Camp Fire
MINNESOTA

My nature connection

SOLAR POWER SCIENTISTS

GRADES: 3-12
TIME: 45 min.

Here Comes the Sun

Billions of stars exist in the Milky Way galaxy, and the one closest to the Earth is our Sun. Plants have been using the Sun's power for 700 million years to help them grow, and humans have been harnessing its power since the 7th century B.C.

ACTIVITY

INTRODUCTION

If you can't take the heat...
The first recorded use of humans using the Sun's power was 2700 years ago! Ancient people channeled the Sun's light through a magnifying glass to light torches and even to set enemy ships on fire!

Solar Power Today
In 1954, the first "solar cell" was invented. Solar cells are small devices that can convert the sun's energy into electricity. A collection of solar cells is called a solar panel.

Benefits of Solar Power
- It's a renewable energy source, which means we'll never run out of solar energy.
- Unlike fossil fuels, solar energy does not add any additional greenhouse gases to the atmosphere, which slows the rate of climate change.
- Installing solar panels on your home can decrease your utility bills each month.

WHAT YOU'LL NEED:

- A computer or tablet with internet access

- Pencil or Pen

Students will:

1. Understand solar power as a renewable energy source.
2. Use Google Earth to find the best locations to build solar farms.

SETTING

Indoors

1. SOLAR FARMS

Many people choose to install solar panels on rooftops to power a specific building, but some people choose to dedicate large areas of land for the sole purpose of creating solar electricity. Solar farms are large collections of solar panels used to supply energy to a power grid or a specific community.
Using Google Earth, you will look at some examples of solar farms and find new places to build.

1. **Log on to Google Earth:**
Using a computer or tablet, open your web browser and go to https://earth.google.com/web/ .

2. **The World's Largest Solar Farm**: Click on the magnifying glass icon on the left.
In the search bar type: **Noor Complex Solar Power Plant**. Then hit the enter key on your keyboard.
Google Earth will then show you a satellite image of the world's largest solar farm located in the country of Morrocco. This solar farm provides electricity to over 1 million people.
Examine the location and environment of this solar farm. **What makes this the ideal environment to place solar panels?**

_____
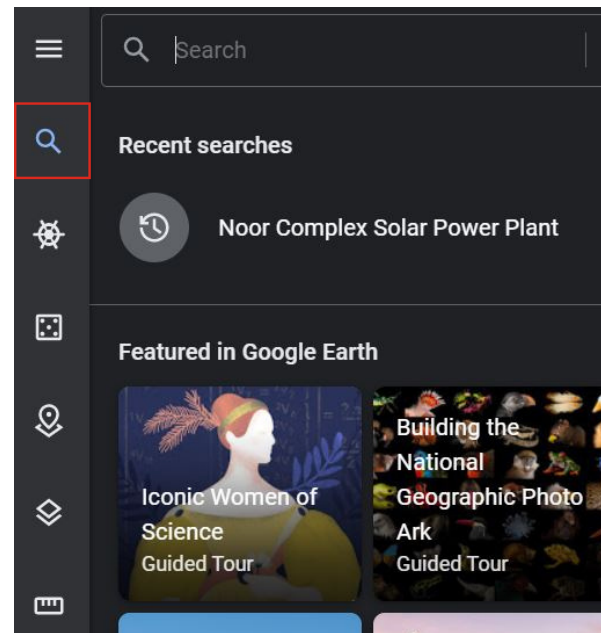
3. **Minnesota's Largest Solar Farm:** Go to the search bar of Google Earth and type in: **North Star Solar Farm**. This is the largest solar farm in our state and is located in the town of North Branch.
What does this solar farm have in common with the Noor Complex Solar Power Plant? _____

How do you think the winter snow will impact the efficiency of these solar panels?_____

2. Plan Your Own Solar Farm

Now that you have seen two examples of effective solar farms, it is time for you to plan your own. Using Google Earth, find 3 different locations around the world that would be ideal places to build a solar farm.

Hints:

- Locations closer to the equator get more sunlight than those farther away.
- Man-made structures and tall trees can cast shade and reduce the efficiency of solar panels.
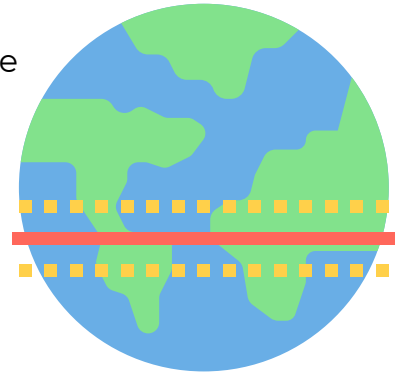
Record Your Locations

Once you find the location of your future solar farm, look at the bottom right corner of your Google Earth Screen.

The numbers and letters in the red box are your GPS coordinates for your solar farm location. These coordinates reflect your location's distance from the equator and can be used by others to find your location. Use GPS coordinates to complete the following tasks.
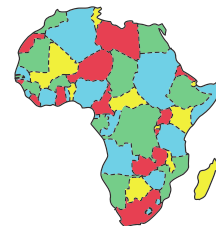
Camera: 541 m   44°58'13"N 93°14'06"W   226 m

1. Find a new location to put a solar farm on the continent of North America. GPS coordinates Solar Farm Location:

_____

What nearby community (city, town, etc.) would this solar farm power?

_____

2. Find a new location to put a solar farm on the continent of Africa. GPS coordinates of Solar Farm Location:

_____

What nearby community would this solar farm power?

_____

3. Find a new location to put a solar farm on the continent of Asia. GPS coordinates of Solar Farm Location:

_____

What nearby community would this solar farm power?

_____

CONNECTING WITH QUESTIONS

What continent did you have the most difficulty finding a solar farm location on? Why?

Once you decide on a location, what would be the next steps to begin the construction of your solar farm?

While searching on Google Earth, did you see anything that surprised you?

Do you think that there will come a point where a majority of the world's electricity (>50%) will come from solar power?

How would building your solar farm impact the existing plant and animal communities?

ADDITIONAL RESOURCES

The History of Solar:
https://www1.eere.energy.gov/solar/pdfs/solar_timeline.pdf

How Solar Panels Work with Bill Nye:
https://www.youtube.com/watch?v=av24fEMhDoU

Google Earth Basics Tutorial:
https://www.youtube.com/watch?v=-nN11Yhk8f0

TELL US WHAT YOU THINK!

Take a short survey at: campfiremn.org/mynatureconnection

Or here: Kids Survey - click here | Teachers/Parents Survey - click here

Grade Level	Science Education Standard
Grade 3	3.3.3.1.1 Observe and describe the daily and seasonal changes in the position of the sun and compare observations.
Grade 4	4.1.2.1.1 Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used. 4.1.2.2.2 Generate ideas and possible constraints for solving a problem through engineering design. For example: Design and build an electromagnet to sort steel and aluminum materials for recycling
Grade 5	5.1.1.1.4 Understand that different models can be used to represent natural phenomena and these models have limitations about what they can explain 5.1.3.4.2 Create and analyze different kinds of maps of the student's community and of Minnesota. For example: Weather maps, city maps, aerial photos, regional maps, or online map resources.
Grade 6	6.1.2.1.1 Identify a common engineered system and evaluate its impact on the daily life of humans. For example: Refrigeration, cell phone, or automobile.
Grade 7	7.1.3.4.1 Use maps, satellite images and other data sets to describe patterns and make predictions about natural systems in a life science context. For example: Use online data sets to compare wildlife populations or water quality in regions of Minnesota.
Grade 8	8.1.1.2.1 Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence. 8.3.3.1.1 Recognize that the sun is a medium sized star, one of billions of stars in the Milky Way galaxy, and the closest star to Earth.
Grade 9-12	9.2.4.1.1 Compare local and global environmental and economic advantages and disadvantages of generating electricity using various sources or energy.