

## Community in the Classroom Presentation Plan

**Lesson Name:** “Energy: The Currency of Chemistry”

**Presenter:** Daniel Goldman

**Grade Level:** 4

**Standards Connection:** Life Science: Plants are the primary source of matter and energy entering most food chains.

**Abstract:** During the lesson, we will become familiar with the idea that energy is exchanged and conserved in chemical reactions, and can be stored in different forms. We will explore some important and interesting examples of how energy is exchanged and stored in biology and the environment. In order to illustrate these principles, we will do a fun group activity that will demonstrate how energy flows from the sun to plants to other organisms in the food chain.

### **Vocabulary/Definitions:**

*Conservation of Energy:* Energy is never destroyed or created; it is only exchanged (or moved)

*Solar Energy:* Energy in the form of light from the sun

*Photosynthesis:* The process by which plants take in carbon dioxide and water and use them to make food and grow

*Food chain* – the path of energy from one food to another

*Food web* – overlapping food chains, with multiple paths for the flow of energy

*Producers*

*Consumers*

### **Materials:**

- Matches
- Energy currency
- Potato chip
- Aluminum pan
- Tongs

### **Classroom Set-up**

The students should be assigned to one of three groups; the first and second groups should consist of about 3-4 students each, and the third group will consist of the remainder of the class.

A chalkboard or dry erase board for writing.

#### **1. Personal Introduction (5 min):**



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I am a student studying chemistry at UC-Berkeley. I am especially interested in energy and biology.

I like science because I get to learn about how things work and do interesting experiments.

## 2. Topic Introduction (10-15 min):

Today we are going to learn about energy and how it is exchanged among living (and non-living things). Ask students what they think energy is and why it is important. [define vocabulary words & write definitions on board] What are some examples of energy in everyday life? (list suggestions on board)

Burn the potato chip over the aluminum pan. Ask the students what is happening when the chip burns (stored energy is being released). Where does the stored energy come from? (make a diagram on the board)

People need energy to stay alive. Where do we get it from? What your body does when you eat a potato chip is a lot like what we did when we burned the potato chip – both are converting the energy in the chip into other forms of energy, like heat and mechanical energy (movement).

All energy comes from the sun. How does it get from the sun to plants, animals and people? Has anyone heard of photosynthesis? In what form is energy stored in plants? (use board to draw a diagram of energy flow). Can you think of a form of energy that does not come from the sun?

## Learning Experience (20-30 min):

Students are divided into groups as indicated above. The students are told that they are either the plants (the large group), the animals or the humans. The teacher will play the role of the sun. Ask the students why the plants are a big group, while the humans are a small group. The teacher is given a stack of “energy currency”. Tell the students that this currency represents the amount of energy that the sun provides the earth with. It is a bright and sunny day. The teacher divides the currency evenly between all of the plants. Ask the students what happens when the plants receive energy from the sun. Where does it go? The plants have to pay one unit of currency as a “toll”. Ask the students why? Where does this energy go? Now tell the animals that they can each “eat” two plants. Have them choose two plants to “eat”. The plant must give his/her energy to the animal. Ask the students what happens when the animals eat the plants. Where does the energy go? Now the animals must pay four units of currency as a toll, and the plants pay one unit again. Why do the animals have to pay more energy than the plants? Now tell the people that they can each “eat” *either* one animal *or* two plants. The animal or plant must give his/her energy to the person. Where does this energy go? Now count the



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money that each “human” has. The “humans” who chose to eat two plants should have more energy currency than the “humans” who chose to eat one animal. Why is this true? (because an animal requires much more energy to live than a plant, so it uses up most of the energy it consumes)

### **3. Wrap-up: Sharing Experiences**

What did we learn about energy? How does energy get from the sun to people? What are some human activities that require energy and where do we get that energy from? What are some other ways of storing energy. (Briefly mention solar, wind, nuclear energy as different ways of storing energy for humans to use) How is energy similar to money in a bank account?

### **4. Connections & Close:**

What did you have for lunch today? For each lunch item, explain how the energy gets from the sun to your body. Draw a picture showing how the energy flows from the sun to a human.



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