ELEMENTARY

Energy production

from the Esri GeoInquiries™ collection for Upper Elementary

Target audience – Upper elementary **Time required – 15 minutes**

Activity	In this activity, students will learn about energy production and consumption in the United States.
Standards	**NGSS:4-ESS3-1.** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. **C3:D2.Geo.2.3-5.** Use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions and their environmental characteristics.
Learning Outcomes	• Students will compare the amount of money spent on electricity across the country by state and by county. • Students will analyze patterns of electricity generation across the United States.

Map URL: http://esriurl.com/fourGeoinquiry14

Engage

How does electricity affect our lives?

? What type of electricity do we use in our homes? *[Alternating current]*

? Where does that electricity come from? *[It is produced in power plants and transmitted through power lines to our homes.]*

Explore

Who spends the most money on all energy costs?

→ Click the map URL link above to open the map.

→ From the Details pane, click the button, Show Contents Of Map.

→ To see the legend click the layer name, All Energy Expenditures Per Capita ($) 2013.

? What states spend the most money per person on energy? Hint: Click the state for pop-up information or use the legend. *[North Dakota, Alaska, Wyoming, Louisiana , andTexas]*

→ Click off the checkbox next to the layer name, All Energy Expenditures Per Capita ($) 2013.

→ Click the checkbox next to all 11 layers of US Power Plants.

? Do the states that have the highest energy expenses have the most power plants? *[No. Electricity production costs are related to the type of fuel used in generating the electricity.]*

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Explain

What renewable sources of energy create electricity?

→ Turn off the coal, natural gas, nuclear, other, and petroleum layers.

? What is the difference between renewable and non-renewable resources? *[Renewable resources will never run out, while non-renewable resources can eventually run out of supply.]*

? What energy plant types are renewable? *[Geothermal, hydroelectric, pumped storage, solar, wind, and biomass]*

? Where are the most geothermal, hydroelectric, solar, biomass, and wind plants located? *[North Carolina, California, New Jersey, and Massachusetts]*

? What are the electricity generation types in your state? *[Answers will vary based on state.]*

Elaborate

Which states are using non-renewable sources of energy?

? Which states use mostly renewable resources? *[Nevada and Arizona]*

→ Turn off the renewable energy power plant layers. Turn on coal, natural gas, nuclear and petroleum

? Do you see patterns of where non-renewable resources are used? *[The South and Midwest have the greatest amount of non-renewable resources used for electricity generation.]*

? Which states would you recommend transition to more renewable energy sources? *[Answers will vary, but may include Texas, Oklahoma, and Mississippi.]*

TURN A MAP LAYER ON AND OFF

- Make sure that the Details pane is visible, and click the button, Show Contents Of Map.
- To show individual map layers, click the check box next to the layer name.
- If a map layer name is gray, zoom in or out on the map until the layer name is black. The layer can be turned on.

IDENTIFY A MAP FEATURE

- Click any feature on the map, and a pop-up window will open with information.
- Links and images in the window are often clickable.
- An arrow icon in the upper-right of the window indicates that multiple features have been selected. Click the button to scroll through the features.

Next Steps

DID YOU KNOW? ArcGIS Online is a mapping platform freely available to public, private, and home schools. A school subscription provides additional security, privacy, and content features. Learn more about ArcGIS Online and how to get a school subscription at http://www.esri.com/schools.

THEN TRY THIS...

• Explore wind farms with the *Wind Farms: I'm a Big Fan* story map at http://esriurl.com/Geo552.

• Learn about renewable energy with the *Mapping Renewable Energy Around the World* story map at http://esriurl.com/Geo553.

TEXT REFERENCES

This GIS map has been cross-referenced to material in sections of chapters from these texts

- *Science: A Closer Look by Macmillan/McGraw-Hill — Chapter 12*
- *Science, Level 4 by Harcourt — Unit F, Chapter 1*

Version Q1 2018. Send feedback: http://esriurl.com/GeoinquiryFeedback