

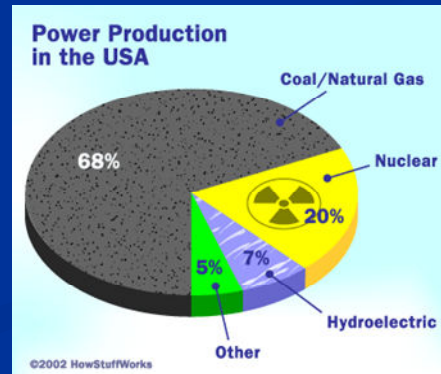
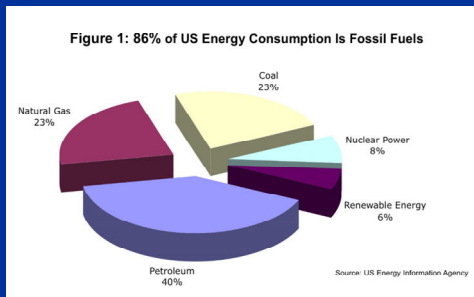
Earth Science

Chapter 12

Energy & Material Resources

Energy & Fossil Fuels

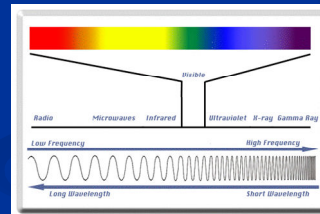
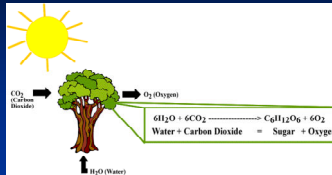
- A **fuel** is a substance that provides a form of energy—such as **heat, light, electricity, or motion**
- **energy**-rich substances formed from the remains of once-living organisms.
- The three major fossil fuels are **coal, oil, and natural gas**. They are considered **nonrenewable** resources.
- **Hydrocarbons** - energy-rich chemical compounds that contain carbon and hydrogen



Different Forms of Energy

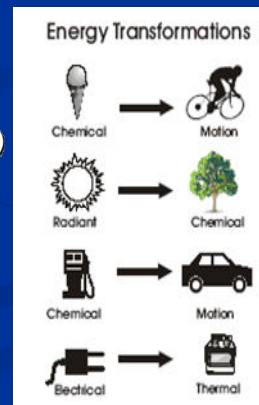
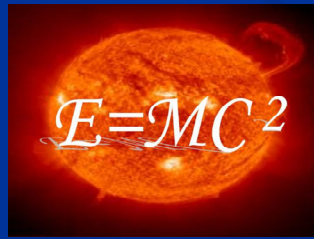
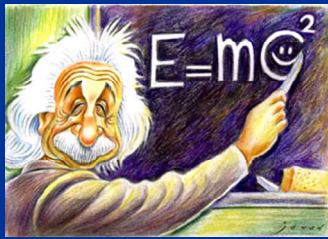
■ 6 different types:

- **Mechanical**
- **Thermal Energy**
- **Chemical Energy**
- **Electrical Energy**
- **Electromagnetic Energy**
- **Nuclear Energy**

[illegible]

Energy Conversion and Conservation

- Most forms of **energy can be converted from one type to another.**
- **Law of the Conservation of Energy** - states that energy cannot be created or destroyed. It simply changes from one form into another
- Einstein's theory of Relativity - **$E = mc^2$**
 - a small amount of mass can be changed directly into a tremendous amount of energy
 - **E = the energy produced**
 - **m = the mass being converted**
 - **c = the speed of light (186,000 miles/second)**

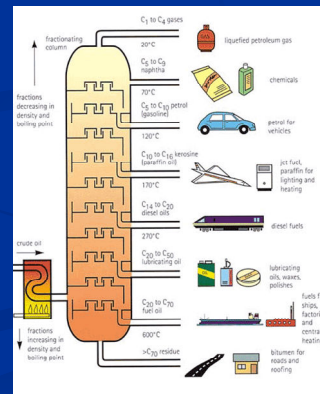
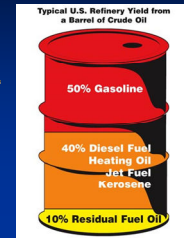


Fossil Fuels - Coal

- Solid fossil fuel formed from decaying plant matter.
- Coal is the most plentiful fossil fuel in the United States

Fossil Fuels - Oil

- Oil (Petroleum) is a thick, black liquid fossil fuel.
- Oil is formed from the remains of small ocean-living organisms.
- Crude oil is separated into fuels and other products by heating is called a refinery
- Petrochemicals are compounds that are made from oil.

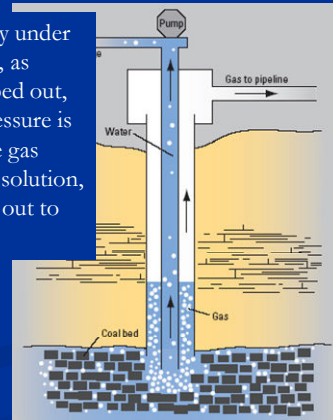


Fossil Fuels - Natural Gas

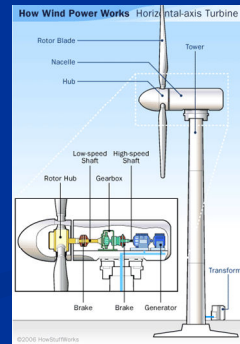
- Natural gas is 95% Methane, (CH_4) & other gases.
- Natural gas forms from the same organisms as oil.
- Because it is less dense than oil, natural gas often rises above an oil deposit, forming a pocket.
- Natural gas produces lower levels of many air pollutants than coal or oil and is fairly easy to transport.



Gas is typically under great pressure, as water is pumped out, the pocket pressure is reduced & the gas comes out of solution, bubbles up & out to be recovered.

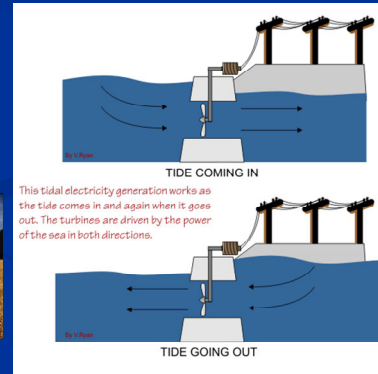
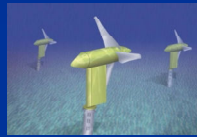


- Include **Solar, wind, biomass, geothermal & tides**
- **Hydroelectric Power** - Once the dam and power plant are built, hydroelectric power is inexpensive and clean. Dams can have negative effects on the environment.
- **Wind power** - Large wind farms contain many wind turbines. The turbines turn to generate electricity. Wind power causes no pollution and is renewable. It is possibly the fastest-growing energy resource. Drawbacks of using wind power include the need for steady strong winds and opposition to the building of wind farms in scenic areas.



Renewable Sources of Energy

- **Biomass Fuels** -Fuels made from material that was once part of a living thing
- **Energy from Tides** harnesses the regular rise & fall of the oceanic tides, Tidal power plants use this regular flow to turn turbines and generate electricity.

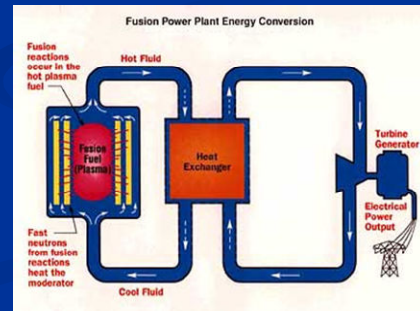
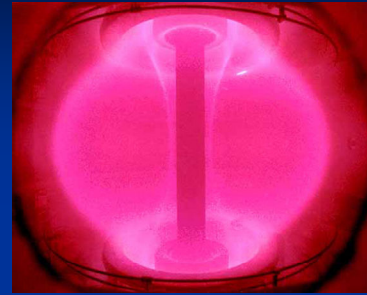
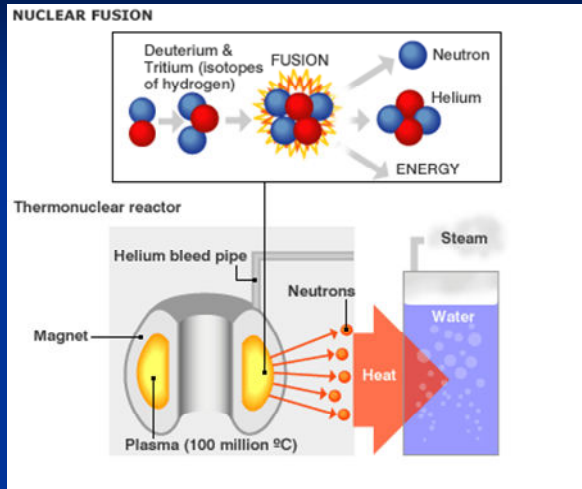


Nuclear Energy

- **Nuclear fission** – the splitting of an atom's nucleus into two smaller nuclei
- In a nuclear power plant, the heat energy released from fission is used to change water into steam. The steam then turns the blades of a turbine to generate electricity.
- The reactor contains rods of uranium, called **fuel rods**. The chain reaction is controlled by placing **control rods** made of the metal cadmium between the fuel rods. The heat that is produced is used to boil water to produce steam, which runs the electrical generator.
- Major environmental disasters can occur when meltdowns occur
- **Nuclear fusion** is the combining of two atomic nuclei to produce a single larger nucleus
- In nuclear fusion, two **hydrogen** nuclei combine to create a **helium** nucleus, which has slightly less mass than the two hydrogen nuclei. The lost mass is converted to large amounts of energy.
- Nuclear fusion is a promising future energy source.

[illegible]

Nuclear Energy - Fusion

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

