

The Future of Solar Energy

Environmental Study of the Sun - Engineering

Essential Question	*What is the future of solar energy and other energies in Ohio? USA? Globally?*
Outcomes	Students will be able to: • define the "engineering design process," which is composed of 3 simple phases. • view teamwork and engineering problem solving through videos. • compare jobs, careers and opportunities in renewable energies. • research information to be prepared for a Job interview • answer interview questions • clarify the current status of solar energy
Standards Benchmarks identified in RED are priority benchmarks.	**Science Assessment Targets** **L.c.1** Flow of energy in ecosystem (e.g. energy pyramids), conservation of energy in an ecosystem (e.g. energy lost as heat, energy passed on to other organisms) and sources of energy (e.g. sunlight, producers, lower level consumer). **ES.a.3** Extraction and use of natural resources, renewable vs. non-renewable resources and sustainability. **Content Standards** **R.3.3**. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (RI/RL.4.1) **R.3.15**. Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (RI.5.7) **R.4.1**. Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text. **D.3.13**. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. (6.SP.3) **D.4.10.** Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which composes the event. (7.SP.8b)

	W.3.4. With guidance and support from peers and others, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (Editing for conventions should demonstrate command of Language standards 1–3 at this level.) (W.5.5) **W.4.4.** With some guidance and support from peers and others, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well the purpose and audience have been addressed. (Editing for conventions should demonstrate command of Language standards 1–3 at this level.) (W/WHST.6-8.5) **S.3.6.** Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (SL.5.5) **S.4.5.** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (SL.8.5) **MP.1** Make sense of problems and persevere in solving them.
STEM Focus	☐ **Science** ☐ **Technology** **X Engineering** ☐ **Mathematics**

TEACHERS: this content was designed for ABE/ASE students. Instructional scaffolding used in this lesson can be beneficial for multilingual students.

Because adult classrooms are multi-level, teachers will want to differentiate this HyperDoc by accommodating the different ways that students learn by using scaffolding strategies and appropriate leveled materials. Teachers will want to vary the instructional activities based on their student's needed skills.

For more information about collaborating and sharing on Google Drive, check out videos 36-45: Google Junior Training series - YouTube.

STUDENTS: Before you begin this lesson



- Go to File > Make a copy
- Change the name to: <your name> Solar Engineering
- Begin working in your document
- When completing an activity, make a copy of the document and save with your name and the title of the activity

Be sure to read carefully. The green text is a prompt for reflection or activity.

Engage

Click on the image below to watch *Save Your Watts.*



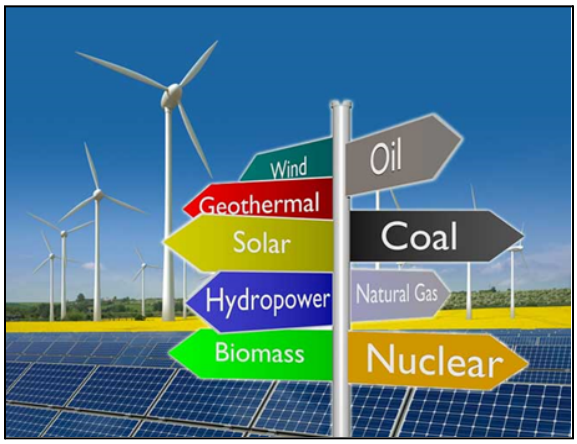
(51 seconds)

Read:

Currently, our world is diving into renewable energies like never before in order to reduce carbon emissions. It is working but will it be fast enough?
Still we are very dependent on fossil fuels. 79% of our energy needs are supported by fossil fuels. A small amount of our energy needs 13% are supported by wind and solar energy. It seems like a small amount, but it really is quite remarkable, giving our world great hope to increase the use of more and more renewable energy.

Solar Engineers are working diligently to find solutions to our energy crisis. They are working solely with solar and also combining with other energies to provide needed electricity to power our world.

Energy is all around us in nature. Some sources of energy will never run out so that energy is known as renewable energy. Other sources of energy are available in specific amounts and will not regenerate, so they make non-renewable energy. It is energy from a source that will run out.



Choose either:

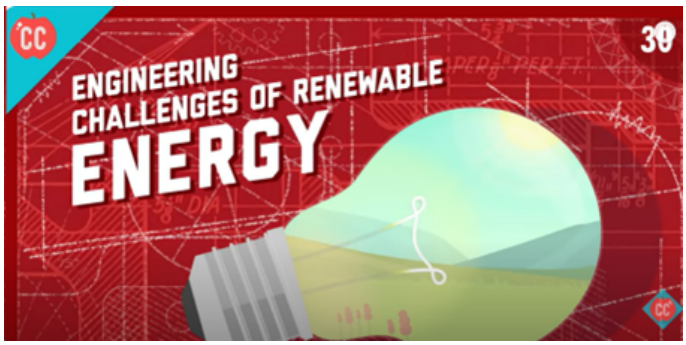
- ***Renewable energy - powering a safer future*** *or*
- ***Renewable and non-renewable energy***

After reading the information above, give a fact or statistic about renewable energy that you found interesting in the Answergarden.

Read:
Each renewable energy comes with advantages and disadvantages. As we explore, grow and create, we will find solutions to the disadvantages to make renewable energy more efficient, more stable, and more available to sustain everyone's electrical needs and desires.

Engineers and technicians have goals to make their products and energy sources more efficient and more stable to bring electricity to each home, building, and business.

Click on the image below to watch the video. Use the note-taking chart Advantages and Disadvantages to Renewable Energy to collect this important information.



(11:31 min)

When you are finished check your answers against the Answer Key to Solar Advantages to see how you did!

YOUR turn

Think of one activity you do every day that requires either renewable or non-renewable energy. The first sentence should describe the action. The second sentence should describe the resources required to complete the action. The third sentence should state whether the energy used is renewable or non-renewable.

My activity would be drinking water. The sentences below are an example of my writing to describe this resource:

1. *My drinking water comes from the faucets in my house, but sometimes I also drink bottled water. There are processes needed to make both of these resources readily available to me. 2. Water is a natural resource which is not*

only found on the surface of the earth in rivers, oceans, lakes, and streams but also underground. 3. Water would be a renewable energy because it can be replenished naturally and is sustainable; although conservation of water must also be observed so that my grandchildren continue to have access to this resource.

Write three complete sentences about YOUR action in the box below:

1.

2.

3.



Explore

Use the Engineering HyperDoc Vocabulary to complete the vocabulary terms as you learn more about solar energy. Write out the definitions as you find them in the information you are learning. Be sure to make a copy of the document before filling in your answers. Later in the lesson you will be using these terms to create a PowerPoint presentation.



Read:

Because of the growth in the field of renewable energies, careers and jobs have also grown. The one important detail to remember is that solar panels need maintenance. If a panel gets broken or cracked it needs to be replaced. Hail, people stepping on the panel, snow and ice, or limbs can damage the panel creating a hotspot.

Some of the earlier drawbacks or disadvantages to solar panels now have solutions. You will see in the videos, Solar Farmers have created solutions to hail, snow and wind.

In looking at renewable energy in our country we are growing in all directions with energy being fed into the energy grid to power our electrical needs. Solar, wind, and nuclear are the top energies.

Review the following sites:

Howdy -The Turbine Cowboy

Explore Solar Energy Careers

Nuclear Careers -- ANS

A day in the life of a solar farm: 260MW Impact solar in Texas, USA | Lightsource bp *(6:11 min)*

How the world's largest wind farm works

Did you find anything interesting?

Please write some of the information that you found to be important in the box below:

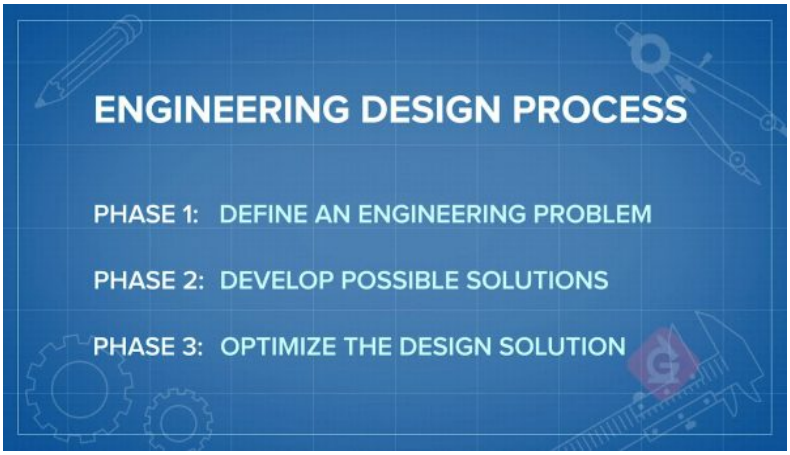
Add the title and URL (website address) of the video or article that you found interesting in the box below:



Explain

A Day in the Life of a Solar Engineer

Engineers and technicians work on projects over and over again to see if the product can be improved or changed to get a better product. It is important to complete projects so we can see how ideas work. They use an engineering process to define the engineering ***problem***, then develop possible ***solutions***, and finally ***optimize the design*** solution.

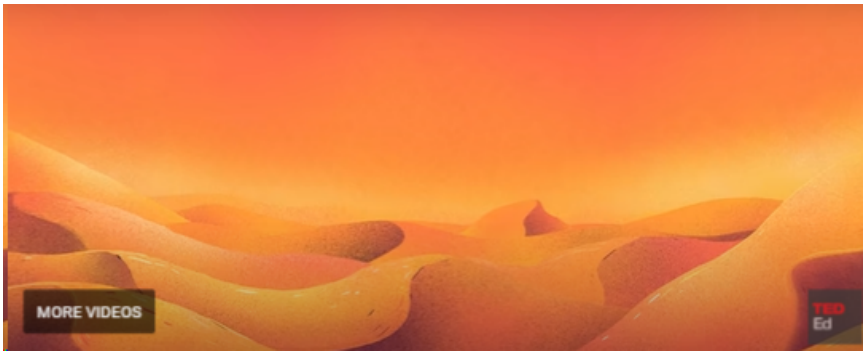


Source: https://www.generationgenius.com/videolessons/engineering-design-process-video-for-kids/

Read:
Engineering Design Process

Can we cover the Sahara Desert with solar panels?

Click on the image below to watch the video *Why don't we cover the desert with solar panels?*



(5:24 min)

As you watch the video, use the Design Process Organizer below to take notes. You may complete your organizer with a classmate:
Design Process Organizer.docx

Imagine you are the lead engineer on this project. How would you explain to your supervisor the problems with the design and possible solutions?

Type in the box below:



Elaborate

What kinds of jobs exist in solar energy?

Review: ***Jobs in Solar Energy***

SKILLED TRADES & TECHNICAL POSITIONS	ENGINEERING & STEM POSITIONS	BUSINESS & PROFESSIONAL POSITIONS
Installation Contractors	Software Engineers	IT Specialists
Project Managers	System Designers	Lawyers
Electricians	Structural Engineers	Procurement Specialists
Solar PV Technicians & Installers	Electrical Engineers	Code Officials
Plumbers	Environmental Engineers	Sales Representatives
Roofers	Mechanical Engineers	Marketing Specialists
	Materials Scientists	

Read: ***Get Into Solar*** to find out more about possible job options.

What are some benefits to a career in this field?

Write your answers in the box below:

Complete: *Career Quiz - Get Into Energy*

What did you find out about yourself after taking the quiz? Would you be interested in pursuing the suggested job?

Write your answers in the box below:

> ***"Find out what energizes you most. The energy industry is home to over 100 skilled, well-paying careers that offer reliable employment. Take a look today at what your future could look like tomorrow."***
>
> Source: The Energy Industry: Take Charge of Your Future https://stem.getintoenergy.com/module7

Read about energy careers:

Overview of Working in the Industry

Research solar energy jobs!

Step One:

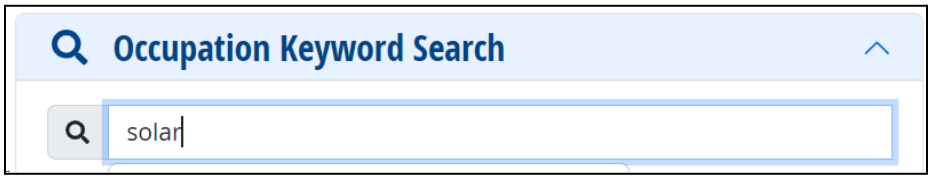
Review solar energy jobs:

O*NET Online

CareerOneStop

Get Into Energy

Search on keyword: solar



Here you will find 5 types of jobs:

- Solar Energy Systems Engineers
- Solar Sales Representatives and Assessors
- Solar Energy Installation Managers
- Solar Thermal Installers and Technicians
- Solar Photovoltaic Installers

Step Two:

Choose two jobs you want to explore or learn more about. Using the websites above, use the Solar Energy Jobs Graphic Organizer to take notes.

Step Three:

Based on what you learned, pick one job you might want to pursue as a future career position. Then you will create a PowerPoint presentation (PPT) describing each of these characteristics. Your Solar Energy Career Presentation should contain charts, graphs, key ideas from online resources to describe your job.

Use the vocabulary terms from the Engineering HyperDoc Vocabulary Definitions you have been learning throughout the lesson. Incorporate them into your PowerPoint presentation.



Collaborate

Read:

Solar Energy Technician | Get Into Stem

A Day in the Life of a Solar Technician - Get Into Energy

With a partner, prepare a list of questions for an Informational Interview from the two articles above.

What would you ask a solar technician about their job if you were interested in learning more about what a solar technician does?

Watch: *Solar Technician* *(5:06 min)*

Using the Informational Interview handout, return to your questions and answer them based on the information from the video.

The interview process allows an employer to determine if a candidate has the skills, experience and personality to meet the job's requirements.

Click on the image below to watch a video about questions employers should ask:



Review:

10 Common Job Interview Questions and How to Answer Them

28+ Common Interview Questions and How To Answer Them | Indeed.com

Your 2024 Guide to the Most Common Interview Questions and Answers

Interview Tips | CareerOneStop

With your partner, each of you should choose five questions that you think are important to ask during the interview process. Practice asking each other your questions. Give your partner positive feedback about their answers based on what you learned from the reading.

Next, go to Flip Solar Engineering and record your response to one of the interview questions.

Evaluate

Complete the Solar Engineering Assessment by answering the 3 questions.

Go back to your Solar Energy Career Presentation (PPT) and add a summary of why you think this job is best for you. Talk with your teacher about when you will be ready to present your findings to your class.



Extend

Watch the videos below to find out more information about the largest to the weirdest in solar energy:

How the world's largest solar power plant works

Revisiting The Billion Dollar Solar Plant Mistake

The largest offshore wind farm in the world | 60 Minutes

Learn more about careers in renewable energy:
https://getintoenergy.org/careers-in-renewable/

https://ratedpower.com/blog/solar-engineer/

Click on the logo below to go to O*NET. Use this to site to search for possible careers

O*NET OnLine

	The following project is creating a mason jar solar light decorative. This project is inexpensive. **Click on the image below to watch a video that walks you through each step:** 