



From There to Here — How Energy Moves and Changes

Grade/Subject: Physics

Strand/Standard PHYS.2.3 Develop and use models on the macroscopic scale to illustrate that energy can be accounted for as a combination of energies associated with the motion of objects and energy associated with the relative positions of objects. Emphasize relationships between components of the model to show that energy is conserved. Examples could include mechanical systems where kinetic energy is transformed to potential energy or vice versa. (PS3.A)

Lesson Performance Expectations:

- Students will describe how energy changes from one form to another.
- Students will model where all energy goes and explain that no energy is lost.

Materials: A group of 4 needs

- 1- Set of Energy Cards
- 1- Small poster (or a 11 x 16 sheet of paper)
- Colored pencils or access to a computer and printer

Time: 60 minutes/1 period

Teacher Background Information:

- Ten types of Energy <https://www.thoughtco.com/main-energy-forms-and-examples-609254>
- Energy Sources and Statistics <https://www.eia.gov/state/analysis.php?sid=UT>

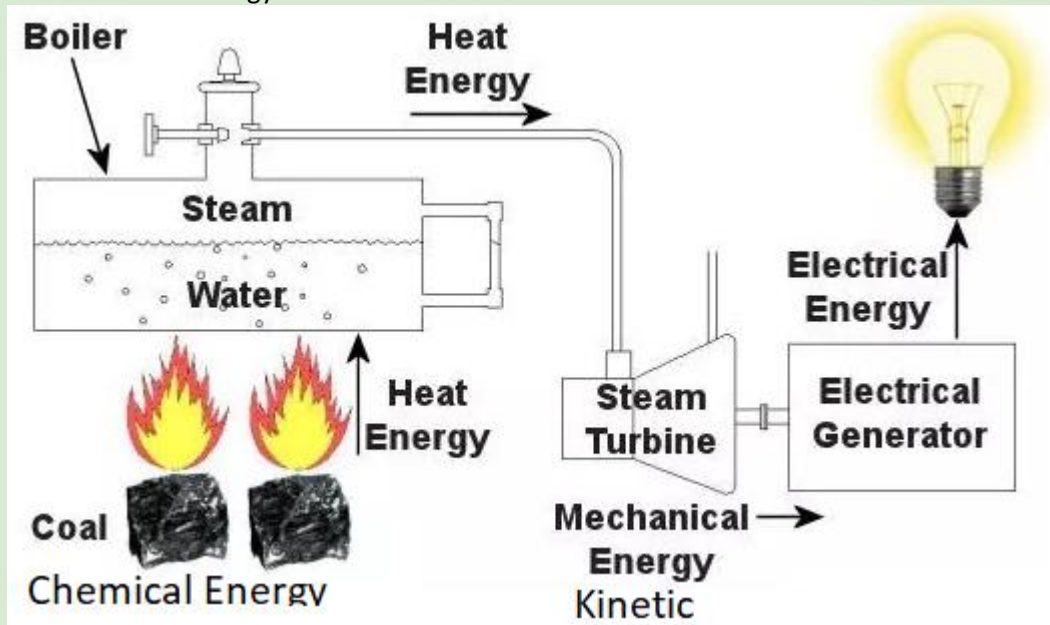
Student Background Knowledge:

- Students should have a basic idea of what 'energy' is and that it is transferred from sources to the places it is used.

Teacher Step by Step: A 3-d lesson should insist students do the thinking. Provide time and space for the students to experience phenomenon and ask questions. The student sheet provided below provides guidance but is only an example of how students might respond.

1. Introduce Phenomenon: Watch the video about people living in a very rural country with no electricity. Think about what your life would look like without access to electricity. Write down questions you have about why they don't have electricity in their village. What are the ways that electricity gets to us/what is required? Life Without Electricity <https://www.youtube.com/watch?v=DSCiPFoCAX8> (5:45 min)
2. Draw a picture of a lamp in your house, draw arrows and pictures going back to where the energy for your house started/was created.
3. Give student groups a set of pictures, have students sort them into groups based on how they 'see' energy. Ask them to write a description of how they sorted their cards into different groups, with a couple examples for each.
4. Have student groups share one or two of the ways they 'saw' energy with the class. Create a list on the board. Students should end up describing the main types of energy- Chemical, Electrical, Heat/Thermal, Kinetic/Mechanical, Sound, Electromagnetic/light, and possibly gravitational. If they don't have these exact words give them the words and have them label their groups with the energy types.
5. Have students look at the diagram they drew of the lamp and see if they can label the energy transformations at each step with the types of energy.

6. Either as a class discussion or talking with groups help students realize that no energy is lost anywhere in the process. The energy that appears to be 'lost' is almost always in the form of heat energy. Have students label heat energy at every transformation point.
7. Have students watch this video on electricity generation and transmission.
<https://www.youtube.com/watch?v=20Vb6hLQ5g> (5:18 min.) or
<https://www.youtube.com/watch?v=E8QF8uRCeE> (1:37)
8. Students work in small groups to create a mini poster showing the path of electricity from coal to a light in their house with the energy transformations labeled.



Assessment of Student Learning:

1. Describe the difference between the lives of people living in a place without electricity and people living in a place with electricity.
2. Name two forms of energy and provide two examples that are commonly seen for each.
3. Diagram the flow of electricity from a dam to an oven in a home. Label the energy transformations.

Standardized Test Preparation:

From There to Here- How Energy Moves and Changes

1. Which of the following is a transfer of energy?
 - a. The lighting of a light bulb from electricity
 - b. The heating of a burner on a gas stove
 - c. The movement of electricity down a wire.*
 - d. The creation of electricity from moving water.

Use the diagram to answer the next questions:



X



Y



Z



2. Which of the following could be sources for the energy produced at “Z”? Choose all that apply.
 - a. Moving water*
 - b. Wind*
 - c. Coal burning*
 - d. Gravity

3. What happens at point “Y”?
 - a. Electricity travels down a wire.
 - b. Electricity is created from the movement of electrons from the energy source.
 - c. A spark creates a chain reaction of energy across a vacuum.
 - d. A device like a turbine transforms the energy into electricity.*

4. What happens at “X”?
 - a. Heat travels down a wire and light the filament in the light bulb.
 - b. Light signals travel along a wire and are released in the light bulb.
 - c. The electricity produced travels through wires to the light bulb*
 - d. Mechanical energy is transformed into electrical energy to turn on the light.

Extension of lesson and Career Connections:

Lineman <https://www.jobhero.com/lineman-job-description/> <https://www.youtube.com/watch?v=YEKDD-MCVqI>

Power Plant Operator <https://www.truity.com/career-profile/power-plant-operator>