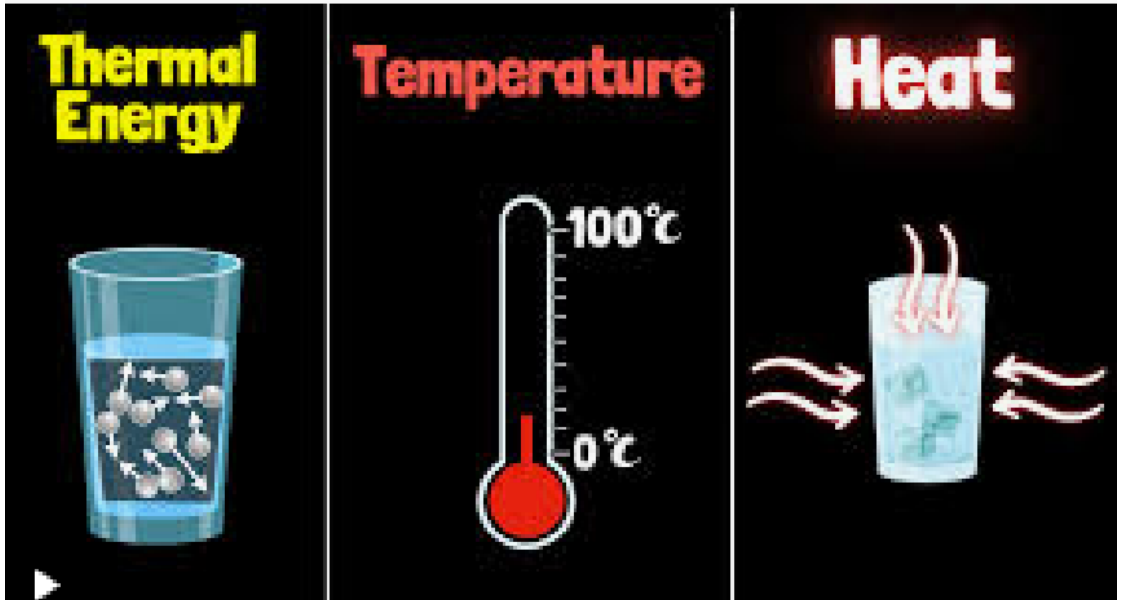



The goal of this project is to strengthen energy education and student leadership by pairing middle school students with elementary students for hands-on learning experiences. Middle school students will take on a leadership role as they guide younger learners through NEED Infobooks, complete Infobook activities, play Energy Bingo, practice energy chants, read and illustrate energy-related stories, and participate in Energy Source Connections games. These activities are designed to build foundational energy knowledge, promote collaboration and communication, and foster enthusiasm for science through engaging, age-appropriate instruction.


8 Grade NEED Project
Southport Middle School
Student Leaders: Easton Black, Liron Halberg, Daniel Gahly
Teacher Advisor:  Mr. Noah Guntow

## Goal 1: Complete experiement on thermal energy in order to learn how combustion engines and turbine engines work

Energy Activities

- Used the NEED unit “Thermal Energy Put to Work”
- Complete experiment on how thermal energy works

Student leader

- Completed research on how thermal energy works
- Completed experiment on thermal energy.

Resources

- “Thermal Energy Put to Work” NEED unit
- Research websites on thermal energy

Evaluation

- Experiment was evaluated.

Thermal energy is defined as the energy associated with heat. Thermal energy is used for many things, including cooking. People use thermal energy every day in their homes without even knowing it! On a larger scale, thermal energy is used for combustion engines in cars and factories as well as in turbine generators to convert wind energy into electricity.

During this experiment, we used heated water to create energy. The air in the empty bottle expanded when it was placed in the hot water and it caused the balloon to fill with air. When the bottle was placed in ice water, the balloon deflated. This shows how heat creates energy.

## Goal 2: Present information on thermal energy to an elementary class.

Energy Activities

- Research information on thermal energy on an elementary level
- Create presentation for elementary school class.

Student leader

- Present information on thermal energy to elementary class.

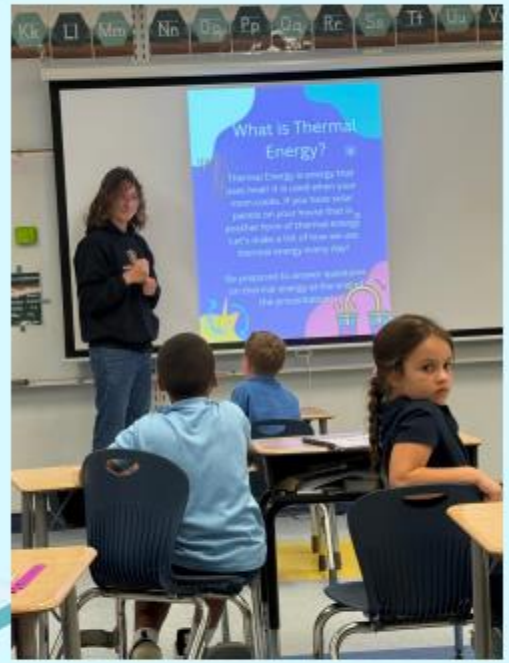
Resources

- “Thermal Energy Put to Work” NEED unit
- Research websites on thermal energy

Evaluation

- Positive feedback from the students and teacher.

# Presentation




The information on thermal energy was presented to a class of 18 first graders. The students were engaged and asked thought provoking questions about how thermal energy can be used in every day life.

# Goal 3: Increase energy literacy and student leadership by engaging middle school students as mentors who guide elementary students through interactive hands-on energy activities using NEED resources.

**Energy Content Activities**

Middle school students meet with elementary students to lead hands-on energy lessons using NEED Infobooks, Infobook activities, Energy Bingo, energy chants, energy stories, and Energy Source Connections. Students reinforce energy vocabulary, energy sources, and conservation concepts through interactive reading, games, and creative illustration activities.

**Student Leadership**

Middle school students act as peer leaders by planning, teaching, and guiding energy activities for elementary students. They model collaboration and communication while building leadership, responsibility, and confidence through mentoring and instruction.

**Resources**

This project uses NEED Project resources including Infobooks, Infobook activities, Energy Bingo, energy chants, energy stories, and Energy Source Connections materials. Basic classroom supplies and art materials support student-created illustrations.

**Evaluation**

Student understanding is assessed through observation, completed activities, discussions, and student illustrations. Middle school leadership skills are evaluated through teacher observation and student reflection on participation, communication, and teamwork.

# Energy Infobook and Infobook activities

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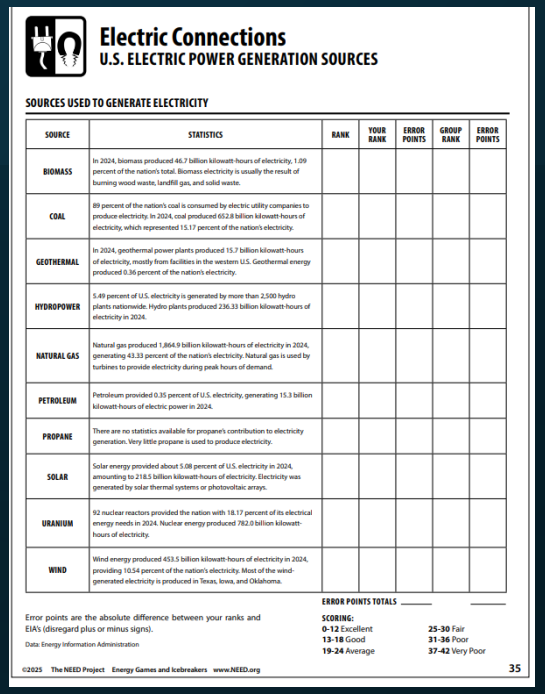
# Energy Source Connections



## Electric Connections
### U.S. ELECTRIC POWER GENERATION SOURCES

**SOURCES USED TO GENERATE ELECTRICITY**

| SOURCE | STATISTICS | RANK | YOUR RANK | ERROR POINTS | GROUP RANK | ERROR POINTS |
|---|---|---|---|---|---|---|
| BIOMASS | In 2024, biomass produced 46.7 billion kilowatt-hours of electricity, 1.09 percent of the nation's total. Biomass electricity is usually the result of burning wood waste, landfill gas, and solid waste. | | | | | |
| COAL | 89 percent of the nation's coal is consumed by electric utility companies to produce electricity. In 2024, coal produced 652.8 billion kilowatt-hours of electricity, which represented 15.17 percent of the nation's electricity. | | | | | |
| GEOTHERMAL | In 2024, geothermal power plants produced 15.7 billion kilowatt-hours of electricity, mostly from facilities in the western U.S. Geothermal energy produced 0.36 percent of the nation's electricity. | | | | | |
| HYDROPOWER | 5.49 percent of U.S. electricity is generated by more than 2,500 hydro plants nationwide. Hydro plants produced 236.33 billion kilowatt-hours of electricity in 2024. | | | | | |
| NATURAL GAS | Natural gas produced 1,864.9 billion kilowatt-hours of electricity in 2024, generating 43.33 percent of the nation's electricity. Natural gas is used by turbines to provide electricity during peak hours of demand. | | | | | |
| PETROLEUM | Petroleum provided 0.35 percent of U.S. electricity, generating 15.3 billion kilowatt-hours of electric power in 2024. | | | | | |
| PROPANE | There are no statistics available for propane's contribution to electricity generation. Very little propane is used to produce electricity. | | | | | |
| SOLAR | Solar energy provided about 5.08 percent of U.S. electricity in 2024, amounting to 218.5 billion kilowatt-hours of electricity. Electricity was generated by solar thermal systems or photovoltaic arrays. | | | | | |
| URANIUM | 92 nuclear reactors provided the nation with 18.17 percent of its electrical energy needs in 2024. Nuclear energy produced 782.0 billion kilowatt-hours of electricity. | | | | | |
| WIND | Wind energy produced 453.5 billion kilowatt-hours of electricity in 2024, providing 10.54 percent of the nation's electricity. Most of the wind-generated electricity is produced in Texas, Iowa, and Oklahoma. | | | | | |

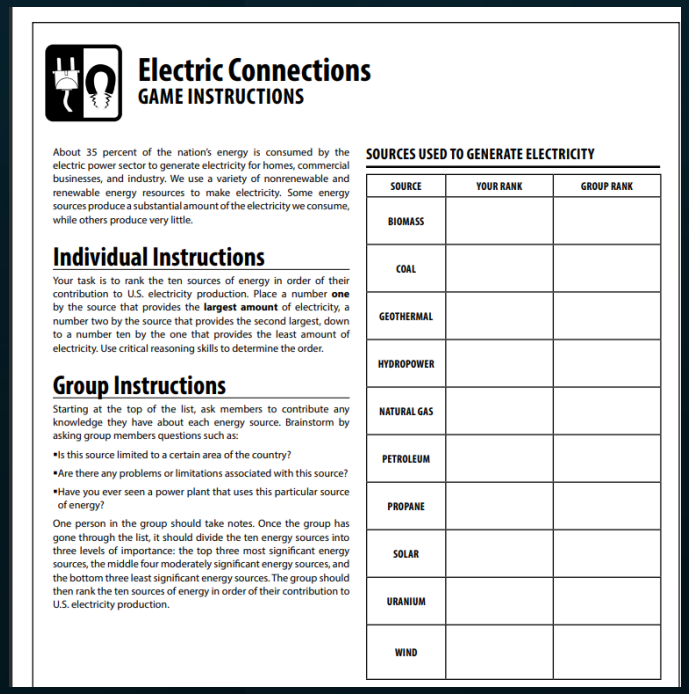
**ERROR POINTS TOTALS** _____ _____

Error points are the absolute difference between your ranks and EIA's (disregard plus or minus signs).

Data: Energy Information Administration

**SCORING:**
**0-12** Excellent
**13-18** Good
**19-24** Average
**25-30** Fair
**31-36** Poor
**37-42** Very Poor



## Electric Connections
### GAME INSTRUCTIONS

About 35 percent of the nation's energy is consumed by the electric power sector to generate electricity for homes, commercial businesses, and industry. We use a variety of nonrenewable and renewable energy resources to make electricity. Some energy sources produce a substantial amount of the electricity we consume, while others produce very little.

### Individual Instructions

Your task is to rank the ten sources of energy in order of their contribution to U.S. electricity production. Place a number **one** by the source that provides the **largest amount** of electricity, a number two by the source that provides the second largest, down to a number ten by the one that provides the least amount of electricity. Use critical reasoning skills to determine the order.

### Group Instructions

Starting at the top of the list, ask members to contribute any knowledge they have about each energy source. Brainstorm by asking group members questions such as:

- Is this source limited to a certain area of the country?
- Are there any problems or limitations associated with this source?
- Have you ever seen a power plant that uses this particular source of energy?

One person in the group should take notes. Once the group has gone through the list, it should divide the ten energy sources into three levels of importance: the top three most significant energy sources, the middle four moderately significant energy sources, and the bottom three least significant energy sources. The group should then rank the ten sources of energy in order of their contribution to U.S. electricity production.

**SOURCES USED TO GENERATE ELECTRICITY**

| SOURCE | YOUR RANK | GROUP RANK |
|---|---|---|
| BIOMASS | | |
| COAL | | |
| GEOTHERMAL | | |
| HYDROPOWER | | |
| NATURAL GAS | | |
| PETROLEUM | | |
| PROPANE | | |
| SOLAR | | |
| URANIUM | | |
| WIND | | |

# Energy Chants

## Nonrenewable Energy Chants

**COAL in the hole—makes light in the night!**

1. I look like shiny, black rock.
2. I am a fossil fuel that is buried underground.
3. There is a lot of me in the United States.
4. I am burned to make electricity.
5. I can pollute the air when I am burned.

**Burn clean, burn fast—NATURAL GAS!**

1. I am a gas with no color, no taste, and no smell.
2. I am a clean-burning fossil fuel.
3. Companies drill wells to pump me from the ground.
4. My major use is electricity.
5. I am burned to heat buildings and to make electricity.

**Pump, pump—PETROLEUM!**

1. I am buried underground and under the ocean.
2. I am a fossil fuel that makes more energy than any other energy source.
3. I am made into lots of things—like gasoline and plastics.
4. My major use is for transportation.
5. I can pollute the air when I am burned.

**Put a little pressure on me—PROPANE!**

1. I am a gas with no color, taste, or smell.
2. I am a clean-burning fossil fuel.
3. I am buried underground with other fossil fuels.
4. I turn into a liquid under pressure.
5. I am used on farms and in backyard grills.

**URANIUM, URANIUM—split goes the atom!**

1. I am buried underground in rocks.
2. There is plenty of me; I am cheap.
3. My energy is used to make electricity.
4. Using me doesn't pollute the air.
5. My waste is radioactive; it can be dangerous.


## Renewable Energy Chants

**Garbage, wood, landfill gas...it's all BIOMASS!**

1. Bio means life. I am the energy in things that used to be alive.
2. My energy is stored in trees, plants, and garbage.
3. My energy comes from the sun.
4. You can burn me to make heat and electricity.
5. I can pollute the air when I am burned.

**Geo-Earth, Thermal-heat—GEOTHERMAL—Earth-heat!**

1. Geo means Earth. Therme means heat. I am heat energy from inside the Earth.
2. I heat underground rocks and water.
3. My hot water can heat houses.
4. My power can make electricity.
5. I am clean energy.

**Falling water, HYDROPOWER, HYDROPOWER!**

1. Hydro means water. I am the energy in moving water.
2. Dams can harness my energy.
3. I am only available in certain parts of the United States.
4. My power can make electricity.
5. I am clean, cheap energy.

**SOLAR ENERGY—sun shine bright, SOLAR ENERGY—give me light!**

1. Sol means sun. I am energy from the sun.
2. I make plants grow and I give you light.
3. When my energy reaches the Earth, it can heat homes and water.
4. Photovoltaic cells can turn my energy into electricity.
5. I am clean, cheap energy.

**Energy is flowin' in the WIND!**

1. I am the energy in moving air.
2. The sun makes the air move.
3. Some places have a lot of me, others only a little.
4. I can't make electricity 24 hours a day.
5. I don't pollute the air, except with sound.


- Before the school day began, Easton, Daniel and Liron gathered up some elementary school students and taught them about the NEED project and renewable energy sources. Then, the students played a game with the boys to conclude their learning activity.


MERGENCY EXIT
CANES


Our Promise
MORNINGSIDE
ELEMENTARY
WHERE EVERYBODY S.E.A.R.S
ADVICE FROM A GNOME