



So Watt's the Sun Been Up To?

Overview

The history of solar energy is long, but that the most significant advances tend to have happened most recently. A timeline will help you relate the history of solar energy to your own life span. If you were to create a timeline that goes back to the year zero, 100 years occupy just one twentieth of the length of the timeline, and 10 years occupy just one 200th of the length. If the timeline is extended all the way back to the birth of our sun (4.5 billion years ago), 100 years would occupy just one 25 millionth of the length of the timeline. Be sure to pick a realistic scale whenever creating a time line.

Arizona State Standards

SC06 S2C1 PO1 Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations.

SC06 S2C1 PO2 Describe how a major milestone in science or technology has revolutionized the thinking of the time.

SC06 S2C1 PO3 Analyze the impact of a major scientific development occurring in the past decade.

SC06 S2C2 PO1 Describe how science is an ongoing process that changes in response to new information and discoveries.

SC06 S2C2 PO2 Describe how scientific knowledge is subject to change as new information and /or technology challenges prevailing theories.

SC06 S5C3 PO1 Identify various ways in which electrical energy is generated using renewable and non renewable resources.

Objectives

The student will create a time line of solar energy identifying the people, cultures, technologies, and attitudes about solar energy and investigate how those have changed over time.

Background Information

The information provided below is to be used to assign different students in the class with a different event and have them research it. Some of the events will not require as much depth as others, assign the work accordingly to your students abilities.



Solar Energy Timeline

4.5 billion years ago Solar energy reaches the earth.

7th Century BC Magnifying glass was used to concentrate sun's rays to make fire.

3rd Century BC Greeks and Romans used "burning mirrors" to focus sunlight as weapons of war to ignite fires and burn sails of enemy war ships.

20 AD The Chinese document the use of "burning mirrors" to light torches for religious purposes.

100 AD Italian historian, Pliny the Younger, builds a passive solar home using glass for the first time to keep the heat in and cold out.

1-500 AD Roman baths were built with large windows facing south to let sunlight in and used the heat from the sun to heat the water.

6th Century The Justinian Code was enacted to protect sunrooms on houses and public buildings so that shadows would not interfere with the sun used for heat and light.

1300 AD Ancestors of Pueblo people called Anasazi lived in North America. They lived in south-facing cliff dwellings that capture the winter sun.

1600 AD Educated people accepted the idea that the sun and stars are the same.

1643-1715 Reign of French King Louis XIV was an era of solar experiments. Louis was known as the Sun-King.

1695 Frenchman Georges Buffon concentrates sun's rays and uses mirrors to burn wood and melt lead.

1700s European aristocracy used walls to store solar heat for ripening fruit (fruit walls). England and Holland lead development of greenhouses with sloping glass walls facing south. Frenchman Antoine Lavoisier builds a solar furnace to melt platinum.

1767 Swiss scientist Horace de Saussure invents the first solar collector (solar hot box).

1800s Wealthy Europeans build and use solar-heated greenhouses and conservatories. French scientist used heat from a solar collector to make steam to power a steam engine.

1830s Astronomer Sir John Herschel used a solar cooker to cook food during his expedition to South Africa.

1839 French scientist Edmund Becquerel observes the photovoltaic effect.

1860s Post-Civil War U.S. development of solar energy; pioneers recognize that water left in black pans in the sunlight gets hot.

1861 French scientist Augustin Mouchot patents the solar engine.

1870s Augustin Mouchot used solar cookers, solar water pumps for irrigation, and solar stills for wine and water distillation (most widespread use of solar energy).

1880s Engineer John Ericsson, the "first American Solar Scientist," develops solar-driven engines for ships. The first solar-powered printing press began working in France.



- 1891** Baltimore inventor Clarence Kemp, "father of solar energy in the U.S.," patents first commercial Climax Solar Water Heater.
- 1892** Inventor Aubrey Eneas establishes, "Solar Motor Company of Boston" to build solar-powered motors to replace steam engines powered by coal or wood.
- 1897** Kemp's water heaters were used in 30% of homes in Pasadena.
- 1908** Los Angeles: Carnegie Steel Company invents modern type of roof solar collector.
- 1920s** The solar industry focus moved from California to Florida.
- 1936** American astrophysicist Charles Greeley Abbott, invents the first solar boiler.
- 1940s** Great demand for solar homes, both active and passive. Book of solar house plans, Your Solar House, published by 49 great solar architects.
- 1941** Approximately 60,000 solar hot water heaters in use in Florida.
- 1950s** Architect Frank Bridgers designs world's first solar-heated office building. Low-cost natural gas becomes primary heating fuel.
- 1954** Birth of solar cells (photovoltaics).
- Late 1950s** Extensive use of solar cells in the space industry for powering satellites.
- 1960s** Some U.S. companies begin to manufacture solar cells or solar hot water heaters. U.S. oil imports surpass 50 percent.
- 1970s** Department of Energy established; national solar research laboratories established.
- 1973** Energy shortages and the oil embargo spark public interest in solar energy use.
- 1977** President Jimmy Carter installs solar panels on the White House and promotes incentives to home builders to put in new homes solar energy systems. Second U.S. oil embargo; solar trade association (Solar Energy Industries Association) established in Washington, DC.
- 1980** Energy Security Act virtually shuts down national solar research programs; states begin establishing their own solar research facilities.
- 1980s** U.S. government and private industry assist several thousand Navaho and Hopi Indians in Arizona and New Mexico supplement their passive solar homes with photovoltaic power.
- 1983** Wisconsin enacts solar access law to protect the "right to light" for urban gardens, was enacted soon afterward in Arizona and Michigan
- 1990s** Tokyo has approximately 1.5 million buildings with solar hot water heaters (more than in the entire U.S.). Israel uses solar water heating for approximately 30 percent of their buildings and all new homes are required to install solar water heating systems. Greece, Australia and several additional countries are ahead of the U.S. in solar energy usage.



Materials

Large piece of butcher paper

Research materials

Markers

Construction paper 5" by 5" (variety of colors)

Procedures

1. Introduce the concept of a timeline to the students by having them create a "mini" time line of their life. Have them start with birth and finish with current school year.
2. Explain to the students that they will be creating a class time line for the history of solar energy. They will be assigned a topic and they will need to find out when it happened, what happened, and what the significance of the event was.
3. The students will then do research to find their event and the significance, recording that information on the colored piece of construction paper you gave them.
4. When the students are finished with their colored papers have them line up in the correct order in the classroom.
5. Once they are lined up correctly, have them orally present their information and then glue it to the time line on the butcher paper.
6. Finally, ask the students what they felt was the most significant event and why. They may not choose their own.