

GOVERNOR'S OFFICE OF
ENERGY DEVELOPMENT

Advancing Utah's Energy Future



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 fresh water, 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 it 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:
- [Renewable energy locations in Utah](#)
- [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](#)

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 required 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 nice summary: <https://www.eia.gov/state/analysis.php?sid=UT>
- Hydrocarbons (fossil fuels) are our main sources of energy to generate secondary sources (such as 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 photo or follow the link to this website: <https://www.eia.gov/state/analysis.php?sid=UT>



- 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. Internet access will be needed.
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 being developed to meet the increasing demand of our growing population. 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 it 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:** Give students the opportunity 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](#) Possible [Video](#) to show
 - f. [Utah Coal Fields](#)
 - g. [Utah Road Map](#)
 - h. [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. Reasoning should include statements Utah has an abundance of energy-rich locations.

Standardized Test Preparation:

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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 the energy development have environmental benefits?*

3. What are 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. A parcel of land is located in west-central Utah and its owner 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 and Career Connections:

- Have students research who their electric provider is and what resource(s) they generate electricity from. Have them research their own monthly electricity usage and come up with ways to conserve energy at home.
- Research and compare both the costs of coal, solar, and wind energy, as well as 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.).

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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 are environmental issues that 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. [Renewable energy locations in Utah](#)
2. [Utah Solar Radiation Map.](#)
3. [Geothermal Map.](#)
4. [Oil and Gas Field Map](#)
5. [Interactive Map of Wind Farms](#) Possible [Video](#) to show
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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