



Quarrybrook
EXPERIENTIAL EDUCATION CENTER

Program Title: Nature's Solar Panels

Audience: 5th grade students

Program Theme: Sunlight becomes the energy for all living things on Earth. Plants and trees are living solar panels, collecting the Sun's energy and converting it into food, through photosynthesis.

Program Goals: Students will understand the movement of energy from the sun, through the plants, to the animals and people eating the plants. Students will be able to explain that green plants get the energy they need to live, and the mass they need to build their parts, from sunlight. Students will be able to explain that animals and people get the energy they need to live, and the mass they need to build their bodies, from the food they eat. Students will understand how the process of photosynthesis connects all living things.

Next Generation Standards: 5-PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.
PS3.D Energy in Chemical Processes and Everyday Life: The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water).

Program Outline:

Activity 1: Build A Tree (45 min.) – Students will make the motions and sounds of the actions operating inside a tree. Adding one part at a time, the group will discover the work of each component in a tree's system, and build a cross-section model of a tree, with moving and sound-making participants!

Objective: Students will learn about and imitate the flow of water and sap within a tree's system, to build context for understanding how photosynthesis fits into a tree's plumbing.

Measure: Students will make the motions and sounds of the roots, heartwood (old xylem), sapwood (new xylem), cambium, leaves, inner bark (new phloem), and outer bark (old phloem).



Teachers and other chaperones will be helpful by encouraging students to loudly and continuously make their sound effects and act out their motions. If student group is small, adults will be helpful in participating as parts of the tree.

Activity 2: Photosynthesis Puzzle (45 min.) – Photosynthesis is Greek for “light putting together” and is the most important process on Earth! Students will build the story of photosynthesis, and see how it connects all living things, by assembling poster cards in the order of their action. Three different card

sets will address the process of photosynthesis through its chemical equation, through detailed description, and through illustrations.

Objectives: Students will understand the sequence of photosynthesis. Students will be able to explain the movement of energy from the sun, through the plants, to the animals and people.

Measure: Students will arrange poster cards in the order of their action, by equation, description, and illustration.



Teachers are welcome to add any classroom-connecting comments, as we build the story of photosynthesis.

Activity 3: Biomimicry (30 min.) – Next we'll visit a few machines and processes invented by people, who studied Nature and its solutions to solve our challenges. By imitating life (bio-mimicry) and applying Nature's principles, we're learning from a system that generates enough energy to operate the natural world without burning any oil or producing any pollution!

Objective: Students will understand how the process of photosynthesis and the adaptations of trees and plants to be as efficient as possible in collecting and using solar energy, can inspire new technologies.

Measure: Students will be able to explain how the process of photosynthesis connects all living things, and which parts of the process we can investigate further, to develop more-efficient technologies.



Teachers and other chaperones are welcome to add any information about solar panels or other building systems that the students might have seen, in their school area or their neighborhoods.

Conclusion/Wrap-up: Taking a closer look at Nature's solar energy converters is something we can do everywhere we go! Photosynthesis connects all living things. The same atoms cycle from the air and the ground through the plants into the animals and people and back out to the air and the ground. Photosynthesis changes the gas in the air into the mass of plants, which fuels all life on Earth.

As time allows, or as a follow-up activity in the classroom, this process is a great one to be illustrated and labeled by students on a mural.