimates \$7518/ton capacity (2-3 tons for average household) with large variation (\$4164 std. dev.)
- 30% federal tax credit and utility incentives (~\$150-500) available

Other Options

Air source heat pumps and water heaters



Solar thermal



Note: All graphics from DOE EERE