

Alternative Energy Sources

Alternative energy sources are sources of energy based on research to reduce the negative impact on the environment. Alternative energy sources include: Hydroelectricity; Solar energy; Geothermal energy; Tidal energy; and Wind. There are advantages and disadvantages to each alternative energy source. Despite efforts to reduce the negative impact on the environment, alternative energy sources may sometimes trade one negative impact for another. Compared to fossil fuels, many of the alternative technologies are very expensive. It is up to the consumer to decide.

Hydroelectricity produces electricity from the energy in moving water. Water turns a turbine which turns a generator to produce the electricity. It is a renewable resource because it is replenished continuously. It is pollution free, but it disrupts the lives of aquatic organisms, primarily because it depends on dams.

Solar energy is an inexhaustible resource. The sun can't be used up by humans. Solar collectors which consist of black panels act as a thermal collector by absorbing sunlight and heating water that is sent through pipes for heat, washing, and bathing. Some solar panels have photovoltaic cells that transform radiant energy directly into electricity. Unfortunately, solar energy doesn't work at night without some sort of storage device, and it is unreliable on cloudy days. Solar technology is expensive, and requires a lot of land to generate appreciable power. Production, transportation, and installation of solar panels are *not* pollution free activities.

Geothermal energy comes from the interior of the earth. The interior of the earth is hot due to radioactivity. The heat can melt rock forming magma. Magma comes close enough to the surface in some places to heat water that seeps through cracks and form steam. Hot water and steam that becomes trapped in cracks and pockets is called a *geothermal reservoir*. Geothermal powerplants are in places where geothermal reservoirs are only several kilometers deep, and wells can be drilled to tap them. Geothermal energy can also be used for heat pumps. Heat pumps stay at a constant temperature, and can be used for either heating or cooling. The temperature several meters below ground is a constant 10°C to 20°C due to geothermal energy. A heat pump contains a water filled loop that passes through a region of the ground where the temperature is nearly constant. Water is pumped through the loop to the region of constant temperature where it either gains or loses heat underground depending on its temperature. Then the water is pumped back up where it is either used for heating or cooling. Geothermal energy is only practical in areas that have geothermal reservoirs, and they can run out of steam. Drilling for geothermal energy at setting up a power plant is very expensive, and harmful gasses may escape through the holes that are drilled.

Tidal energy can be tapped in places where the difference in the level of the high tide and low tide is large. High tide and low tide occur about twice each day. The tide can be used to generate electricity. As the water comes in, it moves through a turbine. The incoming water is trapped behind a dam. When the tide goes out, the water is released through the turbine. The turbine spins a generator to make electricity. Tidal technology has relatively high costs, and limited availability.

Wind is an inexhaustible supply of energy. The propeller of a windmill is connected to a generator so it produces electricity. The advantages of wind power are that it is inexhaustible and nonpolluting. Unfortunately, it requires large tracts of flat land, it is noisy, and it may accidentally kill birds.



Answer the questions below based on the reading above and on your knowledge of physics.

1. Evaluate the statement, "Alternative energy is better than traditional energy sources." Support your point of view. _____

2. What is the purpose of "alternative energy?" Does it accomplish its goal? _____

3. What are the pros and cons of the various forms of alternative energy:
 - a. Hydroelectric? _____

 - b. Solar? _____

 - c. Geothermal? _____

 - d. Tidal? _____

 - e. Wind? _____

4. Why does the cartoon on the previous page use birds as the ones complaining about wind power? _____

5. What technology do hydroelectric plants, tidal energy, and wind power have in common with each other and with traditional power plants? _____
