**Renewable Energy WebQuest**

* Use the following link to help you complete the questions on energy.
	+ [**http://www.eia.gov/kids/energyfacts/index.html**](http://www.eia.gov/kids/energyfacts/index.html)
1. How do scientists define energy?

Energy is the ability to do work, people use energy for everything from making a jump shot to sending astronauts into space. Energy comes from multiple sources such as Heat, Light, Motion, etc. Modern civilization is possible because people have learned how to change energy from one form to another and then use it to do work.

1. Explain the law of conservation of energy. Give examples of energy transformations.

Energy is neither created nor destroyed. When people use energy, it doesn't disappear. People change energy from one form of energy into another form of energy. A car engine burns gasoline, converting the chemical energy in gasoline into mechanical energy. Solar cells change radiant energy into electrical energy.

1. What is energy efficiency?

Is the amount of useful energy obtained from any type of system. A perfectly energy-efficient machine would convert all the energy put into the machine to useful work.

1. What does it mean for energy to be nonrenewable? Renewable?

Renewable (an energy source that can be easily replenished)

Nonrenewable (an energy source that cannot be easily recreated)

1. According to the “U.S. Energy Consumption by Energy Source, 2015”, what percentage of energy that we use is renewable? What percent is nonrenewable?

Renewable: 10%

Nonrenewable: 90%

* **Renewable Energy Sources**
1. What are the 6 forms of renewable energy resources? Biomass, Geothermal, Hydropower, Wind, Solar
* **“Solar”**
1. What is solar energy? Energy from the sun. The sun has produced energy for billions of years. The energy in the Sun’s rays that reaches the earth (solar radiation) can be converted into heat and electricity.
2. Solar energy is converted into what energy?  Solar energy can be used for heat and electricity
3. Give two examples of how solar energy is used. To heat water for use in homes, buildings, or swimming pools; to heat spaces inside homes, greenhouses, and other buildings; and to heat fluids to high temperatures to operate turbines that generate electricity.
4. What do solar cells do? Change sunlight directly into electricity. Individual PV cells are grouped into panels and arrays of panels that can be used in a variety of applications
5. What do solar power plants do?  Solar thermal power plants use the sun's rays to heat a fluid to high temperatures. The fluid is then circulated through pipes so that it can transfer its heat to water and produce steam.
6. What are the 2 main disadvantages to solar energy?

Clearing land for construction and the placement of the power plant may have long-term impacts on plant and animal life by reducing habitat areas for native plants and animals. Power plants may require water for cleaning solar collectors or concentrators and may require water for cooling turbine-generators.

1. Explain how solar energy is beneficial for the environment.

Using solar energy does not produce air or water pollution and does not produce greenhouse gases.

* **“Wind.”**
1. What is wind and how is it caused?

Energy from moving air. Wind is caused by the uneven heating of the earth's surface by the sun. Because the earth's surface is made of different types of land and water, it absorbs the sun's heat at different rates

1. What did American colonists use windmills for?

To grind grain, to pump water, and to cut wood at sawmills.

1. What do wind machines produce?

Wind turbines use blades to collect the wind’s kinetic energy. Wind flows over the blades creating lift (similar to the effect on airplane wings), which causes the blades to turn. The blades are connected to a drive shaft that turns an electric generator, which produces electricity.

1. Describe a wind power plant.

Operating a wind power plant is more complex than simply erecting wind turbines in a windy area. Wind power plant owners must carefully plan where to position wind turbines.

1. Describe the negative effects of wind machines.

A small number of wind turbines have also caught fire, and some have leaked lubricating fluids, but these are rare occurrences. Some people do not like the sound that wind turbine blades make. Most wind power projects on land also require service roads that add to the physical impact on the environment. Wind turbines also require the use of rare earth minerals. Some types of wind turbines and wind projects cause bird and bat deaths.

* **“Geothermal”**
1. What does the word “geothermal” mean?

The word geothermal comes from the Greek words geo (earth) and therme (heat).

1. What is geothermal energy?

Geothermal energy is heat from within the earth. This heat can be recovered as steam or as hot water, and it can be used to heat buildings or to generate electricity.

1. Geothermal energy is generated deep inside the earth
2. Where is geothermal energy found?

Geothermal reservoirs are naturally occurring areas of hydrothermal resources. They are deep underground and are largely undetectable above ground. Volcanoes and fumaroles (holes where volcanic gases are released), Hot springs, Geysers

1. Name 2 ways people have used direct geothermal energy?

Geothermal energy is also used to heat buildings through district heating systems. Hot water near the earth's surface can be piped directly into buildings and industries for heat. Hot springs.

1. Describe how has Iceland used geothermal energy?

A district heating system provides heat for most of the buildings in Reykjavik, Iceland.

* **“Biomass”**
1. What does Biomass mean and what does it contain?

Biomass is organic material that comes from plants and animals. Biomass contains stored energy from the sun.

1. Name 5 things that are biomass materials.

Wood, crops, animal manure, and human sewage.

1. What is the most common biomass material?

Wood.

1. 84% of wood energy is used where?

Industry, electric power producers, and commercial businesses

1. How can biomass energy be negative to the environment?

Burning fossil fuels and burning biomass releases carbon dioxide (CO2), a greenhouse gas.

* **“Hydroelectric.”**
1. Hydroelectric power generates what type of energy?

Electricity.

1. What 3 states hold over one-half of the total U.S. hydroelectric capacity for electricity is, Washington, Oregon, and New York.
2. Most dams in the United States were not built to provide electricity, but for irrigation and flood control.

* **“Ocean”**
1. Tides are the rising and falling of the ocean shore. What are tides caused by?

Tides are caused by the gravitational pull of the moon and sun, and the rotation of the earth.

1. Compare wind turbines and wave turbines.

Tidal turbines are basically wind turbines in the water that can be located anywhere there is strong tidal flow. Because water is about 800 times denser than air, tidal turbines have to be much sturdier than wind turbines.

1. Not only could the ocean provide us with tidal energy, but wave energy.
2. What is Ocean Thermal Energy Conversion?

System uses a temperature difference (of at least 77°F) to operate a turbine to produce electricity.

1. Since the ocean expands almost two-thirds of the Earth, it makes sense to use that open ocean to provide us with energy. What are the two forms of energy have scientists considered placing over the open ocean? Electricity and Heat.
* **“Use of Energy.”**
* What are the 4 areas in which energy is used?

Homes, in businesses, in industry, and for personal travel and transporting goods.

* **“Residential- homes.”**
1. List the 5 ways in which energy is used in our homes.

Space heating, electronics, refrigeration, air conditioning, water heating.

1. What is the most used type of energy in the home? Space heating.