Investigating Energy in My State

MIDDLE AND HIGH SCHOOL

SUMMARY

Energy is an important part of our daily lives. How we extract/harness, generate, transport and consume energy impacts the environment, the economy and communities. In this activity you will take a look at energy in your state, specifically around consumption, renewable energy, coal, carbon dioxide and solar and wind potential.

MATERIALS

- Internet access
- Phone or computer to conduct virtual interviews

WHAT TO DO

- Complete Activity 1: Assessing What I Know.
- Complete Activity 2: My State and Energy.
- Complete Activity 3, My Community.

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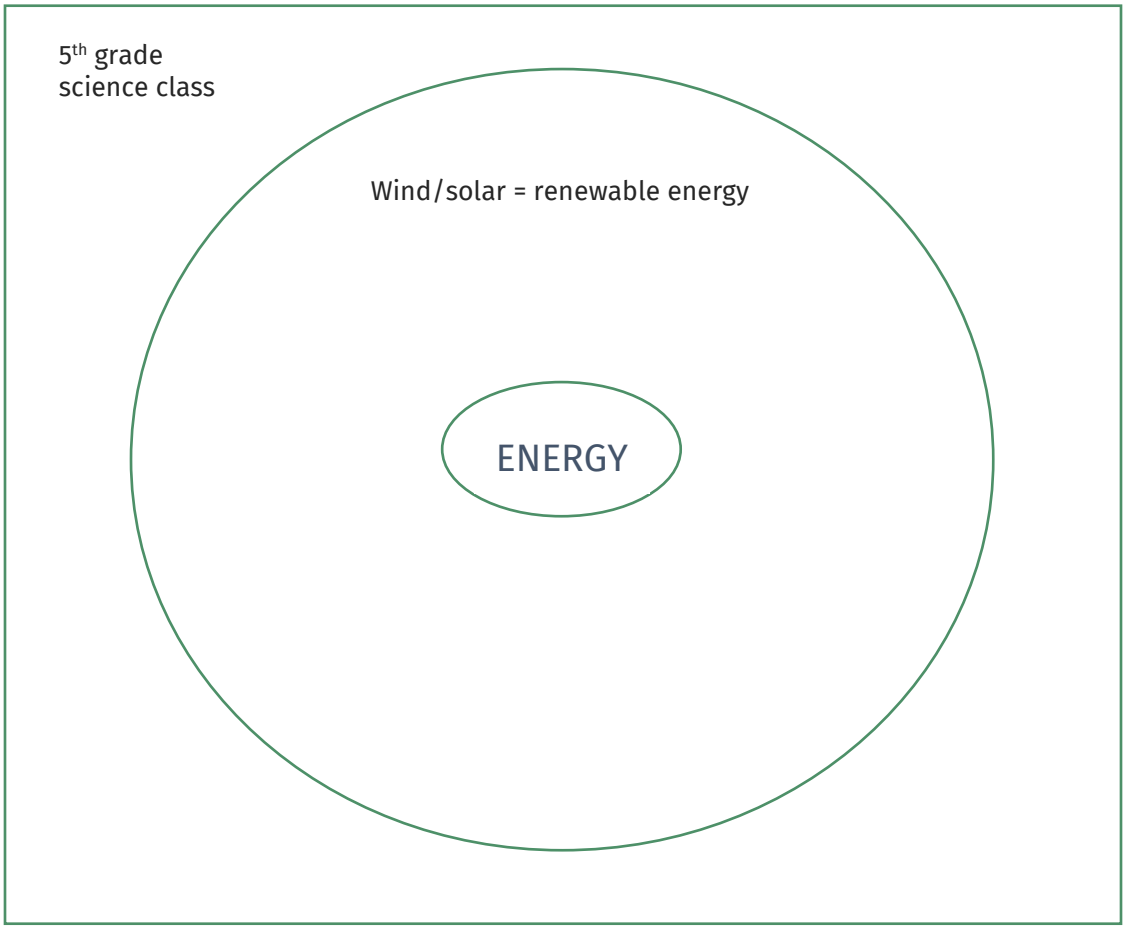
ACTIVITY 1: ASSESSING WHAT I KNOW

1. What is your current mental model around energy? Use the energy graphic organizer below to acknowledge what you know about energy.
   - In the large circle write what you know. These can be single words, statements, or sentences.
   - In the square, write how you know this information? Did you read about it in an article, learn it from a teacher, listened to a podcast, etc.
   - See example below.



SHARE YOUR MENTAL MODEL @ECOSCHOOLSUSA #EcoSchoolsAtHome

2. Spend 15-20 doing some internet research about renewable energy. These guiding questions are here to help you get started. Come up with more or write down facts you come across while searching.
    - How is renewable energy defined?
    - How much of the energy produced in the U.S. is renewable? How much of the consumed energy in the U.S. is renewable?
    - Are there differences in use between commercial and residential?

3. Based on your research, what new facts can you add to your renewable energy graphic organizer.

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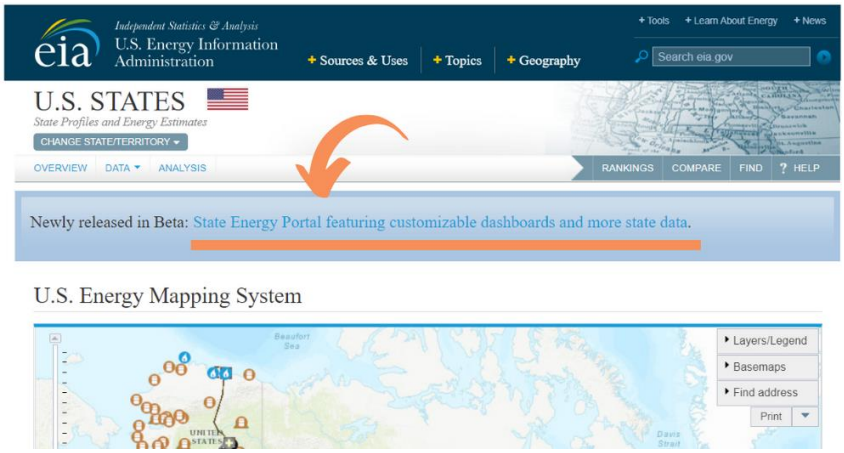
ACTIVITY 2: WHAT DOES MY STATE'S ENERGY MAP TELL ME ABOUT OUR ENERGY USE?

- Go to U.S. Energy Information Administration's *Energy Mapping System*, https://www.eia.gov/state/maps.php.
- Click on the newly released in Beta: State Energy Portal, scroll down and click on your state.



- Spend five minutes exploring the page. Use the tabs, OVERVIEW, DATA, and ANALYSIS to toggle back forth between types of data you are exploring.
- Starting on the next page, answer the questions using the data found for your state.

1. Define these terms. You will see them used while answering the questions.
   - British thermal unit (Btu), https://www.eia.gov/energyexplained/units-and-calculators/british-thermal-units.php:

   - commercial sector, https://www.eia.gov/dnav/pet/TblDefs/pet_pri_prop_tbldef2.asp:

   - industrial sector, https://www.eia.gov/dnav/pet/TblDefs/pet_pri_prop_tbldef2.asp:

2. **Electric power sector by source**. What are the total trillion British thermal units (BTUs) for your state? Looking at the electric power sources, what percentage of the whole is attributed to renewable energy?

3. **End-use consumption by sector**. Using the data in this section, create a pie chart. Include a title and appropriate labels.

4. Click on the coal icon in the section titled, **electric power sector consumption by source.**
   - **Coal consumption estimates by sector, annual**. Looking solely at the electric power sector (brown line), what conclusion can you draw about coal in the last 10 years?

   - **Average number of coal mining employees**. If you are in a state where coal is not produced, write N/A as your answer. What has been the trend for coal mining employees in the last ten years? Why has this happened? What ideas/solutions do you have to support former coal miners in need of work?

   - **Energy related carbon dioxide emissions from coal by sector, annual.** Looking at only electric power (brown bar) how has carbon dioxide emissions changed over time - has it gone down, gone up or fluctuated? For the most recent year data is available how much carbon dioxide what emitted by electric power?

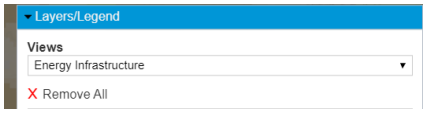
5. Click on the renewable energy icon in the section titled, **electric power sector consumption by source** and answer the following questions.
   - Where is your state's rank for **Renewable Energy Consumption**?
   - **Net electricity generation by renewable resource, monthly**. What renewable resource drives the majority of the renewable energy electricity generation?

   - **Renewable energy consumption estimates, annual**. For the most current year data is available, what were the estimated billion Btus of solar consumed? Wind?

   - **Electricity generation estimates of small scale solar, monthly**. Has electricity by solar power increased or decreased over time? Explain why you think this has happened?

   - Find the table labeled **alternative fueling stations**. Use the toggle arrows to go to the second set of data, **Electric Vehicle Fueling Stations**. How many fueling stations are there in your state? What might this say about electric vehicles in your state? What other information would you like to know before drawing conclusions?

- Scroll down to the map, **U.S. Energy Mapping System** with renewable energy layers. Click on Layers/Legend and remove all. With all the layers removed add: STATE MASK and under ALL POWER PLANTS click on BIOMASS, GEOTHERMAL, HYDROELECTRIC, SOLAR and WIND POWER PLANTS. Close the layers dropdown. Looking at your state with all the renewable energy plants shown, where would you put your state on a scale from 1 to 5, where 1 are no renewable energy resources and 5 are a lot of renewable energy resources?



- Using the same map, clear the filters by clicking remove all. Add STATE MASK, SOLAR RESOURCES (almost at the bottom). Also, click the plus sign to expand the legend. In what part of your state is the great potential for solar based on kWh/m2/Day Global Horizontal Irradiance? Follow the same instructions for wind as you did for solar, clicking either On Shore 50 Meter Tower Wind Potential, Off Shore 90 Meter Tower Wind Speed or both. Be sure to click the plus sign to expand the legend. What part of the state has the greatest potential for on shore wind power?

6. Scroll back up to the top of the page and click on **Overview** tab, that is found below your state name. Scroll down to your state's facts and read the 5-6 facts selected. Did you know any of these energy facts about your state?

7. Keep scrolling down, until you see **Selected rankings for** your state. Click on **View all rankings**. Use this page to answer the following questions.
    - Where does your state rank in -
        - **total energy consumption per capita**?
        - **total energy production**?
        - **total carbon dioxide emissions?**
        - **average retail price of electricity to residential sector?**

8. Summarize what you've learned about your state and energy. Be creative. Writing is only one way to demonstrate what you know!

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ACTIVITY 3: MY COMMUNITY

1. Watch: Against the Wind, segment from the Years of Living Dangerously, https://youtu.be/btFe0zd1t9c. As you watch, take some general notes and be thinking about your own community. Guiding question: In this case, what problem did wind technology solve?

2. Write a list of some of the issues that plague your community, these could be ongoing/longstanding issues or event-based issues, such as impacts from extreme weather events? Can renewable energy technologies be a part of any of those solutions? Why or why not?

3. What impact does/could renewable energy technologies have on under-resourced communities?