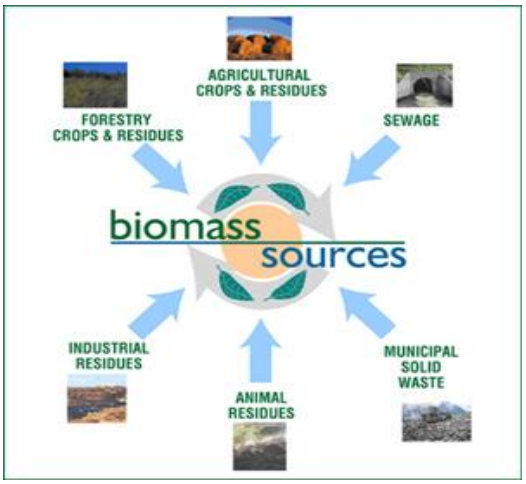
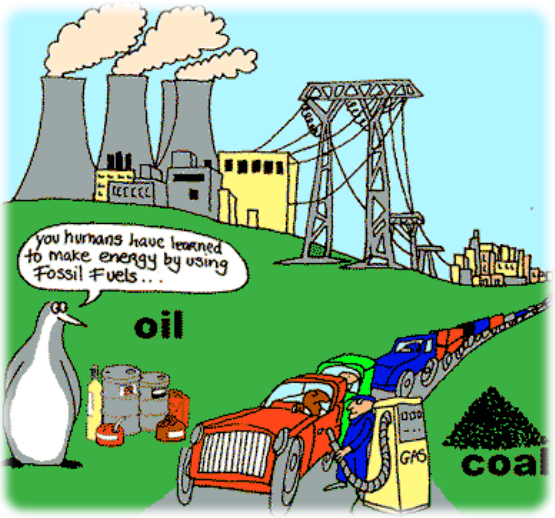
RENEWABLE AND NONRENEWABLE ENERGY SOURCES

Due to increases in population, the demand for energy has increased exponentially. The environment cannot remain successful and productive if we continue our reliance on energy solutions that cause large amounts of pollution. All energy sources can be classified as renewable, meaning they can be reused or reformed after a brief period of time, or nonrenewable, meaning that it takes too long (millions of years to form). Here are the current options for power sources in the United States:

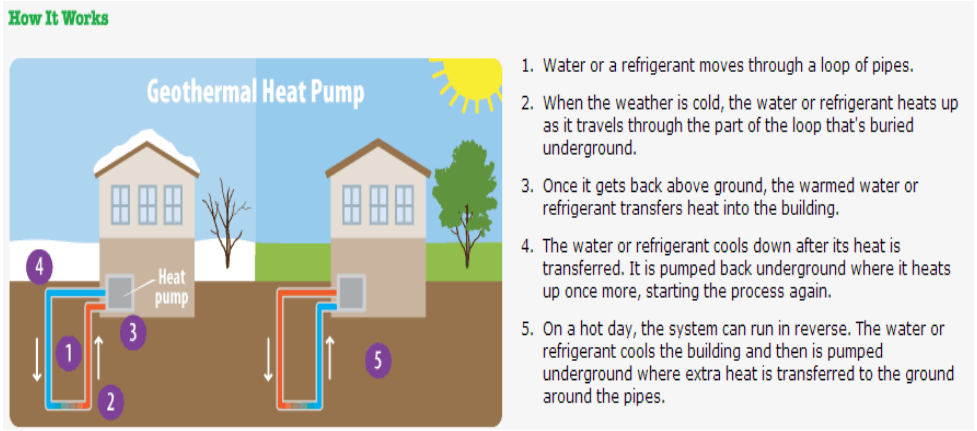
BIOMASS POWER (plant material and animal waste) is the oldest source of renewable energy, used since our ancestors learned the secret of fire. Until recently, biomass supplied far more renewable electricity—or "biopower"—than wind and solar power combined. If developed properly, biomass can and should supply increasing amounts of biopower. Sustainable, low-carbon biomass can provide a significant fraction of the new renewable energy we need to reduce our emissions of heat-trapping gases like carbon dioxide to levels that scientists say will avoid the worst impacts of global warming. But like all our energy sources, biopower has environmental risks that need to be mitigated. If not managed carefully, biomass for energy can be harvested at unsustainable rates, damage ecosystems, produce harmful air pollution, consume large amounts of water, and produce net greenhouse emissions. *Via:* http://www.ucsusa.org/clean_energy/our-energy-choices/renewable-energy/how-biomass-energy-works.html

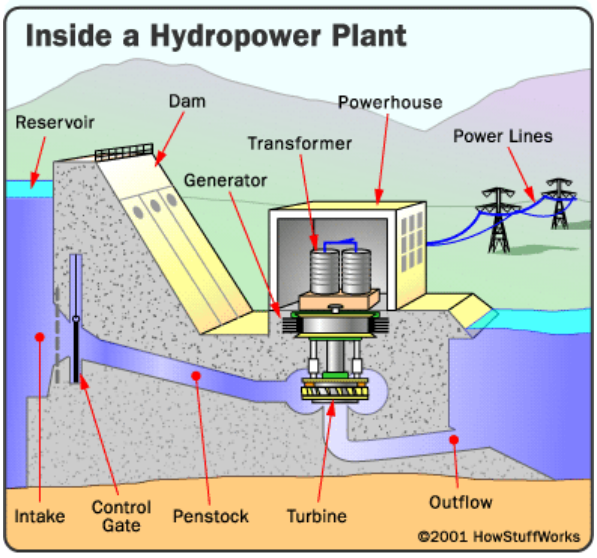




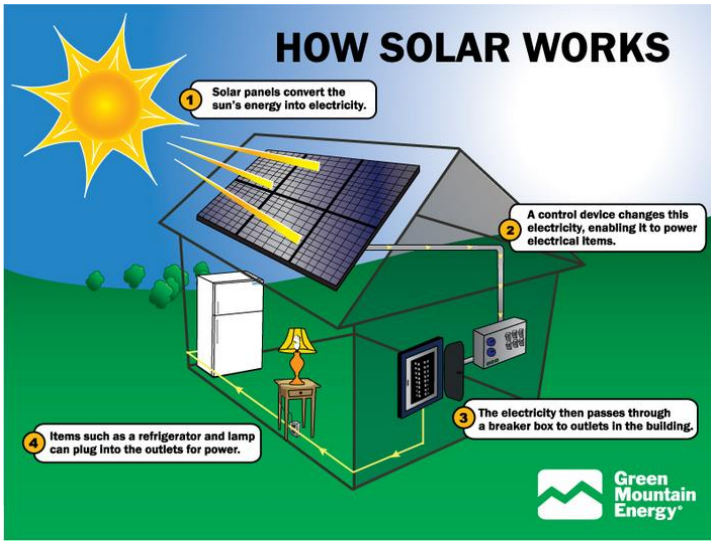
FOSSIL FUELS There are three major forms of fossil fuels: coal, oil and natural gas. All three were formed many hundreds of millions of years ago before the time of the dinosaurs – hence the name fossil fuels. The age they were formed is called the Carboniferous Period. It was part of the Paleozoic Era. "Carboniferous" gets its name from carbon, the basic element in coal and other fossil fuels. More and more rock piled on top of more rock, and it weighed more and more. It began to press down on the peat. The peat was squeezed and squeezed until the water came out of it and it eventually, over millions of years, it turned into coal, oil or petroleum, and natural gas. Fossil fuels take millions of years to make. We are using up the fuels that were made more than 300 million years ago before the time of the dinosaurs. Once they are gone they are gone. So, it's best to not waste fossil fuels. They are not renewable; they can't really be made again. We can save fossil fuels by conserving energy. *Via*http://www.energyquest.ca.gov/story/chapter08.html

GEOTHERMAL POWER is the heat from the Earth. It's clean, sustainable and renewable. Resources of geothermal energy range from the shallow ground to hot water and hot rock found a few miles beneath the Earth's surface, and down even deeper to the extremely high temperatures of molten rock called magma. Almost everywhere, the shallow ground or upper 10 feet of the Earth's surface maintains a nearly constant temperature between 50° and 60°F (10° and 16°C). Geothermal heat pumps can tap into this resource to heat and cool buildings. A geothermal heat pump system consists of a heat pump, an air delivery system (ductwork), and a heat exchanger-a system of pipes buried in the shallow ground near the building. While very efficient, they are very expensive. In the winter, the heat pump removes heat from the heat exchanger and pumps it into the indoor air delivery system. In the summer, the process is reversed, and the heat pump moves heat from the indoor air into the heat exchanger. The heat removed from the indoor air during the summer can also be used to provide a free source of hot water. *Via:* http://www.renewableenergyworld.com/rea/tech/geothermal-energy



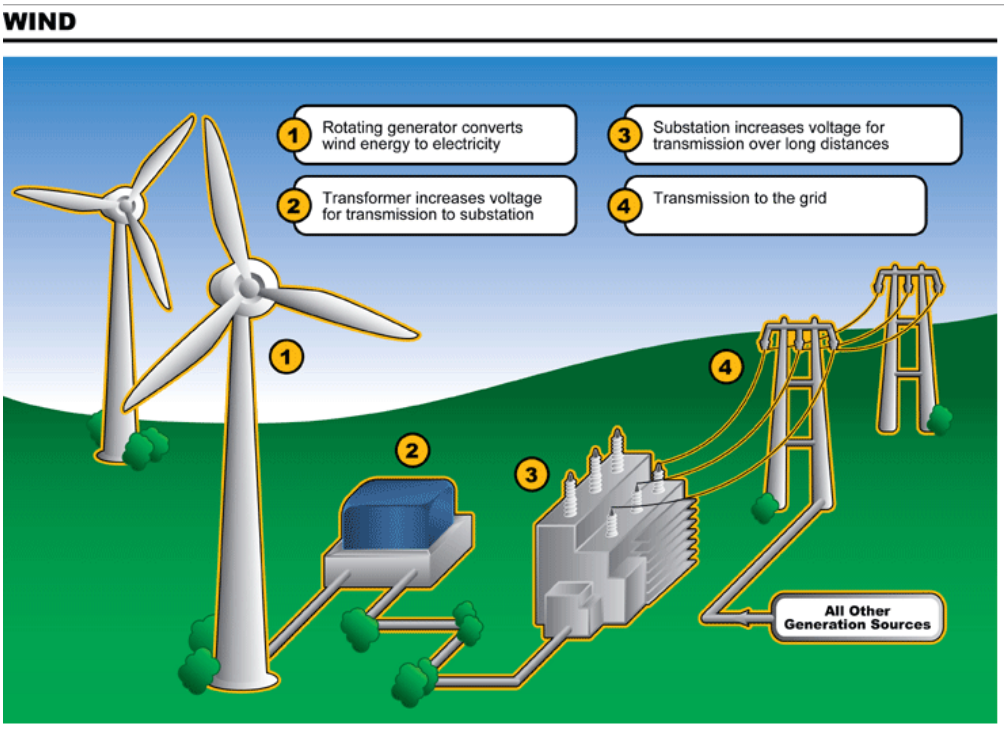


HYDROELECTRIC POWER So just how do we get electricity from water? Actually, hydroelectric and coal-fired power plants produce electricity in a similar way. In both cases a power source is used to turn a propeller-like piece called a turbine, which then turns a metal shaft in an electric generator, which is the motor that produces electricity. A coal-fired power plant uses steam to turn the turbine blades; whereas a hydroelectric plant uses falling water to turn the turbine. The results are the same. Once the hydroelectric power plant is built, it is very clean and efficient. The only issue with hydroelectric power is that in times of drought, the hydroplant may not function properly or produce enough energy to meet demands. *Via:*http://ga.water.usgs.gov/edu/hyhowworks.html



SOLAR POWER is the conversion of sunlight into electricity, either directly using photovoltaics (PV), or indirectly using concentrated solar power (CSP). Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Photovoltaics convert light into electric current using the photoelectric effect. Photovoltaics were initially, and still are, used to power small and medium-sized applications, from the calculator powered by a single solar cell to off-grid homes powered by a photovoltaic array. They are an important and relatively inexpensive source of electrical energy where grid power is inconvenient, unreasonably expensive to connect, or simply unavailable. However, as the cost of solar electricity is falling, solar power is also increasingly being used even in grid-connected situations as a way to feed low-carbon energy into the grid. Solar power is very clean, and after the starting costs, low impact energy source. *Via:* http://en.wikipedia.org/wiki/Solar_power

WIND POWER Wind is the movement of air from an area of high pressure to an area of low pressure. In fact, wind exists because the sun unevenly heats the surface of the Earth. As hot air rises, cooler air moves in to fill the void. As long as the sun shines, the wind will blow. And as long as the wind blows, people will harness it to power their lives. Today, more and more people are using wind turbines to wring electricity from the breeze. Over the past decade, wind turbine use has increased at more than 25 percent a year. Still, it only provides a small fraction of the world's energy.



Most wind energy comes from turbines that can be as tall as a 20-story building and have three 200-foot-long (60-meter-long) blades. These contraptions look like giant airplane propellers on a stick. The wind spins the blades, which turn a shaft connected to a generator that produces electricity. Wind is a clean source of renewable energy that produces no air or water pollution. And since the wind is free, operational costs are nearly zero once a turbine is erected. Mass production and technology advances are making turbines cheaper, and many governments offer tax incentives to spur wind-energy development. Some people think wind turbines are ugly and complain about the noise the machines make. The slowly rotating blades can also kill birds and bats, but not nearly as many as cars, power lines, and high-rise buildings do. The wind is also variable: If it's not blowing, there's no electricity generated. *Via:* http://environment.nationalgeographic.com/environment/global-warming/wind-power-profile/

Assignment- complete on your own paper

1. PARTNER READ AND SUMMARIZE EACH PARAGRAPH WITH ONE SENTENCE per paragraph.
2. Why has the demand to find more than fossil fuels for energy increased? (COMPREHENSION RI 8.2)
3. Create and complete a chart like the one in this document on your paper. Make sure to complete all of the information from the article.

TYPE OF POWER	Renewable or nonrenewable?	WHAT IS IT?	PROs	CONs
Biomass				
Fossil fuels				
Geothermal				
Hydroelectric/ hydropower				
Solar power				
Wind power				

4. Based on the information in this document, which source of power do you think is the most efficient, with the least negative impact? Support your 4 sentences with evidence from the article. (EVALUATE RI 8.1)