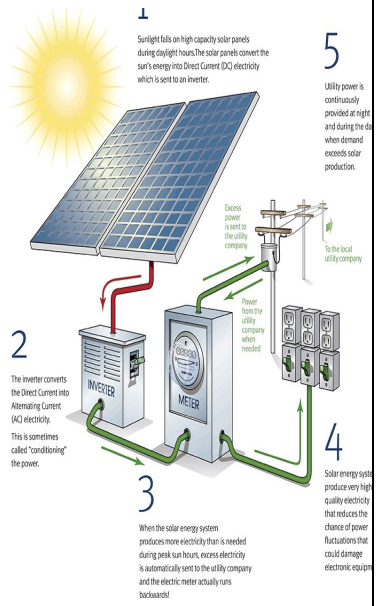
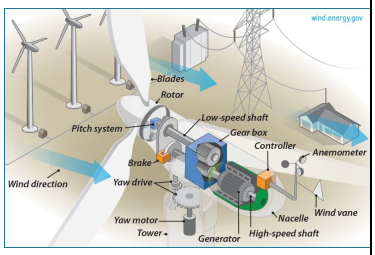
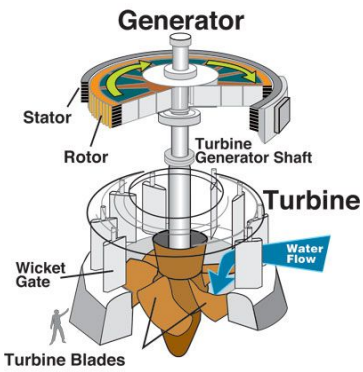
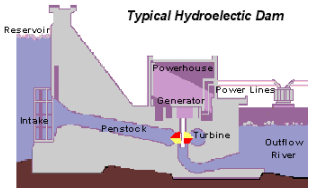
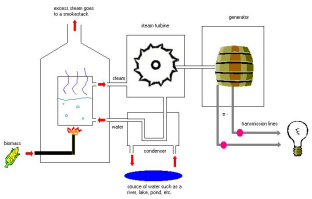
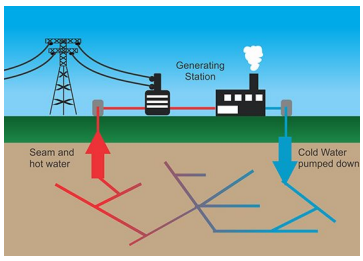
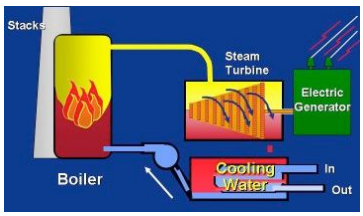
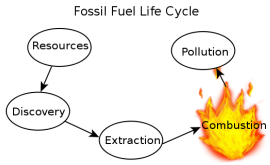
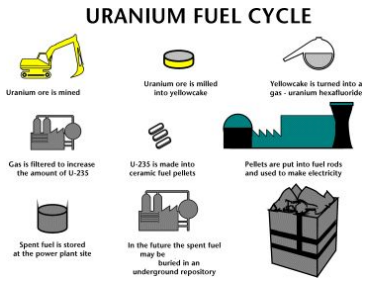
Energy Source	How does it work?	Pros	Cons
Solar Power **<u>Group A</u>** 	Solar Panels work by allowing photons or particles of light to <u>knock electrons free from atoms,</u> generating a flow of electricity. The electricity generated can be used right away or stored in the panel.	• Renewable • sustainable • silent • low maintenance • Environmentally friendly • <u>Very abundant</u> • Sustainable	• Cloud/night/ Intermittent • Cost upfront Expensive • Exotic Materials that need mining • <u>Energy Storage is Expensive</u>
Wind Power **<u>Group A</u>** 	The wind moves the blades which spins a shaft <u>which powers a generator.</u>	• Produces no air or water pollutants • Wind farms are relatively Cheap to build • <u>Renewable energy source</u>	• Constant wind is needed • <u>Wind farms need a lot of land</u> • Threat to birds
Hydro Power	Water is stored in a dam and is slowly released through the penstock (intake tube), the water spins a turbine which generates electricity	Renewable (water cycle) Does not release greenhouse gases. Domestic source of energy, green source/ don't make pollution, low maintenance, technology has been used	<u>Droughts, initial expense, limited number of places where these can be built, flooding, changing water flows, takes water away from lakes and streams,</u> often built in natural

Group B     	through a generator (look at the left), the energy gets sent through the power lines and the water flows through the outflow river to be recycled. The largest hydroelectric dam is the Three Gorges Dam in the Yangtze river. The most common turbine designs are the Kaplan turbine, Francis turbine, and the Pelton wheel. The Kaplan is similar to a boat propeller. Pelton wheel systems are the most common in high pressure facilities. It uses a series of buckets like one of the pictures at left (the one with the American flag). The two types of hydroelectric plants are based on a dam or a river. The dams are more common because they provide more water and the flow can be controlled but they take more space. That space is often wildlife habitats. With dams, a system called pump-storage is often in place. To learn more click here.	for a long time/ reliable, water can be used over again without having to wait, large amount of fuel(water) can be stored, recreation.	preserved land/takes habitats, damaging to fish environments, recreation.

Biomass/Biofuel **Group B**  	Organic matter (plants) is burned in a boiler, which spins a turbine to create electricity.	Renewable (you can grow plants). Almost all coal based power plants have the ability to easily swap to using biofuel.	¼ more carbon emissions than coal. Could also consume a ton of water
Geothermal Energy  	It is using heat from Earth such as ground to hot water or molten rock beneath the crust. We use this heat to create steam powering a Turbine.	• Renewable • Not a lot of pollution • Very efficient • Underground (doesn't change landscape) • The heat source will be there for as long as the earth is around • http://www.renewableenergyworld.com/geothermal-energy/tech.html	• Takes energy to heat pumps • The plants need a lot of water • Locations are very limited. • Large geothermal power plants can be dangerous to the earth's surface • Affects water quality in closed systems and in open systems there are emissions of dangerous gasses
Oil/Petroleum (fossil fuel) **Group C**	Crude oil, coal, or natural gas that was formed by decayed plants and animals being condensed together over millions of years because of heat and pressure	• Oil is abundant • Easy to use • No new technology required • Easy to transport in liquid form (ex. Cars) • Burned creating significant amounts	• Emits carbon dioxide • Non renewable • Destroys environment (ex. Potentially DAPL) • Dangerous • Expensive

	beneath the earth's crust. https://www.reference.com/science/fossil-fuel-work-54a34d530d4558bf	of energyhttp://palaeolimnologypetroleumrrr.weebly.com/pros-and-cons.html	• Drilling can lead to spills
Natural Gas (fossil fuel) 	We burn the fossil fuels to create energy, in which we convert to mechanical energy. http://naturalgas.org/overview/uses-electrical/	-produces less pollution than other fossil fuels -abundant supply -more energy efficient, which makes them cheaper Found in US	• highly flammable • Non-sustainable • Obtained via fracking. • greenhouse gas emissions • expensive pipelines • not easy to isolate when found
Coal (fossil fuel) 	A dark colored rock made mainly of plant matter, found in deposits underground and frequently burned as fuel.	-burns for a long time -easy to obtain -cheap -abundant Found in US	-Nonrenewable Resource -Largest Co2 producer in the world - Emits toxic substances -Coal emission is linked to asthma and lung cancer

Nuclear/Uranium **Group E** **Hayden S, Cais W,** **Morgan B, Chloe O**  http://kalahkingnuclearenergy.blogspot.com/	Energy originates from the splitting of uranium atoms – a process called fission. This generates heat to produce steam, which is used by a turbine generator to generate electricity. https://www.duke-energy.com/energy-education/how-energy-works/nuclear-power	• Low Pollution: Nuclear power also has a lot fewer greenhouse emissions • Low Operating Costs: Nuclear power produces very inexpensive electricity • Reliability: It is estimated that with the current rate of consumption of uranium, we have enough uranium for another 70-80 years www.conserve-energy-future.com/pros-and-cons-of-nuclear-energy.php	• Like fossil fuels nuclear fuels are nonrenewable energy resources • If there is an accident, large amounts of radioactive material could be released into the environment • In addition, nuclear waste remains radioactive and is hazardous to health for thousands to millions of years www.conserve-energy-future.com/pros-and-cons-of-nuclear-energy.php

Why build a house without electricity?

1. How much energy do humans use? In what forms? Do different countries have different ratios? Eliam W., Matt J., Zoe N.

The total energy consumption of the US is 3,863,275 thousand megawatt hours.

Natural gas	47%
Coal	27%
Hydroelectric	10%

Non-hydro renewables (Wind, solar, biomass, geothermal, etc.)	10%
Nuclear	9%
Petroleum	4%
Other	<1%

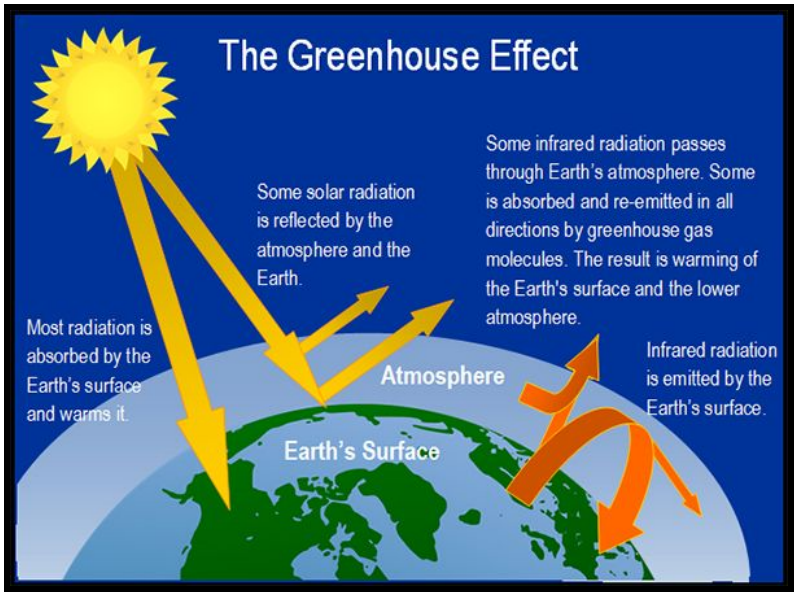
The average US household uses 955 kilowatt hours a month. Different countries use different resources for electricity based upon what resources are available. http://www.tsp-data-portal.org/Breakdown-of-Electricity-Generation-by-Energy-Source#tspQvChart

2. Cost/Economics of electricity: How much money is spent on electricity generation? In different parts of the country? In other countries?

In 2010, America spent $1,205,000,000 for one full year of electrical generation. (8.3% of GDP) https://www.quora.com/How-much-does-the-US-economy-spend-on-energy-per-year
average household spends $1,326.60 per year on electricity in America.
https://www.eia.gov/energyexplained/index.cfm?page=electricity_home#tab2
In this part of the country the need for electricity drops due to the temperate weather, In Northern California there are few weather extremes so using heating and air conditioning is not as vital, but in other parts of the country and world the weather is more extreme and may cause someone to use more electricity to be able to live. If you do live in a place where more energy is needed then using a renewable energy source becomes intriguing because in the long run one might be able to save money and help stop the use of fossil/renewable fuels

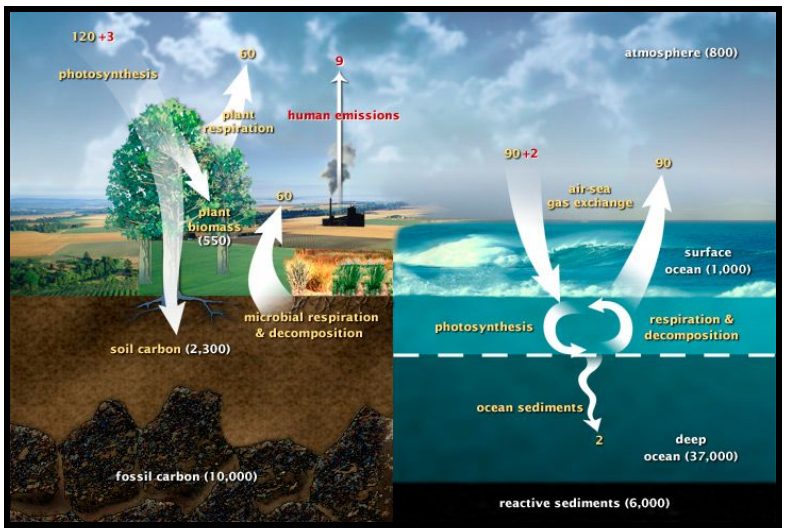
3. Climate change - how does it happen?(greenhouse effect, carbon cycle, use of sun's energy? Lexi, Gordy, Tyler, Rohan

Greenhouse gases: You may wonder, how do greenhouse gases heat the Earth's surface. This is known as the Greenhouse Effect. Since we are adding more greenhouse gasses to the atmosphere heat is getting trapped so Earth's surface is getting hotter. In the past 150 years the average temperature of Earth has increased by 1 degree Celsius. Burning biomasses, deforestation, and production can also produce greenhouse gasses that can heat Earth's surface. These gases are important because they trap heat from the sun to keep the Earth at a temperature that we can survive and live in.



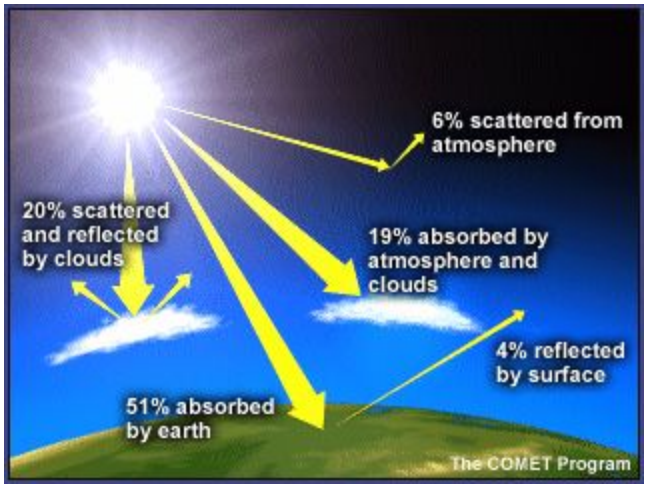
Click here for more information followed by an experiment.

Carbon cycle: The carbon in the atmosphere and the amount taken in are naturally equal. When humans burn coal it releases 9 extra gigatons of carbon into the atmosphere. Plants can only take in 5 of those gigatons which results more carbon in the atmosphere than there is naturally



More on Carbon Cycle

Sun's energy: Only 50% (the other 50% is reflected out) of the sun's energy actually gets to earth's surface and then it turns to heat which is called infrared radiation and at night it tries to leave Earth.



4. Consequences of Climate Change- what could happen?
Group E

The best case scenario would be stopping all carbon emissions right now. If we did that, the temperature would still increase by 1.1°F.

If we continue consuming energy as we are now, in 30 years, the entire country of Kiribati will be uninhabitable. Hurricanes and snowstorms will become much stronger, which will affect a lot of people. Many animals will also become extinct which will throw off the ecosystem.

However, if we switch to nuclear energy, the global economic output can rise from 1.4% to 1.5% by 2025. There will also be fewer winter deaths, which means that people will live longer. Certain crops will also be able to grow in different times of the year providing more fresh fruits and vegetables to people worldwide.

The worst case scenario is sea levels rising 200 feet, submerging 18-story buildings and putting some of the world's largest cities underwater. In fact, most of Ellis Island and Liberty Island and the Statue of Liberty could be submerged. Also, climate change could make the world a more tick-friendly environment and reverse a whole half-century's advancements in health.

http://www.iflscience.com/environment/what-would-happen-climate-if-we-stopped-emitting-greenhouse-gases-today/
https://insideclimatenews.org/news/11092015/climate-change%E2%80%99s-worst-case-scenario-200-feet-sea-level-rise-antarctica-ice-sheet-melt

https://www.theguardian.com/environment/2013/sep/30/owen-paterson-minister-climate-change-advantages
http://www.ncpa.org/sub/dpd/index.php?Article_ID=23746
http://www.nationalgeographic.com/environment/global-warming/global-warming-effects/