**Solar Energy and Wrap Up:**
Grades 5-8 Saturday Science Lesson Plan

**Objectives:**

* After listening to a presentation on solar panels, students will begin to understand what solar panels are used for and how they are made. Students will be responsible for listing at least three characteristics of solar panels and identify at least two practical uses for solar panels.
* After creating their own graphic organizers showing how the sun contributes to the production of all different forms of energy, students will begin to make connections between solar energy and other forms of energy and be able to visually represent this information. Students will be responsible for connecting solar energy to at least three different types of energy within their graphic organizers.
* After participating in a class discussion on how we can conserve energy and use it more efficiently, students will be able to identify ways in which they can do these things in their own lives. Students will be responsible for listing at least three ways in which they can conserve energy in their own lives.

**Standards:**

* 5.1.5 - Explain that technology extends the ability of people to make positive and/or negative changes in the world. **(Core Standard)**
* 6.3.17 - Recognize and describe that energy is a property of many objects and is associated with heat, light, electricity, mechanical motion, and sound. **(Core Standard)**
* 7.3.16 - Recognize and explain that different ways of obtaining, transforming, and distributing energy have different environmental consequences. **(Core Standard)**
* 7.7.1 - Explain that the output from one part of a system, which can include material, energy, or information, can become the input to other parts and this feedback can serve to control what goes on in the system as a whole.
* 8.3.13 - Explain that energy cannot be created or destroyed but only changed from one form into another. **(Core Standard)**
* 8.3.15 - Identify different forms of energy that exist in nature. **(Core Standard)**

**Teacher Content Knowledge:**

Teachers should have a strong understanding of:

* **Solar energy –**
	+ Solar energy is any form of energy radiated by the sun, including light, radio waves, and X rays. (In general use, this term usually refers only to the visible light of the sun.) Solar energy is needed by green plants for photosynthesis; the energy in fossil fuels (e.g., coal and oil) and other organic fuels (e.g., wood) is also derived from solar energy.
* **Solar panels** –
	+ Solar panels are modules that group solar cells together to generate a practical amount of electricity from solar energy. These cells - also known as photovoltaic cells - convert sunlight directly into electricity. A solar panel is a group of cells connected electrically and packaged into a frame, which can then be grouped into larger solar arrays. Photovoltaic cells are most commonly made of silicon semiconductors. When light strikes the cell, a certain portion of it is absorbed within the semiconductor material; this means that the energy of the absorbed light is transferred to the semiconductor.

Because of their relationship to solar energy, teachers should review their understanding of these concepts as well:

* **Hydropower** –
	+ Hydropower is a source of renewable kinetic energy, created through the motion of water. This energy is normally captured through the motion of water through turbine blades to generate electricity or to move objects. Solar energy also contributes to hydropower through the sun’s role in the water cycle – evaporating water from the Earth’s surface to form clouds.
* **Kinetic energy** –
	+ Kinetic energy is produced by motion – the motion of waves, electrons, atoms, molecules and substances. Specific types of energy that are kinetic in nature are thermal, radiant, sound, electrical and motion energy. Solar energy (radiant) and wind energy (motion) are types of kinetic energy.
* **Wind energy** –
	+ Wind energy is an inexhaustible source of kinetic energy, primarily captured from the motion of wind through turbine blades to generate electricity. Wind energy has its origins in solar energy, as winds on Earth are produced by the uneven heating of oceans and other surfaces, creating convection currents in the air.

**Materials List:**

* Material Needed for Solar Panel Presentation (these are unknown)
* 5 Large Poster Boards
* 30 Multi-Colored Markers

**Lesson:**

**Engage: KWL Charts**

The students will begin the day with a Know, Want to Know, and Learned (KWL) chart. The students will be asked to write anything they know about solar panels in the “Know” portion of their chart and write down any questions they would like to answer about solar panels in the “Want to Know” portion of their chart. These questions should be listed on the board for all students to see. Once the class completes the first activity, they will revisit the questions on the board to see if they have answered any of them and if so, discuss how they were answered. Students should record the answers in their journals or on the back of their charts.

**Explore and Explain:**

**Activity 1: Solar Panel Presentation**

The first activity of the day will be a presentation by Mr. Baer on his solar panel project. The students will gain new knowledge on solar panels. Once the presentation is over, we will discuss what we learned and connect our new knowledge to the questions we have listed on the board, which will be taken from the KWL charts. I will work with the students to see whether or not we were able to find the answers to any of our questions. The students will record the answers in their KWL charts.

**Activity 2: Wrap Up**

The final activity for the day will be a wrap up of the entire Saturday Science experience. The students will have an opportunity to show me what they have learned. They will split up into five groups of three. If there are students missing, we will adjust the groups accordingly. Each group will be given a large poster board and a handful of markers. Their task is to create some sort of graphic organizer that incorporates all of the different types of energy we learned about during Saturday Science. In order to review the ideas we have covered so far, we will work as a class to generate a list to write on the board so the students can refer to this list as they are working. They must also include information on how solar energy is connected to all the other forms of energy since this was a major theme carried out through all of the lessons. Once the students have finished their posters, the groups will be expected to come to the front of the class to share their posters with their peers.

**Elaborate:**

The students will further their understanding of solar panels and really all of the energies by brainstorming ways they think we can conserve energy. Some ideas could include turning off the water while brushing your teeth, using solar panels to heat your house, and using energy efficient cars. This is important for students to know because saving energy can affect their lives in the present and in the future.

**Evaluate:**

The students will be evaluated based on their KWL charts. The students will fill in the “Learned” portion of their KWL charts. The charts will make it obvious which students retained the information they learned about during the activities because their charts will be more complete and detailed than others. The teacher should look for the items listed in the objectives at the beginning of this lesson plan. It would also be preferable if students put some of the information they found most interesting to them instead of only including what is expected of them. They will also be assessed based on their graphic organizers. Students must include some sort of information on all of the energy types in their organizers. Also, they will be expected to include information on how solar energy contributes to at least three of the energy types in their organizers. These expectations will be explained to the students before they begin creating their graphic organizers.

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