

# Energy Data Jam

## *Communicating Data to Nonscientists*

### Description

Students identify trends in New Mexico energy consumption data and then develop and present a creative project to communicate the data to nonscientists.

### Grade Level

5 – 12

### 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

### Time

1 Hour

### Common Core State Standards

English Language Arts Standards >> Reading: Informational Texts >> Grade 5

CCSS.ELA-LITERACY.RI.5.4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

English Language Arts Standards >> Speaking & Listening >> Grade 5

CCSS.ELA-LITERACY.SL.5.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

English Language Arts Standards >> Science & Technical Subjects >> Grade 6-8

CCSS.ELA-LITERACY.RST.6-8.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.  
CCSS.ELA-LITERACY.RST.6-8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

English Language Arts Standards >> Science & Technical Subjects >> Grade 9-10

CCSS.ELA-LITERACY.RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific

words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.

CCSS.ELA-LITERACY.RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

English Language Arts Standards >> Science & Technical Subjects >> Grade 11-12

CCSS.ELA-LITERACY.RST.11-12.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

Mathematics Standards >> Statistics & Probability >> Grade 6

CCSS.MATH.CONTENT.6.SP.B.5: Summarize numerical data sets in relation to their context, such as by: C. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

### New Mexico State Science Standards

(Strand – Standard – Benchmark – Performance Standard)  
5<sup>th</sup> Grade

1-1-1-3: Use graphic representations (e.g., charts, graphs, tables, labeled diagrams) to present data and produce explanations for investigations.

1-1-3-2: Use mathematical skills to analyze data.

2-2-1-4: Describe how human activity impacts the environment.

3-1-1-1: Describe the contributions of science to understanding local or current issues (e.g., watershed and community decisions regarding water use).

6<sup>th</sup> Grade

1-1-1-1: Construct appropriate graphs from data and develop qualitative and quantitative statements about the relationships between variables being investigated.

1-1-3-2: Use probabilities, patterns, and relationships to explain data and observations.

3-1-1-1: Examine the role of scientific knowledge in decisions (e.g., space exploration, what to eat, preventive medicine and medical treatment).

7<sup>th</sup> Grade

1-1-1-2: Use models to explain the relationships between variables being investigated.

1-1-3-2: Use mathematical expressions to represent data and observations collected in scientific investigations.

1-1-3-3: Select and use an appropriate model to examine a phenomenon.

### 8<sup>th</sup> Grade

- 1-1-3-2: Create models to describe phenomena.
- 2-1-2-3: Distinguish between renewable and nonrenewable sources of energy.

### 9<sup>th</sup> – 12<sup>th</sup> Grade

- 1-1-3-1: Create multiple displays of data to analyze and explain the relationships in scientific investigations.
- 3-1-1-9: Describe how scientific knowledge helps decision makers with local, national, and global challenges (e.g., Waste Isolation Pilot Project [WIPP], mining, drought, population growth, alternative energy, climate change).

## Next Generation Science Standards

### 5<sup>th</sup> Grade

- 5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

### Middle School

- MS-ESS3-5: Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

### High School

- HS-ESS3-5: Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

## Materials

- *Energy Data Jam* handout [1 per student]
- PowerPoint presentation
- Computer and projector\*
- A large assortment of craft and recycled household supplies\* to be used for projects such as:
  - Large-format paper, butcher paper, and/or poster boards
  - Markers and/or crayons
  - Glue
  - Pipe cleaners
  - Plastic/paper cups
  - Plastic/paper plates
  - Paper bags
  - Fabric
  - Pom poms
  - Googly eyes
  - Streamers
  - Beads
  - Stickers
  - Cardboard
  - Empty, clean egg cartons

\*Not included in kit

## Background

Climate change is closely tied with human energy production and consumption. Burning fossil fuels for energy production releases CO<sub>2</sub> into Earth's atmosphere. As a greenhouse gas, CO<sub>2</sub> 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 increasing temperatures are predicted to create a greater need for energy for air conditioning.

New Mexico is the United States' sixth largest supplier of energy. This energy is mostly in the form of natural gas and petroleum. While New Mexico's climate creates potential for large-scale wind and solar projects, renewable energy only supplied 9.3% of the state's electricity production. Consumption follows a similar trend to production, with the majority being supplied from non-renewable sources.

Both 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 energy consumption data, students will be able to identify where energy in New Mexico comes from and where it is consumed. This will give students background information necessary to apply their understanding to action projects.

### **Tips for Entire Class Participation**

- Group sizes can vary to encourage each student to play a role. We recommend groups of one, two, or three students.
- Encourage students to use their own interests (e.g., art, music, games) to drive their creative projects. If they are working in groups, suggest that they work with someone who shares a common interest.

### **Preparation**

1. Prepare the craft and recycled household supplies for student use. If you have space, it is helpful to lay the supplies out on a surface so that students can more quickly assess available supplies and develop project ideas.
2. Set up a computer and projector and display the PowerPoint presentation.

### **Teaching Guide**

#### ***Introduction to the Project and the Data (~10 minutes)***

1. Pass out an Energy Data Jam handout to each student.
2. Give an introduction to the Energy Data Jam using the PowerPoint presentation.
  - a. Slide 2: 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.
  - b. Slide 3: Here is an example of a student using painting to communicate data. The amount of different paint colors was scaled to reflect the amounts of solar radiation, soil temperature, air temperature, and precipitation over several two-year periods in Las Cruces, New Mexico.
  - c. Slide 4: This is an example of a student using dance to communicate data. The height of the student's foot was scaled to represent the amount of precipitation received every two years in Las Cruces, New Mexico. The ribbon tied to her foot helps visualize the differences each year.
  - d. Slide 5: Students may work individually or in teams of up to three students. Larger groups are not recommended for this project because of the difficulties of ensuring that all group members are equally involved. Students should develop a creative project to represent the data and appeal to nonscientists. The project should not be a graph or table. Instruct students to use their imaginations to design a project that will be attention grabbing and appealing. Example projects include songs, demonstrations, poems, children's stories, newscasts, physical models, infographics, and skits. Representations of the data trend must be scaled accurately.
    - i. Emphasize that students should represent a trend in the data in a creative way rather than using the data directly in their projects. For example, one light bulb picture represents 1% of total residential energy use.
  - e. Slide 6: Ensure that students understand the word trend by asking for a volunteer to define it [answer: the general direction, or pattern, of the data; something that is happening in the data].

- f. Slide 7: Students will have two datasets available. The first is New Mexico energy consumption by source; it shows where the energy that New Mexicans used came from. Have students examine data and ask students to identify some trends in the dataset. For example: New Mexico's natural gas consumption is more than five times higher than all renewable energy consumption combined.
- g. Slide 8: The second dataset is New Mexico energy consumption by end-use sector. Explain to students that this dataset shows where the energy was consumed. Have students examine data and ask students to identify some trends in the dataset. For example: the industrial and transportation sectors combined account for nearly 2/3 of the energy consumed in New Mexico.
- h. Slide 9: 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 10: 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.
  - c. Create the Energy Data Jam project (infographic, skit, etc.).
  - d. Fill out the Presentation Summary.
  - e. Practice the presentation.
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!

### ***Project Presentations (~20 minutes)***

1. Remind students that they have just three minutes to present their projects.
2. Encourage them to use the Energy Data Jam Presentation Summary on page 4 of the handout to prompt them to include all of the necessary components.
3. Determine the order of group presentations by asking for volunteers, drawing numbers from a hat, or assigning an order that is preferable to you.
4. Begin the first presentation. Set a timer or plan to watch the clock for three minutes.
5. Repeat with the remaining groups until all have presented.
6. Lead a discussion about the Energy Data Jam projects and what students learned. Solicit feedback for ideas about how this project could be extended further.

### **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](http://eia.gov)) to compare New Mexico energy consumption with the national average or with energy consumption from another state.