

Title: Using Geothermal Energy

Name _____

Introduction: Begin this activity by opening this webpage and reading the information. Look for the location of your home and school on the map.

https://geology.utah.gov/docs/emp/geothermal/geothermal_in_utah.pdf

Imagine in this activity that your home sits on rock with hot water in fissures below. The hot water can be piped out at a temperature of 80°C.

Your challenge is to deliver the underground water to hot water heaters in your home at a temperature of 50°C (warm enough to change air temperature to about 20°C) without a significant net loss of energy. You will have a variety of materials to work with and do not need to use all of them.

Materials: 2-liter soda bottle, plastic tubing, tubing connectors and clamps, stoppers, stopper adapters, insulating materials, 2 liter plastic beaker, hot pads, hot water, digital thermometer, styrofoam.

Safety information: Water at 80°C can cause discomfort to your skin. Handle the hot water with hot pads and pour carefully. Starting temperature for your water in the system must be less than 80°C

Criteria: U. Water is delivered out the end of the tube at 50°C. It must remain at this temperature for 30 seconds or more. The heat loss is captured and measured and as little as possible is released to the environment.

Constraints:

1. The system should seem possible for a home. (no ice cubes) Place directly in hot water
2. 500 mL at a time can be tested. Additional tests are allowed.
3. Any heat loss or gain must be identified and measured.
4. Heat loss must be prevented or reclaimed at least partially.
5. Careful documentation of the amounts of water used and its temperatures must be made. Your results may have to be verified.

Design your first attempt. The set-up for delivering the hot water is as shown:



Data: Record your results. Add titles to the columns.

Trials	Trial 1	Trial 2	Trial 3	Trial 4
Starting temp				
Time at 50C				
Ending temp				
Change in temp				

Re-test. What will you do differently a second time?

Re-test. What will you do differently a third time?

Analysis:

1. Did you achieve 50°C? For how long?

2. How was heat lost from the hot water?

How much heat was lost?

3. Where did the heat go?
4. What is the total heat change in your system? (use $q = mc\Delta T$) How much was lost to the environment?
5. From the map on the website, how likely are people living in your area to have a source of geothermal energy?
6. What are the benefits of geothermal energy?
7. What are drawbacks?