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.

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)

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

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.

  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.

  Discusses various kinds of solar energy, the history and development of their use, economic aspects of solar energy, and future possibilities.

Internet Sites


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.
### Poster Contest

<table>
<thead>
<tr>
<th><strong>B.C.E.</strong></th>
<th>4.5 billion years ago</th>
<th>Solar energy reaches the earth</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th Century B.C.E.</td>
<td>Magnifying glass used to concentrate sun's rays to make fire</td>
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<tr>
<td>3rd Century B.C.E.</td>
<td>Greeks and Romans use &quot;burning mirrors&quot; to focus sunlight as weapons of war to ignite fires and burn sails of enemy war ships</td>
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<table>
<thead>
<tr>
<th><strong>Year 1 - 500</strong></th>
<th>20 A.D</th>
<th>Chinese document use of burning mirrors to light torches for religious purposes</th>
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<tbody>
<tr>
<td></td>
<td>100</td>
<td>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</td>
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</tbody>
</table>

| **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 |

<table>
<thead>
<tr>
<th><strong>1600s</strong></th>
<th>Educated people accept the idea that the sun and stars are the same</th>
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<tbody>
<tr>
<td>1643-1715</td>
<td>Reign of French King Louis XIV, (&quot;Sun King&quot;), is an era of solar experiments</td>
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<tr>
<td>1695</td>
<td>French Georges Buffon concentrates sunlight using mirrors to ignite wood and melt lead</td>
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<tr>
<th><strong>1700s</strong></th>
<th>European aristocracy use walls to store solar heat for ripening fruit (fruit walls)</th>
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<tbody>
<tr>
<td></td>
<td>England and Holland lead development of greenhouses with sloping glass walls facing south</td>
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<tr>
<td></td>
<td>Frenchman Antoine Lavoisier builds solar furnace to melt platinum</td>
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<tr>
<td>1767</td>
<td>Swiss scientist Horace de Saussure invents first solar collector (solar hot box)</td>
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</table>
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

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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<table>
<thead>
<tr>
<th>Energy</th>
<th>Standard 1</th>
<th>SC.B.1.2-</th>
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<th>.3</th>
<th>.4</th>
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<tr>
<td></td>
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<td>Earth and Space</td>
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<td></td>
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<tr>
<td>Nature of Science</td>
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<td></td>
<td>Standard 3</td>
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**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 sources 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