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

Time:
1 - 2 class periods

Internet Sites
http://inventors.about.com/library/inventors/blsolar2.htm
Time line of photovoltaics
http://www.solarenergy.com/info_history.html
Solar Energy Inc. site on the history of solar thermal to generate electricity.
http://www.californiasolarcenter.org/history.html
California Solar Center and John Perlin summarize the history of photovoltaics, solar thermal and passive solar

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 time line 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
7. Hang the posters in the class for the duration of your work on Solar Matters.

Energy Whiz

Be an Energy Whiz artist! Submit photos or scanned files of your solar posters to **http://energywhiz.com/**. See your poster on the internet!

Related Research

1. What are the future trends in solar energy? Research what the 'experts' think will be the trends in solar energy in the future.
2. Research important scientists in the history of solar energy.
3. Have the students produce skits about their time period.
4. Prepare a presentation to give to parents, a partner class or the school in general for Earth Day on the history and current applications of solar energy.

Poster Contest

			.1	.2	.3	.4	.5	.6	.7
Nature of Matter	**Standard 1**	**SC.A.1.3-**							
	Standard 2	**SC.A.2.3-**			**X**				
Energy	**Standard 1**	**SC.B.1.3-**	**X**	**X**	**X**	**X**			
	Standard 2	**SC.B.2.3-**							
Nature of Science	**Standard 1**	**SC.H.1.3-**	**X**	**X**				**X**	
	Standard 2	**SC.H.2.3-**							
	Standard 3	**SC.H.3.3-**					**X**		
Social Studies Standards:		**SS.A.1.3.1, SS.A.1.3.2, SS.A.2.3.3**							

Benchmark SC.A.2.3.3 - The student knows that radiation, light, and heat are froms of energy used to cook food, treat diseases, and provide energy.

Grade Level Expectations

The student:

Sixth

- knows forms of radiant energy and their applications to everyday life

Seventh

- knows uses of radiation, light, and thermal energy to improve the quality of life for human beings

Eighth

- extends and refines knowledge of uses of forms of energy to improve the quality of life.

Benchmark SC.B.1.3.1 - The student identifies forms of energy and explains that they can be measured and compared.

Grade Level Expectations

The student:

Sixth

- knows different types of energy and the units used to quantify the energy
- understands that energy can be converted from one form to another

Seventh

- knows examples of uses of energy in the home and ways to measure its use

Eighth

- understands that energy can be transferred by radiation, conduction, and convection
- knows examples of natural and man-made systems in which energy is transferred from

one form to another.

Benchmark SC.B.1.3.2 - The student knows that energy cannot be created or destroyed, but only changed from one form to another.

Grade Level Expectations

The student:

Sixth

- understands that energy can be changed in form
- uses examples to demonstrate common energy transformations

Eighth

- understands how the principle of conservation of energy is applied during an energy transfer.

Benchmark SC.B.1.3.3 -The student know the various forms in which energy comes to Earth from the Sun

Grade Level Expectations

The student:

Sixth

- knows types of radiant energy that come to Earth from the Sun

Seventh

- knows the characteristics, effects, and common uses of ultraviolet, visible and infrared light.

Eighth

- knows ways to measure the various forms of energy that come from the Sun.

Benchmark SC.B.1.3.4 - The student knows that energy conversions are never 100% efficient

Grade Level Expectations

The student:

Seventh

- knows that useful energy is lost as heat energy in every energy conversion

Eighth

- knows that energy conversions are never 100% efficient and that some energy is transformed to heat and is unavailable for further useful work.

Benchmark SC.H.1.3.1 - The student knows that scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way

Grade Level Expectations

The student:

Sixth

- knows ways scientific theories may change with new discoveries
- understands that new technology may lead to new discoveries

Seventh

- understands that new scientific knowledge is often used to reevaluate existing theories

Eighth

- knows that scientific knowledge is subject to modification as new information challenges

prevailing theories and as a new theory leads to looking at old observations in a new way.

Benchmark SC.H.1.3.2 - The student knows that the study of the events that led scientists to discoveries can provide information about the inquiry process and its effects.

Grade Level Expectations

The student:

Eighth

- knows that the study of the events that led scientists to discoveries can provide information about the inquiry process and its effects.

Benchmark SC.H.1.3.6 - The student recognizes the scientific contributions that are made by individuals of diverse backgrounds, interests, talents, and motivations.

Grade Level Expectations

The student:

Sixth

- knows selected scientists and their accomplishments
- knows that scientists who make contributions to knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.

Seventh

- extends and refines knowledge of selected scientists and their accomplishments and recognizes their varied backgrounds, talents, interests, and goals.

Eighth

- extends and refines knowledge of selected scientists and their accomplishments and recognizes their varied backgrounds, talents, interests, and goals.

Benchmark SC.H.3.3.5 - The student understands that contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times and are an intrinsic part of the development of human culture.

Grade Level Expectations

The student:

Sixth

- knows that the advancement of science, mathematics, and technology is ongouing and influenced by a diverse population of scientists.

Seventh

- knows that scientific and technological contributions are made by individuals of different ethnic, economic, and cultural backgrounds

Eighth

- understands that contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times and are an intrinsic part of the development of human culture.

Poster Contest

passive solar - construction technique of using 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

Poster Contest - Solar History Time Line

4.5 billion years ago

- Solar energy reaches the earth

600 - 700 B.C.E.

- Magnifying glass used to concentrate sun's rays to make fire

200 - 300 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

1 - 500 A.D.

- **20 A.D.** - Chinese document use of burning mirrors to light torches for religious purposes
- **100 A.D.** - 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

600s

- 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
- **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** - Photovoltaics reach 10% efficiency; becomes the 'birth' of 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