Georgia Performance Standards Framework for Physical Science – GRADE 8

Unit: Energy in our Life
General Task
Powering our World

Subject Area: Physical Science
Grade: 8

Standards (Content and Characteristics):

S8P2. Students will be familiar with the forms and transformations of energy.
   b. Explain the relationship between potential and kinetic energy.
   c. Compare and contrast the different forms of mechanical, heat, electrical and magnetic energy and
      their characteristics.

S8P5. Students will recognize characteristics of gravity, electricity, and magnetism as major kinds
      of forces acting in nature.
   d. Investigate and explain that electric currents and magnets can exert force on each other.

S8CS1. Students will explore the importance of curiosity, honesty, openness, and skepticism in
     science and will exhibit these traits in their own efforts to understand how the world works.
   a. Understand the importance of—and keep—honest, clear, and accurate records in science.
   b. Understand that hypotheses can be valuable even if they turn out not to be completely accurate.

S8CS2. Students will use standard safety practices for all classroom laboratory and field
     investigations.
   a. Follow correct procedures for use of scientific apparatus.
   b. Demonstrate appropriate techniques in all laboratory situations.
   c. Follow correct protocol for identifying and reporting safety problems and violations.

S8CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and
    technological matters.
   a. Observe and explain how parts can be related to other parts in a system such as the role of simple
      machines in complex machines.
   b. Understand that different models (such as physical replicas, pictures, and analogies) can be used to
      represent the same thing.

S8CS7. Students will question scientific claims and arguments effectively.
   b. Identify the flaws of reasoning in arguments that are based on poorly designed research (e.g., facts
      intermingled with opinions, conclusions based on insufficient evidence).
   d. Recognize that there may be more than one way to interpret a given set of findings.
S8CS8. Students will be familiar with the characteristics of scientific knowledge and how it is achieved.
Students will apply the following to scientific concepts:
a. When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often requires further study. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as meaningful.

S8CS9. Students will understand the features of the process of scientific inquiry.
Students will apply the following to inquiry learning practices:
a. Investigations are conducted for different reasons, which include exploring new phenomena, confirming previous results, testing how well a theory predicts, and comparing different theories.

Enduring Understandings:
- Energy appears in different forms such as mechanical energy, gravitational energy, heat energy, and electric and magnetic energy.
- Energy cannot be created or destroyed, but changed from one form into another.

Essential Question:
- How is energy transferred to my home?

**ADMINISTRATION PROCEDURES**

Pre-Assessment:

1. Conduct a KWL or any type of graphic organizer for students to express their knowledge of electricity, its production, operation, and applications. Later they can either, pair–share and post their findings or form small groups and discuss one aspect of electricity per group and have group presentations through a group’s spokes person.

2. Have students draw a simple sketch of how they believe electricity is created and transferred to their homes. Encourage students to label as much as possible in the sketch and include a short paragraph explaining the sketch.

| Outcome / Performance Expectations: | Students will develop and share a presentation that includes the following performance outcomes. Explain how energy is transformed from fossil fuel, wind, solar, nuclear, hydroelectric, geothermal, tidal, biomass or wave energy to electrical energy in a power plant. Discuss the advantages and disadvantages of each source of energy. Draw a flow chart of the energy transformations taking place in each type of electricity production. Draw and label the parts of an electric generator. |
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<table>
<thead>
<tr>
<th><strong>General Teacher Instructions:</strong></th>
<th>Identify the percentage of the world’s energy supply presently met by each type of fuel. Describe the political, economic and environmental implications of the energy source.</th>
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<td><strong>Materials Needed:</strong></td>
<td>Explain that electricity is the number one form of energy consumption. Explain that we use available energy sources to create electricity in power plants. Divide the students into groups of two. Assign each group a fuel source. Students should complete research and develop a presentation to share with the class.</td>
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<td><strong>Safety Precautions:</strong></td>
<td>Internet access Presentation medium (Software, poster board, craft supplies, etc)</td>
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<td><strong>Task with Student Directions:</strong></td>
<td>Internet safety and responsibility.</td>
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<td>Use the Internet to research your assigned energy source. Create a presentation for the class that includes the following:</td>
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<td>1. An explanation of how the energy source is transformed into electricity.</td>
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<td>2. Advantages and disadvantages of using the energy source as a way to produce electricity.</td>
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<td>3. A flow chart of the energy forms and transformation taking place in the production of electricity from your source. Note: You may want to check out the following resources to help you...</td>
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<td>4. A labeled diagram of the generator.</td>
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<td>5. A picture of the type of power plant used with your energy source.</td>
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<td>6. A brief explanation of how the electricity is sent to your house from the plant.</td>
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<td>7. As part of instruction, explain that according to the law of Conservation of Energy, we cannot create or destroy energy, but we can change it. Explain that in our power plants mechanical energy is converted into electrical energy. It is then transmitted great distances to our homes where the electrical energy is changed back into mechanical energy by way of electric motors in order to do work for us.</td>
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<th>8. To answer the EQ, “How is energy transferred to my home?” assign students to groups based on their neighborhoods. Groups of students will research and create a visual of how electricity is generated and transferred to the home in their neighborhood.</th>
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| **Resources:** | Some good websites  
*Energy Sources* – [http://www.darvill.clara.net/altenerg](http://www.darvill.clara.net/altenerg)  
| **Homework / Extension:** | Research the following individuals to discover their contributions to the field of energy.  
- Oersted, Faraday, Henry, Page, Tesla |
| **Instructional Task Accommodations for ELL Students:** | Consider allowing the ELL student to make the presentation to the teacher only instead of the entire class. Be sure that if the student is presenting information to the class in a group or individually, they are familiar with the vocabulary. Consider limiting the presentation to steps 1 and 2 only. |
| **Instructional Task Accommodations for Students with Specific Disabilities:** | Consider allowing the student with poor fine motor skills to download diagrams and pictures instead of having to draw them. The student may need to create a virtual poster on a slide show presentation instead of a poster board to create a product that is readable. Students with learning disabilities may need assistance understanding technical vocabulary and may require flash cards for referencing during the presentation. |
| **Instructional Task Accommodations for Gifted Students:** | Option 1 - Explain that high-tension power lines are used to transmit electricity over long distances. Explain that the powerful electric current running through the wires produces strong electric and magnetic fields. These fields give off a type of energy called electromagnetic radiation (EMR). Some people and some scientists believe that prolonged exposure to EMR can cause health problems. Have students research the issue and create a health bulletin to present to the class.  
Option 2 - Given a particular place in the world, have students create a model of the most effective power plant for the area. Students should explain the choice of energy source, label the parts of the power plant and the parts of the generator and be prepared to defend their choice with data to support it. |
| Option 3 - Have students research how electricity and magnetism are used in real world applications. Have the students research a topic of interest and create a presentation explaining how the invention uses electricity and magnetism, how it is useful, and how it has bettered human existence. Example topics could be the telephone, telegraph or MRI. |