**LESSON 2**

SOLAR TECHNOLOGY AND ITS GLOBAL APPLICATION

GOALS

1. Educate students about where solar energy comes from and how it works
2. Provide a global perspective on solar technology application
3. Inspire students through stories to take action

MATERIALS

a. Printed stories and worksheet for each student and group

b. Projector for slide show/videos

BENEFITS

a. Students engage in a discussion about solar energy, its source and its application in both developed and developing communities

b. Students learn about the diverse application of solar technology around the world

c. Provide students with changes they can implement at home to help save energy

ADVANCE PREPARATION

Review the presentation and lesson materials ahead of time.

HANDOUT REFERENCE LIST

1. Solar Stories: All 10
2. Energy Action Checklist
3. Presentation: Solar Energy Explained

PROCEDURE

Duration: 60 minutes

Targeted Students: 6-8 Grade

 **Lesson Agenda:**

1. Introduction (5 minutes)
2. Presentation: Solar Energy Explained (15 minutes)
3. Activity: Solar technology around the world stories (20 minutes)
4. Class discussion and Presentations: Solar Lighting and Development (15 minutes)
5. Presentation: Energy Action Checklist (2 minutes)
6. Review Questions (5 minutes)
7. Student Questions (5 minutes)

**1. Introduction:**

 If you are a guest speaker please introduce yourself, `One Million Lights’ and

 `One Million Students’ Program. Show one of the OML videos.

**2. Presentation: Use the presentation `Solar Energy Explained’**

**Discussion Points- Slide #2:**

(Optional discussion on elements)

 Here is a periodic table of elements, Have any of you studied this before?

The periodic table is made up of chemicals both naturally and manmade that are used in our daily lives.

For solar, we need to know about Hydrogen, Helium, Boron, Phosphorus, and Silicon.

Who can tell me about Hydrogen?

 (Hydrogen is the most common element. Mostly found in stars. Used to make water, can be used as an energy carrier)

What do you know about Helium?

(makes your voice squeaky, balloons float, 2nd most common element, gas, in the sun)

Have you heard of Boron? What is it?

(makes things strong, reinforces cell wall, plants, pyrex dishes have boron in them, used to make glass, cleaning material, insecticide)

What about Phosphorus?

(glows when in contact with oxygen, used in fertilizers, used in the military for smoke screens and other explosives, free agent, helps plants grow, )

What is Silicon?

(sand, used in building materials, semi-conductor, solid, gives up and shares electrons, used in electronics)

**Discussion Points Slide #3-5:**

1. hydrogen and helium make up the sun

2. Sun radiates energy

3. The energy come from nuclear fusion, Do you know what nuclear fusion is?

(It's when atoms run into each other, for our purposed hydrogen and helium is the most common)

**Discussion Points Slide #6:**

* Of all of that energy About 15 percent of the radiant energy that reaches the earth is reflected back into space.
* Another 30 percent is used to evaporate water, which is lifted into the atmosphere and produces rainfall. The energy is also absorbed by plants, the land, and the oceans.

Should we use all of that energy that come to earth for our daily use? YES!!!

How?

**Discussion Points Slide #7:** After read the slide... Where have you seen PV cells in your life?

**Discussion Points Slide #8:** some examples

**Discussion Points Slide#9-11:** (show solar panel) Solar panels are made up of Silicon (glass). There are 2 layers: a negative and a positive. The positive side has Boron on it, it attracts electrons. Boron makes things strong... The Negative side has Phosphorus, it gives up electrons easily.

Why do we need a negative and a positive layer?

(so a circuit can be made, just like a battery, the movement of the electons from the 2 layers create energy, the energy can be used for electricity)

 **Discussion Points Slide #12:** Why should we use Solar?

 Answers:

* + The sun will not run out, it is renewable and will last a long time
	+ Sun is eco-friendly and does not harm the earth
	+ There are no carbon emissions that are leading to global warming
	+ Sun is easily available and accessible
	+ Sun is clean and healthy, it does not harm human beings with toxic fumes

**3. Activity: Solar Technology Around The World Stories and Videos**

The purpose of the activity is to transition students from how solar technology works to its global application. Split the class up into groups. Dim the classroom lights. Have one person from each group get a solar light, story and worksheet. Each story is about solar technology and how it is being applied around the world. Each group will have 10 minutes to read the story and have a discussion about the story in their group. If there is time, then each group could read more stories.

**4. Group Presentation:** Each group will share with the group about their specific story, who their person is, what they do and how solar as affected their lives. Great place for a discussion about the experience with reading using a solar light too.

**5. Class Discussion: Solar lighting in the developing regions**

You can select a student volunteer to come up and write on the board the list of impacts solar lighting is having on the developing communities. Lead a class discussion:

Instructions for the students:

* 1. Think about living in a rural community that is completely un-electrified. No computers, no switches, no outlets, no televisions, no lights, no microwaves. The only light you have after the sun goes down is a kerosene lantern.
	2. Class Question: What benefits do you think a solar light would have in that community?
	3. Example: Provide the example of how students are dependent on kerosene lanterns to study in the evening. There are a number of problems associated with kerosene like strain on the eye, smoke inhalation and the danger of fire if it is knocked over. A solar light provides clean and better illumination for additional hours of study.
	4. Additional benefits include:

 - Education: additional study hours for students

 - Health:

 - Decrease smoke inhalation, respiratory illness

 - Allows for improved service at primary health clinics

 - Midwives use solar lights to deliver babies

 - Safety: transportation at night

 - Bio-Conservation: deter wild animals from approaching

 crops/fields

 - Livelihood: communities that produce handicrafts are able to produce more goods and generate a higher income

 - Savings

**6: Review Questions**:

* 1. Where does solar energy come from?

 Answer: Sun, Electrons

* 1. How is solar technology being used around the world?

 Answers: Space, farms, to light and to power homes

 3. What are the benefits of solar lighting?

 Answers:

 a. Education: additional study hours for students

 b. Health:

 - Decrease smoke inhalation, respiratory illness

 - Allows for improved service at primary health clinics

 - Midwives use solar lights to deliver babies

 c. Safety: transportation at night

 d. Bio-Conservation: deter wild animals from approaching

 crops/fields

 e. Livelihood: communities that produce handicrafts are able to produce more goods and generate a higher income

 f. Savings

**7: Student Questions:**

Time allocated for students to ask questions regarding the lesson.