Poster Contest

Student Objective
The student:
- will be able to identify major events in the history of solar energy
- will work cooperatively to create a poster that communicates information.

Key Words:
passive solar
photovoltaic
solar collector
solar furnace
solar still
time line

Materials:
- posterboard or large sheets of paper
- various art materials, e.g. paints, markers, crayons and computer graphics
- time line information
- internet connection and research books (optional)

Time:
1 class period

Background Information
See Solar Energy Timeline

Procedure
1. Divide the class into groups of three or four students.
2. Explain to the class that they will be creating a poster to depict a part of the timeline of solar history, and then sharing them with the class.
3. Assign a period of history to each group.
4. Assist the groups as necessary while they are working on their posters.
5. When the posters are completed, have each group present their poster to the class and explain what information they are depicting.
6. Have the class vote on which time period in solar energy history they think is the most interesting and important. Encourage debate.
7. Hang the posters in the class for the duration of your work on Solar Matters. After the unit is completed, the posters could be hung in a common area or hallway of the school.

Further Research
1. Have students create posters with their ideas of how solar energy will be used in the future.

Related Reading

- ***Solar Power (Energy Forever Series)*** by Ian Graham (Raintree, 1999)
  This book examines solar energy, its history, uses, advantages and disadvantages, and new developments in the field.
- ***Solar Power (True Books)*** by Christine Petersen (Children's Press, 2004)
  This book provides readers with a lucid picture of the sun and wind as natural forces before introducing some of the technology (windmills, turbines, solar panels) used to harness energy on a large scale. The captioned photos are well chosen, and the science and the explanations of the technology are eminently clear. Peterson ends the book with a forecast of the future that informs kids about the advantages and disadvantages of such renewable resources and speculates on their use in years to come.
- ***Solar Power of the Future: New Ways of Turning Sunlight into Energy*** by Susan Jones (Rosen Publishing Group, 2003)
  Discusses various kinds of solar energy, the history and development of their use, economic aspects of solar energy, and future possibilities.

Internet Sites

http://www.eere.energy.gov/solar/pdfs/solar_timeline.pdf

Department of Energy, Energy Efficiency and Renewable Energy's illustrated solar energy timeline.

EnergyWhiz

Be an EnergyWhiz superstar! Submit a photo of your poster to the EnergyWhiz website at **http://energywhiz.com/**. We will publish your class and school name and your teacher's name.

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	B.C.E.
4.5 billion years ago	Solar energy reaches the earth
7th Century B.C.E.	Magnifying glass used to concentrate sun's rays to make fire
3rd Century B.C.E.	Greeks and Romans use "burning mirrors" to focus sunlight as weapons of war to ignite fires and burn sails of enemy war ships
	Year 1 - 500
20 A.D	Chinese document use of burning mirrors to light torches for religious purposes
100	Italian historian Pliny the Younger builds passive solar home using glass for the first time to keep heat in and cold out
	Roman baths built with large windows facing south to let sunlight for heat
	500s
	Justinian Code enacted to protect sunrooms on houses and public buildings so that shadows will not interfere with the sun used for heat and light
	1300s
	Ancestors of Pueblo people called Anasazi, in North America live in south-facing cliff dwellings that capture the winter sun
	1600s
	Educated people accept the idea that the sun and stars are the same
1643-1715	Reign of French King Louis XIV, ("Sun King"), is an era of solar experiments
1695	French Georges Buffon concentrates sunlight using mirrors to ignite wood and melt lead
	1700s
	European aristocracy use 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 solar furnace to melt platinum
1767	Swiss scientist Horace de Saussure invents first solar collector (solar hot box)

1800s

	Wealthy Europeans build and use solar-heated greenhouses and conservatories
	French scientist uses heat from solar collector to make steam to power a steam engine
1830s	Astronomer Sir John Herschel uses solar cooker to cook food for his expedition to South Africa
1839	French scientist Edmund Becquerel observes photovoltaic effect
1860s	Post Civil War U.S. development of solar energy; pioneers find that water left in black pans in the sunlight gets hot
1861	French scientist Augustin Mouchot patents solar engine
1870s	Augustin Mouchot uses 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, "first American Solar Scientist," develops solar-driven engines for ships
	Solar-powered printing press working in France
1891	Baltimore inventor Clarence Kemp, ("real father of solar energy in the U.S."), patents first commercial Climax Solar Water Heater
1892	Inventor Aubrey Eneas founds Solar Motor Company of Boston to build solar-powered motors to replace steam engines powered by coal or wood
1897	Kemp's water heaters used in 30% of homes in Pasadena, CA

1900s

1908	Los Angeles: Carnegie Steel Company invents modern type of roof solar collector
1920s	Solar Industry focus moves from California to Florida
	Albert Einstein receives the Nobel Prize for his work on the photoelectric effect
1936	American astrophysicist Charles Greeley Abbott invents solar boiler
1940s	Great demand for solar homes, both active and passive, creates Your Solar House, a book of house plans by 49 great solar architects
1941	Approximately 60,000 solar 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 space industry for satellites
1960s	Some U.S. solar companies manufacturing solar cells or solar hot water heaters; U.S. oil imports surpass 50 percent
1970s	Department of Energy established; national solar research labs established
1973	Energy shortages/oil embargo; indifference about solar energy begins to decline
1974	Florida Solar Energy Center (FSEC), largest state solar center, is established
1977	President Jimmy Carter installs solar panels on the White House and

	promotes incentives for solar energy systems
1979	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 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, soon enacted in Arizona and Michigan
1990s	Tokyo has approximately 1.5 million buildings with solar 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
	2000s
2000	On the International Space Station, astronauts installed photovoltaic panels on what is the largest solar power array in space. Each wing of the array consists of 32,800 solar cells
2001	NASA's solar-powered aircraft, Helios, sets a new world record for non-rocket powered aircraft: 96,863 feet (more than 18 miles high)
2002	NASA successfully conducts two tests of a solar-powered, remote-controlled aircraft called Pathfinder.

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			.1	.2	.3	.4	.5	.6
Energy	**Standard 1**	**SC.B.1.2-**	**X**	**X**	**X**	**X**		**X**
	Standard 2	**SC.B.2.2-**		**X**	**X**			
Earth and Space	**Standard 1**	**SC.E.1.2-**			**X**			
	Standard 2	**SC.E.2.2-**						
Nature of Science	**Standard 1**	**SC.H.1.2-**						
	Standard 2	**SC.H.2.2-**						
	Standard 3	**SC.H.3.2-**	**X**			**X**		
Additional Standards:	**SS.A.1.2.1, SS.A.1.2.3**							

Benchmark SC.B.1.2.1 - The student knows how to trace the flow of energy in a system.
Grade Level Expectations
The student:
Fourth
- knows that most living things use energy from the Sun to live and grow
- knows how to trace the flow of energy in a system

Fifth
- knows how to trace the flow of energy in a system.

Benchmark SC.B.1.2.2 - The student recognizes various forms of energy.
Grade Level Expectations
The student:
Third
- knows different forms of energy

Fourth
- knows that there are a variety of sources for electricity.

Benchmark SC.B.1.2.3 - The student knows that most things that emit light also emit heat.
Grade Level Expectations
The student:
Third
- knows that the Sun provides energy for the Earth in the form of heat and light.

Benchmark SC.B.1.2.4 - the student knows that many ways in which energy can be transformed

from one type to another.
Grade Level Expectations
The student:
Fourth
- knows ways that energy can be transformed.

Benchmark SC.B.1.2.6 - The student knows ways that heat can move from one object to another.
Grade Level Expectations
The student:
Fifth
- understands that convection, radiation, and conduction are methods of heat transfer.

Benchmark SC.B.2.2.2 - The student recognizes the costs and risks to society and the environment posed by the use of nonrenewable energy.
Grade Level Expectations
The student:
Third
- classifies resources as renewable or nonrenewable.

Benchmark SC.B.2.2.3 - The student knows that the limited supply of usable energy sources places great significance on the development of renewable energy sources.
Grade Level Expectations
The student:
Third
- knows that alternate energy sources are being explored using natural and mechanical processes

Fourth
- knows that the limited supply of usable energy source3s places great significance on the development of renewable energy sources.

Benchmark SC.E.1.2.3 - The student knows that the Sun is a star and that its energy can be captured or concentrated to generate heat and light for work on Earth.
Grade Level Expectations
The student:
Fourth
- knows how the energy of the Sun can be captured as a source of heat and light on Earth.

Benchmark SC.H.3.2.1 - The student understands that people, alone or in groups, invent new tools to solve problems and do work that affects aspects of life outside of science.
Grade Level Expectations
The student:
Third
- understands the relationships between science concepts and the history of science and the contributions of scientists

- uses reference materials to obtain information related to science concepts

Fourth

- knows that technologies often have costs, as well as benefits, and can have an enormous effect on people and other living things
- researches and reports on a science topic

Fifth

- knows areas in which technology has improved human lives
- knows that new inventions often lead to other new inventions and ways of doing things**.**

Benchmark SC.H.3.2.4 - The student knows that, through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas.

Grade Level Expectations

The student:

Third

- knows that, through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas

Fourth

- knows ways that, through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas

Fifth

- extends and refines knowledge of ways that, through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas.

Benchmark SS.A.1.2.1 - The student understands how individuals, ideas, decisions, and events can influence history.

Grade Level Expectations

The student:

Third

- understands ways selected individuals, ideas, and decisions influenced historical events

Fifth

- extends and refines understanding of the effects of individuals, ideas, and decisions on historical events.

Benchmark SS.A.1.2.3 - The student understands broad categories of time in years, decades, and centuries.

Grade Level Expectations

The student:

Third

- reads and interprets a single timeline identifying the order of events.

Poster Contest

passive solar - construction technique that uses structural elements to bring in heat when needed and deflect or vent heat when it is not desired.

photovoltaic - the effect of producing electric current using light from the Sun

solar collector - a device that collects solar energy

solar furnace - a device that uses solar energy to heat, burn or melt.

solar still - a device that uses solar energy to distill a liquid

time line - a chronological list of historical events that all relate to a specific subject