

Alternative Energy

Project

As oil prices increase and the impact of Global Warming is observed, it becomes more and more evident that something needs to be done and alternative energies can be one way to solve the problem. During a unit on energy and heat, 6th grade students will research an alternative energy, create an experiment, model, or multi-media presentation, and then present their research, solutions, and model/experiment to the class. Teacher created Power Points and the 6th grade textbook published by Holt, Rinehart, and Winston and are used to provide knowledge about Heat and Energy. In addition to the research project and teacher directed lessons, students also participate in hands-on learning activities, such as building solar cars (http://www.re-energy.ca/t-i_solarelectricitybuild-1.shtml), solar houses, and observing a solar balloon.

Guest Speakers from energy companies and alternative energy companies bring real life applications to the students. Companies/Organizations in Santa Barbara that have been willing to speak to students include, but are not limited to...

PG&E

Clipper Winds

The topic of Global Warming, rising fuel prices, and the need for alternative energies are ideas that are relevant to students' lives. This project motivates students to start thinking about ways that they can help solve our energy dilemmas. Students become engaged and enjoy researching and thinking about a topic that is meaningful to them. Being able to work with a partner also provides students with someone to collaborate with, so that they may discuss issues and possible solutions to the problems our world is facing right now.

This is a required project for 6th grade GATE students, but is open to all students. Because the project has varying levels of difficulty, all students are able to work on it at their own readiness level.

This project addresses the CA 6th Grade Earth Science Standards regarding Heat and Energy.

Standards

3. Heat moves in a predictable flow from warmer objects to cooler objects until all the objects are at the same temperature. As a basis for understanding this concept:
 - a. *Students know* energy can be carried from one place to another by heat flow or by waves, including water, light and sound waves, or by moving objects.
 - b. *Students know* that when fuel is consumed, most of the energy released becomes heat energy.

- c. *Students know* heat flows in solids by conduction (which involves no flow of matter) and in fluids by conduction and by convection (which involves flow of matter).
- d. *Students know* heat energy is also transferred between objects by radiation (radiation can travel through space).
6. Sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation. As a basis for understanding this concept:
- a. *Students know* the utility of energy sources is determined by factors that are involved in converting these sources to useful forms and the consequences of the conversion process.
- b. *Students know* different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests, and know how to classify them as renewable or nonrenewable.
- c. *Students know* the natural origin of the materials used to make common objects.

Materials

Materials for models and experiments: solar panels, led lights, wheels, hubs for wind turbines, solar bag, cardboard, motors (used as generator) (materials vary depending on project)

LCD Projector

Computers

Internet

PowerPoint

Science Textbook

Books on Alternative Energies and Fossil Fuels

Solar Bag

Solar Cars: (see website) http://www.re-energy.ca/t-i_solarelectricitybuild-1.shtml

Solar House: See Lesson Plan

Timeline for Energy Resource Project

This is an example of the time needed to complete the project.

Thursday, October 19 and Friday, October 20: Introduce Project

Monday, October 23 and Tuesday, October 24: assign alternative resource

Thursday, October 26 and Friday, October 27: project proposals are due

Thursday, October 26- Tuesday, November 21: work on model, experiment, or multi-media presentation

Monday, November 6 and Tuesday, November 7: research notes are due

Monday, November 13- Tuesday, November 21: prepare presentation

Monday, November 20 and Tuesday, November 21: student presentations

Thursday, November, 30 and Friday, December 1: student debates

Monday	Tuesday	Wednesday	Thursday	Friday
October 16	17	18	19	20
Introduce Project				
23	24	25	26	27
Assign Resources		Project Proposals are due		
30	31	November 1	2	3
Work on Project and Conduct Research				
6	7	8	9	10
Notes are due		Work on Project and Presentation		
13	14	15	16	17
Work on Project and Presentation				
20	21	22	23	24
Student Presentations		Thanksgiving Break		
27	28	29	30	December 1
Student Debates				

**The
Following
Pages are
Student
Handouts**

HLT Project about Energy Resources

You and a partner (you may also work by yourself) will choose an alternative energy, research it, and then present your information to the class. Along with your oral presentation, you will need to create a model, experiment, or some type of interactive or multimedia display that you can use to explain about your alternative energy form/renewable resource.

After researching and presenting your project you will be divided into debate teams. Each team will have at least one expert on each alternative resource. Your team will debate the use of renewable resources versus fossil fuels. One team will be on the side of fossil fuels, while the other team will be on the side of renewable resources.

Choose a resource and enjoy learning about the various ways we can change our use of energy.

As you research, make sure that you are collecting pictures, charts, and diagrams that you can use during your presentation.

- A. Solar
- B. Wind
- C. Water
- D. Biomass
- E. Wave
- F. Geothermal
- G. Nuclear
- H. "Green" Buildings
- I. Other

Alternative Energy Source: _____

Research Questions:

1. What is the problem with continuing to use fossil fuels? What are fossil fuels doing to our environment? What are the costs? Both monetary and environmentally?
2. Is this energy currently being used? If so how? For what?
3. How is the energy obtained and/or created?
4. Is the energy able to be stored for later uses? How?
5. Is there waste created from the resource itself or in the gathering of it or in the storage of it?
6. How much would it cost to use this type of energy/resource? For the consumer? To turn it into a usable source?
7. What are the positive and negative aspects of using this resource/type of energy? Is it easily available?
8. What is keeping this form of energy from widespread use?
9. When is the energy/resource expected to be easily accessible to the general public?
10. How can the energy source be used in the future? For what purposes?
11. Is it a practical energy source for Santa Barbara? Why or why not?
12. What needs to happen for Santa Barbara to be able to use this resource as a widespread source of energy?
13. What can we as consumers do to use this resource, if you think it should be used.

IMPORTANT Questions 10-13 are where you need to think: this is the part where you will connect what you have learned and think about how this resource can actually be implemented.

Project Ideas

1. Form a hypothesis and design an experiment about your energy resource.

Some examples...

Wind: Make an anemometer and test what type of area produces the most wind. Make a hypothesis about where wind turbines should be placed in order to make the most amount of energy.

Wind: experiment with blade design to see which blades on a windmill work best to generate electricity.

Biomass: Experiment with nuts and how they can heat water.

Biomass: Can gas be produced from decaying garbage? Using dried beans that have been soaked, put them in a bag and observe to see if a gas is produced.

Solar: determine which material works best as enhancing reflectors for solar panels.

2. Create a model that can be used to demonstrate how the resources can be turned into energy.

Do not purchase a kit. For this to be an HLT project, you will need to experiment and conduct research to learn about what is needed to build your model.

I will provide you with materials such as solar panels and motors.

*****PLEASE TELL ME IN ADVANCE WHAT MATERIALS YOU WILL NEED*****

Examples:

Solar car

Wind turbine that powers a motor or light

Waterwheel that powers a light

Solar Oven or Cooker

3. Create multi-media presentation

Use PowerPoint, Hyperstudio, or other presentation software to create a multi-media presentation. You may include flash animations, pictures, charts, videos etc.

You could also make your own website about your resource. On the website you would have links, possibly video, and animations.

4. Other: Do you have another idea? Get your idea approved and go for it!

Guidelines for Conducting an Experiment

Research: This is research to help you understand the topic, express a problem, propose a hypothesis, and design one or more project experiments—experiments designed to test the hypothesis.

Do use many references from printed sources—books, journals, magazines, and newspapers—as well as electronic sources—computer software and online services.

Do gather information from professionals—instructors, librarians, and scientists, such as physicians and veterinarians.

Do perform other exploratory experiment related to your topic.

Problem: The problem is the scientific question to be solved. It is best expressed as an "open-ended" question, which is a question that is answered with a statement, not just a yes or a no.

Do choose a problem that can be solved experimentally.

Hypothesis: A hypothesis is an idea about the solution to a problem, based on knowledge and research. While the hypothesis is a single statement, it is the key to a successful project. All of your project research is done with the goal of expressing a problem, proposing an answer to it (the hypothesis), and designing project experimentation. Then all of your project experimenting will be performed to test the hypothesis.

Do state facts from past experiences or observations on which you base your hypothesis.

Do write down your hypothesis before beginning the project experimentation.

Don't change your hypothesis even if experimentation does not support it.

Experimentation: Project experimentation is the process of testing a hypothesis. The things that have an effect on the experiment are called variables. There are three kinds of variables that you need to identify in your experiments: independent, dependent, and controlled.

The **independent variable** is the variable you purposely manipulate (change). The **dependent variable** is the variable that is being observed, which changes in response to the independent variable. The variables that are not changed are called **controlled variables**.

Do have only one independent variable during an experiment.

Do repeat the experiment more than once to verify your results.

Do have a control.

Do have more than one control, with each being identical.

Do organize data.

Conclusion: □The project conclusion is a summary of the results of the project experimentation and a statement of how the results relate to the hypothesis.

DON'T leave out experimental results that do not support your hypothesis.

DO give possible reasons for the difference between your hypothesis and the experimental results.

DO give ways that you can experiment further to find a solution.

Adapted from:

<http://school.discoveryeducation.com/sciencefaircentral/scifairstudio/handbook/scientificmethod.html>

Recommended Websites

All Energy Sources

<http://www.alternative-energy-news.info/headlines/>

This site has links to more sites about all the energy resources

<http://www.aresearchguide.com/energy.html>

Great overview of renewable energy

http://www.powerhousekids.com/stellent2/groups/public/documents/pub/phk_ee_re_index.hcsp

Excellent Site about all resources

<http://www.eia.doe.gov/kids/energyfacts/sources/renewable/renewable.html>

Good site about all resources

<http://eduqreen.teri.res.in/explore/renew/renew.htm>

Information on solar, nuclear, hydroelectric, wind, and coal power

http://library.thinkquest.org/C004471/tep/en/traditional_energy/index.html

Information about all energy sources.

<http://home.clara.net/darvill/altenerg/index.htm>

Lots of information about all sources, but can be difficult to understand.

Renewable Energy

http://en.wikipedia.org/wiki/Renewable_energy

Wind Power

This is a great site for researching wind power.

<http://www.windpower.org/en/kids/index.htm>

Info about wind power. Not as kind friendly as the previous site.

http://www.nrel.gov/learning/re_wind.html

Article about wind power

Blowin' in the Wind: Wind Power

<http://www.pbs.org/newshour/bb/environment/jan-june01/blowing.html>

Hydro Power

This site has good graphs about hydropower

<http://www.wvic.com/hydro-facts.htm>

Biomass

Info about the use of biomass

http://www.nrel.gov/learning/re_biomass.html

Solar

Discusses how schools can use solar energy. Also gives some great ideas for projects.

http://nrdc.org/greensquad/library/energy_solar.html

Lots of information about solar energy

<http://www.solarenergy.org/resources/youngkids.html>

Fun site that explains how a sun can be solar efficient

<http://www1.eere.energy.gov/kids/roofus/>

Good overview about solar energy

http://www.icpsolar.com/4105/solar_power_101.asp

Good info, but not as kid friendly as some of the other sites

http://www.nrel.gov/learning/re_solar.html

Nuclear

Good site for nuclear energy

<http://www.nrc.gov/reading-rm/basic-ref/students.html>

Articles about nuclear power

<http://www.pbs.org/wqbh/pages/frontline/shows/reaction/>

Fuel Cells

Not very kid friendly, but interesting.

The Future of Fuel

<http://www.pbs.org/newshour/science/hydrogen/index.html>

A Few Ideas for Science Projects

This site gives you some ideas for projects

<http://www.energyquest.ca.gov/projects/index.html>