



UTAH OFFICE OF
ENERGY DEVELOPMENT

Using Natural Resources in Utah

Grade/Subject: Earth & Space Science

Strand/Standard ESS.4.1 Construct an explanation for how the availability of natural resources, the occurrence of natural hazards, and changes in climate affect human activity. Examples of natural resources could include access to freshwater, clean air, or regions of fertile soils. Examples of factors that affect human activity could include that rising sea levels cause humans to move farther from the coast or that humans build railroads to transport mineral resources from one location to another. (ESS3.A, ESS3.B)

Lesson Performance Expectations: Students will look at maps of energy sources in Utah and compare them to the geography and population centers in Utah to explain where new sites should be proposed.

Materials:

- Copy of student sheet
- Access to the internet for each student, or maps printed from the following links:
- [Utah Energy Resources Story Map](#)
- [Utah Solar Radiation Map.](#)
- [Geothermal Map.](#)
- [Oil and Gas Field Map](#)
- [Interactive Map of Wind Farms](#) Possible [Video](#) to show
- [Utah Coal Fields](#)
- [Utah Road Map](#)
- [Utah geologic Map](#) (scroll down for multiple versions of the map)

Time: 1 - 60 minute period

Teacher Background Information:

- Today's modern world requires electricity. Our cars and other forms of transportation require fuel, and all of the machinery necessary to make material goods in plants and factories use energy. Without electricity, our day-to-day life would be very different. Electricity is a secondary source of energy produced from other primary sources of energy, such as coal, petroleum, natural gas, solar, hydro, geothermal, wind, and other sources found right here in Utah. These natural resources make the electricity and other forms of energy we rely on daily.
- Utah has a diverse range of natural energy resources. See this link for a summary: [EIA State Energy Profile](#)
- Hydrocarbons (fossil fuels) are our primary energy sources to generate secondary sources like electricity, gasoline, and other fuels.

Student Background Knowledge:

- Students understand what natural resources are and how they impact our economy and environment.
- Students know the difference between renewable and non-renewable energy.

Teacher Step by Step: A 3-d lesson should insist students do the thinking. Provide time and space for the students to experience the phenomenon and ask questions. The student sheet provided below provides guidance but is only an example of how students might respond.

1. **Introduce Phenomenon:**

- a. Show students this link to this website: eia.gov
 - b. Ask students what questions they have about the phenomenon. Have them record questions on their student sheet
2. **Brainstorm:** What are energy sources? What is the breakdown and percentages of each energy source used in Utah? What are the different limitations of each energy source? Ask students to brainstorm energy sources available in Utah and list them on their student sheets. Record their responses on a master list on the board.
 3. **Research:** Ask students to pick one (or two if time allows) energy source to answer the questions. Students will need internet access.
 4. **The Question:** Where is the best place in Utah to develop energy sources?
Explain to students that they will be looking at energy sources in Utah and how they are developed to meet the increasing demand. They will use online or printed information to construct an explanation. They will develop a claim concerning two energy resources that describes the location and the evidence they used to place them there. The maps and resources should guide them to use geography, human population, and transportation systems to make rational choices based on evidence. They should describe their reasoning to conclude their explanation.
 5. **Obtain Information:** Allow students to look at the following resources by downloading and printing the following maps or allow students to look them up online.
 - a. [Renewable energy locations in Utah](#)
 - b. [Utah Solar Radiation Map.](#)
 - c. [Geothermal Map.](#)
 - d. [Oil and Gas Field Map](#)
 - e. [Interactive Map of Wind Farms](#)
 - f. [OED Wind Energy Video](#)
 - g. [Utah Coal Fields](#)
 - h. [Utah Road Map](#)
 - i. [Utah Geologic Map](#)

Construct an Explanation

Students will use the information from their research to propose a location for two energy sources based on evidence of the availability of natural resources and the ease of access and transportation.

Assessment of Student Learning.

Students will construct an explanation. The claim may state that a resource should be located in a particular place. Evidence should include data from Utah geology, population centers, and transportation and weather patterns. The reasoning should include statements that Utah has an abundance of energy-rich locations.

Standardized Test Preparation:

Using Natural Resources in Utah

1. What factors are considered when natural resources are selected for energy development? Choose all that apply.
 - a. If they are available nearby.*
 - b. If the cost is affordable to people.*
 - c. If the resource can replace other resources.
 - d. If it can be transported to where it is needed.*

2. What questions are most important when considering the use of solar and wind power? Choose all that apply.

- a. Are the sunshine and wind available most of the time?*
- b. How far does the energy have to travel to be used?*
- c. Is the cost of development balanced by its value?*
- d. Will energy development have environmental benefits?*

3. What are the reasons oil, gas, and coal resources have historically been developed in Utah? Choose all that apply.

- a. They are renewable and will not run out.
- b. There are systems in place that use these fuels.*
- c. They are the easiest and cleanest to mine and use.
- d. These natural resources are found in Utah.*

4. An owner of a parcel of land located in west-central Utah wishes to develop an energy source. What are the most likely resources available for development? Choose all that apply.

- a. Oil
- b. Gas
- c. Coal
- d. Solar*
- e. Wind*



Extension of lesson:

- Have students research their electric provider and what resource(s) they use to generate electricity. Have them research their monthly electricity usage and develop ways to conserve energy at home.
- Research and compare the costs of coal, solar, and wind energy and the amount of real energy production (not potential) from the same resources. Then have a class discussion using those findings. Utah Geological Survey (UGS) is an excellent resource.
- Have students choose an energy source and write an essay on how it benefits the state of Utah (job development, income, etc.).

Career Connection:

- Geologist, Natural Resource Manager, Environmental Scientist, Geoscience Engineer.

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Name _____

Phenomenon: Observe the phenomenon. Write down three questions about what you see.

- 1.
- 2.
- 3.

Brainstorm as many energy sources as you can.

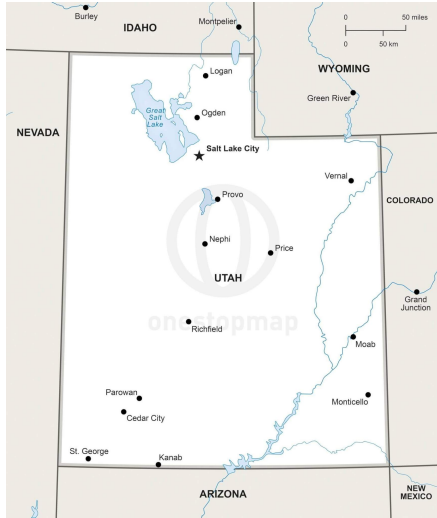
Research: Choose _____ energy sources and answer the following questions

1. How is the source accessed? What equipment is needed?
2. How many people are required to develop this source? Maintain it?
3. How is the energy transferred from the source to its intended use?
4. What environmental issues might affect the use of this source?

Question: Where are the best places to develop energy resources in Utah? These maps will provide information.

1. [Utah Energy Resources Story Map](#)
2. [Utah Solar Radiation Map.](#)
3. [Geothermal Map.](#)
4. [Oil and Gas Field Map](#)
5. [Interactive Map of Wind Farms](#)
6. [Utah Coal Fields](#)
7. [Utah Road Map](#)
8. [Utah Geologic Map](#)

Use the map below to place two choices for different types of energy sources. Label them by type.



Explanation: Explain your choices. Be sure to include information from the maps and other resources you may have used.

First Energy Choice

My Claim

My Evidence

My Reasoning

Second Energy Choice

My Claim

My Evidence

My Reasoning