Energy Data Jam
Communicating Data to Non-Scientists

Description
Students will identify trends in New Mexico energy consumption data and then develop and present a creative project (infographic or poem) to communicate the data to nonscientists. They will apply their understanding of energy production, energy use, and global climate change to understand energy issues in New Mexico.

Phenomenon
Human behavior is changing Earth's atmosphere and affecting the climate.

Objectives
Students will:
- Analyze New Mexico energy consumption data, both by source and end-use sector
- Identify and explain a data trend
- Develop a creative project to portray a data trend and communicate scientific data to nonscientist audiences

Grade Level
5 – 8

Time
1 Hour

Materials
- *Energy Data Jam* handout [1 per student]
- PowerPoint presentation
- Computer and projector for the educator*
- A large assortment of drawing materials* to be used for creative projects (infographics and poems) such as: blank paper, markers, and/or crayons.

*Not included in kit

Background
As demonstrated in the last three activities, climate change is closely tied with human energy production and consumption. Burning fossil fuels for energy production releases CO_2 into Earth's atmosphere. In Insulating You, Insulating Earth, we reviewed how CO_2, as a greenhouse gas, absorbs the radiated thermal energy from Earth and re-emits it back to the planet instead of allowing it to escape into space. This enhanced greenhouse effect is causing average global temperatures to increase. The enhanced greenhouse effect will also likely increase energy consumption since rising temperatures are predicted to create a greater need for energy for air conditioning. In Energy Audit and Energy Resources and Use, we connected human energy production and consumption to greenhouse gas emissions into the atmosphere. Students will look closely at trends related to energy production and consumption in New Mexico in this activity.

New Mexico is the United States' fourth largest supplier of energy. This energy is mainly in the form of nonrenewable resources, such as natural gas and petroleum. While New Mexico's climate creates the potential for large-scale wind and solar projects, renewable energy only supplies 48% of the state's electricity production. Consumption follows a similar trend to production, with the majority supplied from nonrenewable sources.

To meet the needs of increasing energy demand (due to human population increase and temperature increase) and to mitigate the further effects of climate change, a shift to renewable energy is inevitable. By looking at New Mexico's energy consumption data, students will be able to identify where energy in New Mexico comes from and where it is consumed. This activity will give students background information necessary to apply their understanding as they move into solution-focused activities.

Tips for Entire Class Participation
- Group sizes can vary to encourage each student to play a role. We recommend groups of 1-3 students.
- Each group can create either an infographic/drawing or a poem for their project. Encourage students to follow their own interests for the creative project and, if they are working in groups, suggest they work with someone who wants to do a similar type of project.

Preparation
1. Prepare the paper, markers, crayons, etc., for student use.
2. Set up a computer and projector and display the PowerPoint presentation.
3. Students may need a reminder of renewable and nonrenewable energy sources.

Teaching Guide
Introduction to the Project and the Data (~10 minutes)
1. Pass out an Energy Data Jam handout to each student.
2. <u>Slide 1</u>: Give an introduction to the Energy Data Jam using the PowerPoint presentation.
3. <u>Slide 2</u>: Students will be creating an Energy Data Jam project in the next hour. The goal is to design a creative project and presentation that explains New Mexico energy consumption data to an audience not familiar with this information.
4. <u>Slide 3</u>: The following three slides have example creative projects <u>using a different dataset than the students will use for their projects.</u> These creative projects relate to datasets about water. In the Energy Data Jam, students will use datasets about energy consumption in New Mexico. These slides are meant to give students examples of how datasets can be interpreted and then presented creatively. This slide shows a poem (in this case, an acrostic poem where the first letters of each stanza spell out water in different languages). The data trend represented is: <u>In a sample of countries around the world, per person water use varies widely, with some countries using 14 times as much water per person as other countries</u>. Point out to students that this creative project uses the actual data rather than just being a general poem about water use.
5. <u>Slide 4</u>: In the infographic, per capita daily water use is compared to annual precipitation for each country. The trend depicted here is: <u>In general, countries with lower amounts of annual precipitation use less water per person than countries with higher amounts of annual precipitation. The United States is an exception to this trend</u>. Again, have students notice how the trend aligns with the creative representation. Also, point out the scale in the infographic that demonstrates an accurate representation of the quantitative data.
6. <u>Slide 5</u>: This creative project is both a poem and an infographic. The trend represented by the poem is: <u>The United States uses 22 times as much water per person daily as Nigeria</u>. This trend can be seen in the poem, with each word representing 50 gallons of per capita water use. Have

students notice how the trend is evident in the creative project. Students should aim for similar alignment between their trend and creative project. Also, have students notice the scale that assists in accurately representing the quantitative data.

7. <u>Slide 6</u>: Students may work individually or in teams of up to three students. Students should develop a creative project to represent the data and appeal to nonscientists. The project should <u>not</u> be a graph or table. Instruct students to use their imaginations to design a project that will be attention-grabbing and appealing. Explain that students can create either an infographic/drawing or a poem that represents a trend in the data for this activity. For infographics, include an accurately scaled representation of the data trend; for poems, include references to specific data.

8. <u>Slide 7</u>: Ensure that students understand the word <u>trend</u> by asking for a volunteer to define it [answer: the general direction, or pattern, of the data; something that is happening in the data].

9. <u>Slide 8</u>: Students will have two datasets available. The first is New Mexico energy consumption by source; it shows where New Mexicans' energy came from.
   a. To find a data trend, we first need to understand what information we have in the dataset. This dataset has data in a table and a bar graph. The first column in the data table is the category of energy. Point out a few categories of energy that we have discussed in previous lessons – geothermal, hydroelectric, solar, wind, coal, and natural gas. The second column says whether that type of energy is renewable or nonrenewable. For example, we know that solar is renewable and coal is nonrenewable. The third column tells us how much of each type of energy New Mexico consumed in 2021. The units are trillion BTU (a unit of energy), and the higher the consumption estimate, the more New Mexico uses that type of energy.
   b. Have students examine data and ask students to identify some trends in the dataset. A data trend can be an answer to a question. Here are some questions to ask students to help with finding a data trend:
      i. Does New Mexico consume more energy from renewable or nonrenewable sources? [Answer: New Mexico consumes more energy from nonrenewable sources.]
      ii. Is natural gas consumed more than renewable energy? How much more? [Answer: New Mexico's natural gas consumption is higher than all renewable energy consumption combined.]
      iii. Is wind energy consumed more than energy from coal? [Answer: New Mexico's energy consumption from coal is more than the consumption of wind energy.]

10. <u>Slide 9</u>: The second dataset is New Mexico energy consumption by end-use sector. Explain to students that this dataset shows where the energy was consumed.
   a. This dataset has data in a table and a pie chart. The first column is the sector that consumes energy, and the second column explains what that sector means. For example, the residential sector is private dwellings like apartments. Younger students may need more explanation of each sector. The third column tells us how much energy is consumed by each sector in BTU. A higher number in this column tells us that the sector uses more energy. The last column is the percent of total use by each sector.
   b. Have students examine data and ask students to identify some trends in the dataset. Here are some questions to ask students to help with finding a data trend:
      i. What sector consumes the most energy in New Mexico? [Answer: The transportation (followed very closely by industrial) sector consumes the most energy in New Mexico.]
      ii. What sector consumes the least energy in New Mexico? [Answer: The commercial sector consumes the least energy in New Mexico.]
      iii. How much energy do the industrial and transportation sectors combined account for? [Answer: The industrial and transportation sectors combined account for 70% of the energy consumed in New Mexico.]

11. Slide 10: Direct students to look at the top of page 1 of their handout. A good Data Jam project is clear in that it accurately represents the data in a way that is understandable to nonscientists. The data must be scaled correctly, and a legend explaining how the data are represented must be included. The project should also be creative. Think of an imaginative way to get the attention of nonscientists. Finally, the project should be concise. Focus on one important trend and explain it well.

Project Development (~30 minutes)

1. Slide 11: Direct students to look at the project directions on page 1 of their handout.
   a. Students should decide if they would like to work alone or with one or two other students to complete their Energy Data Jam project.
   b. Complete the Planning and Brainstorming Notes on page 1 of the handout. Students will list the trend they might like to represent with their project and choose whether they will make an infographic or poem.
   c. Create the Energy Data Jam project (infographic or poem) and prepare it for the gallery walk by answering questions 3, 4, and 5 on the handout.
2. As soon as students have a plan, help them get started and circulate through the room to help as needed. Thirty minutes goes very quickly, so encourage students to stay on task to complete their project!

Gallery Walk and Discussion (~20 minutes)

1. Slide 12: Have students display their creative projects around the room. Each creative project should include the students' names, a title, and a description of the data trend represented through the infographic or poem.
2. Once student projects are on display, have students move freely among the creative projects to see what trends other groups highlighted and how they chose to represent their trends creatively. Tell students that there will be a class discussion after the gallery walk about the trends seen in the creative projects and some possible solutions. Encourage students to recall what they learned in Insulating You, Insulating Earth, Energy Audit, and Energy Resources and Use to think about the implications of the highlighted trends on the environment and people living in New Mexico. Do the highlighted trends indicate a problem with where and how New Mexicans get their energy resources?
3. Slide 13: Following the gallery walk, lead a discussion about the Energy Data Jam trends. Ask students how they would summarize the trend of both datasets. Support students in recognizing one of the larger trends presented in the Energy Data Jam: New Mexicans rely more on nonrenewable sources to meet their energy consumption needs than renewable sources.
4. Once students have identified a larger trend in Energy Data Jam, discuss how it may be a problem in New Mexico and possible solutions to reverse this trend.

Extensions

1. Challenge students to showcase their Energy Data Jam project in a public setting.
2. Use the U.S. Energy Information Administration website (eia.gov) to compare New Mexico energy consumption with the national average or energy consumption from another state.