Unit 8: Earth's Energy Resources

November 27th

Topic: Energy/Non-renewable Energy

Bell Ringer:

1. **What resources do human use to power their electronics?**
2. **How do these resources affect the Earth?**

November 27th - Circle Diagram

In the center of your circle, you need to write the word “Climate Change” and around that word write words that relate to “Climate Change”

November 27th - Follow Up Questions

Complete the follow up questions
When finished raise your hand so I can pass along your homework and stamp your questions

HW: Situational Question about Drilling due TOMORROW!

November 28th

Topic: Renewable Energy Day 1

Bell Ringer:

1. **What words would you associate with renewable? (List at least 5)**

NC Poster Project

1. **By the End of Today the following should be complete:**
    a. **Research your renewable energy**
        i. **Definition**
        ii. **How to harness it**
        iii. **Where in NC it occurs**
        iv. **Advantages and Disadvantages**

Welcome! November 29th

Topic: Renewable Energy Day 2

Bell Ringer:

1. **Hypothesize why humans pick nonrenewable resources over renewable resources.**

NC Poster Project

1. **You have 20 minutes to apply your information to your construction poster**
2. **When complete retrieve tape and tape it to cabinets or wall!**

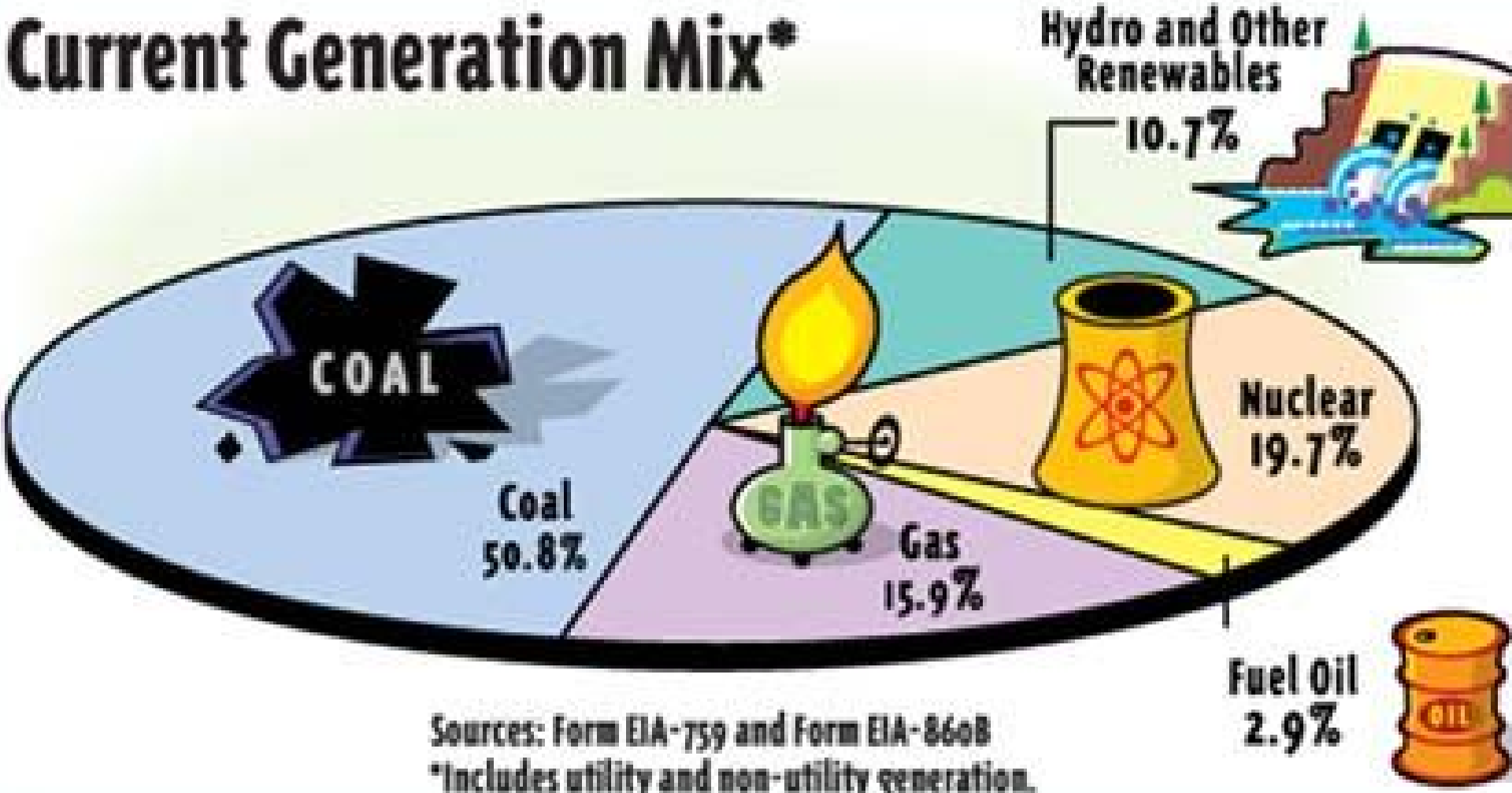
Welcome! November 30th

Topic: Solar Radiation

Bell Ringer:

1. **Based on the different types of renewable resources, if you lived near Coastal Carolina what type of energy would you use and EXPLAIN why!**

Current Generation Mix*



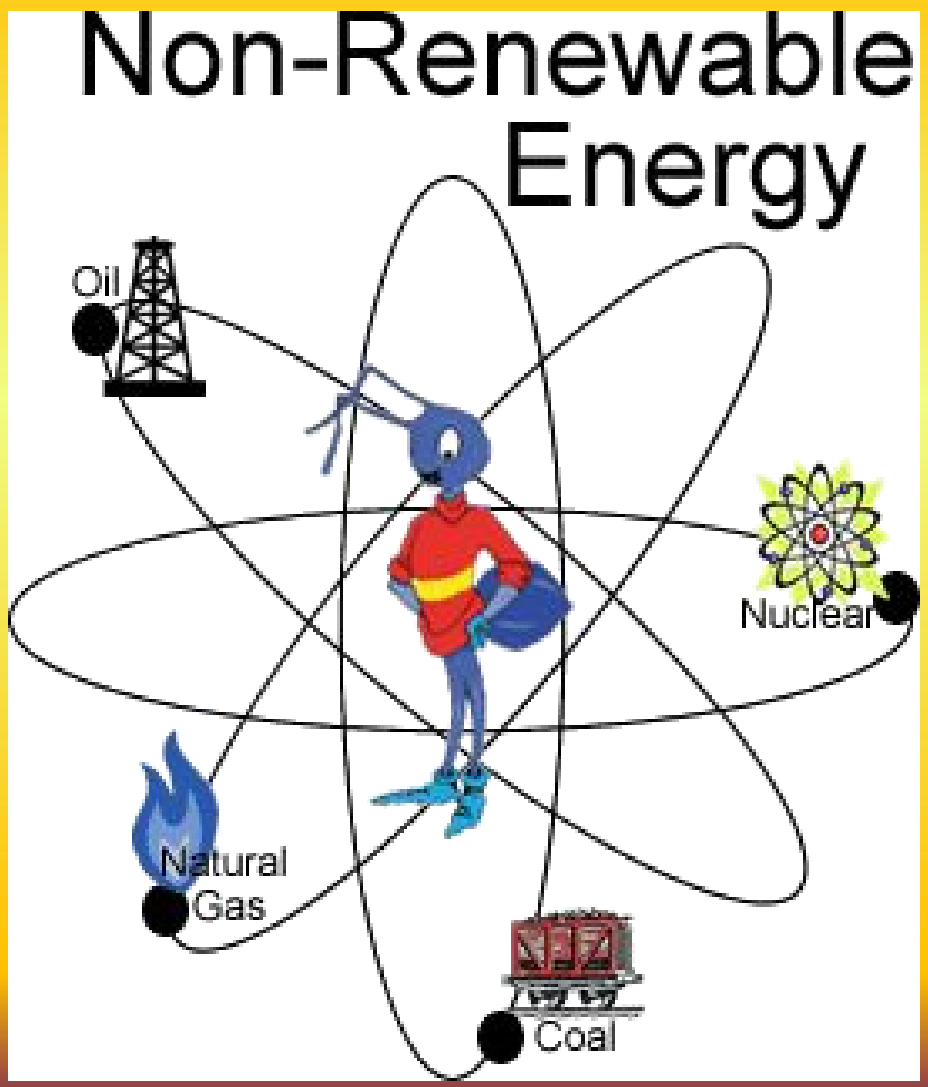
Sources: Form EIA-759 and Form EIA-860B
*Includes utility and non-utility generation.

What is Energy?

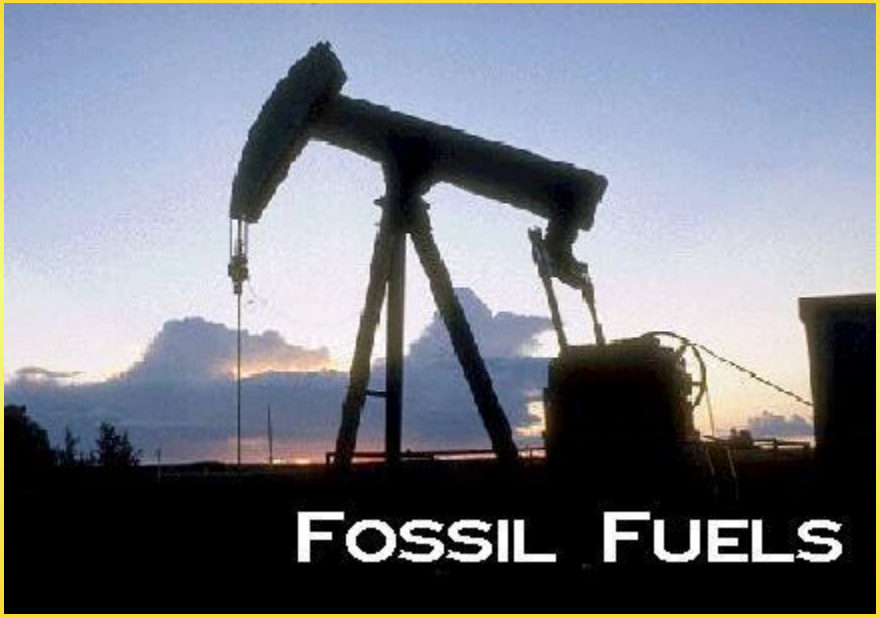
- **Gives off heat or light**
- **Energy causes movement**

What are Nonrenewable Resources?

- **Takes millions of years to form**
- **Finite (limited) supply**
- Ex:
  - Fossil fuels
  - Rocks
  - Minerals



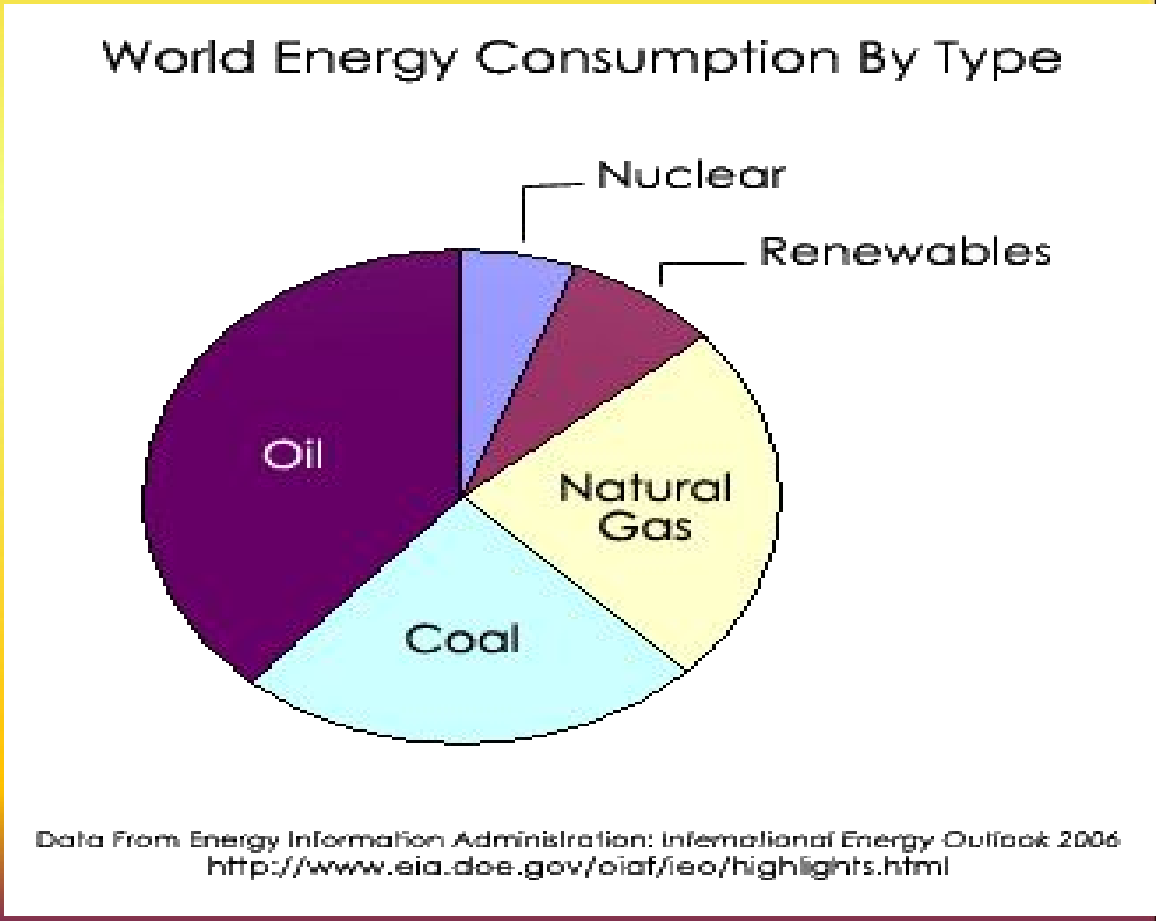
What are Fossil Fuels?



- **Any past living material that is found in rock that is mined out as an energy resource**

Types of Nonrenewable Energy Resources

- **Coal**
- **Oil**
- **Natural gas**
- Tar sands
- Oil shale



Using Coal

- **Pros**
  - **High energy**
  - Cost of coal is low
- **Cons**
  - **Dirty fuel**
  - Releases CO_2, SO_2, and NO_2 as pollutants
  - **Destroys the land**
  - 300 years left

What is OIL?

- **Remains of plants and animals** that are buried in ancient seas
- Extracted by drilling a well
- **Refined as a gasoline product for fuels**

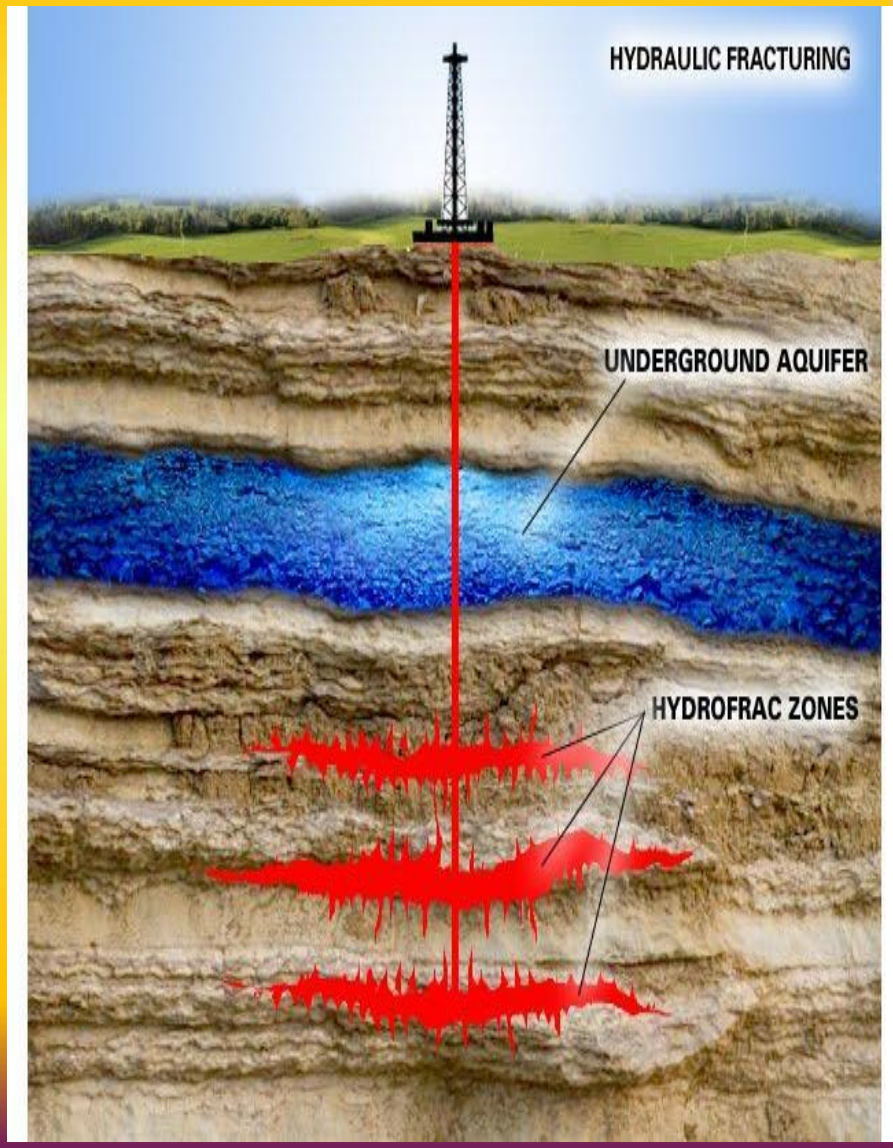
What is Natural Gas?

- **Trapped in porous rock beneath the Earth above oil deposits**

https://www.cbsnews.com/news/natural-gas-coal-future/

Using Natural Gas

- **Pros**
  - **Cleanest energy mined**
- **Cons**
  - **Releases CO_2 into the atmosphere**
  - Fracking—wells **injected water and gets into well water**
  - 125 to 200 years left



Uranium and Plutonium

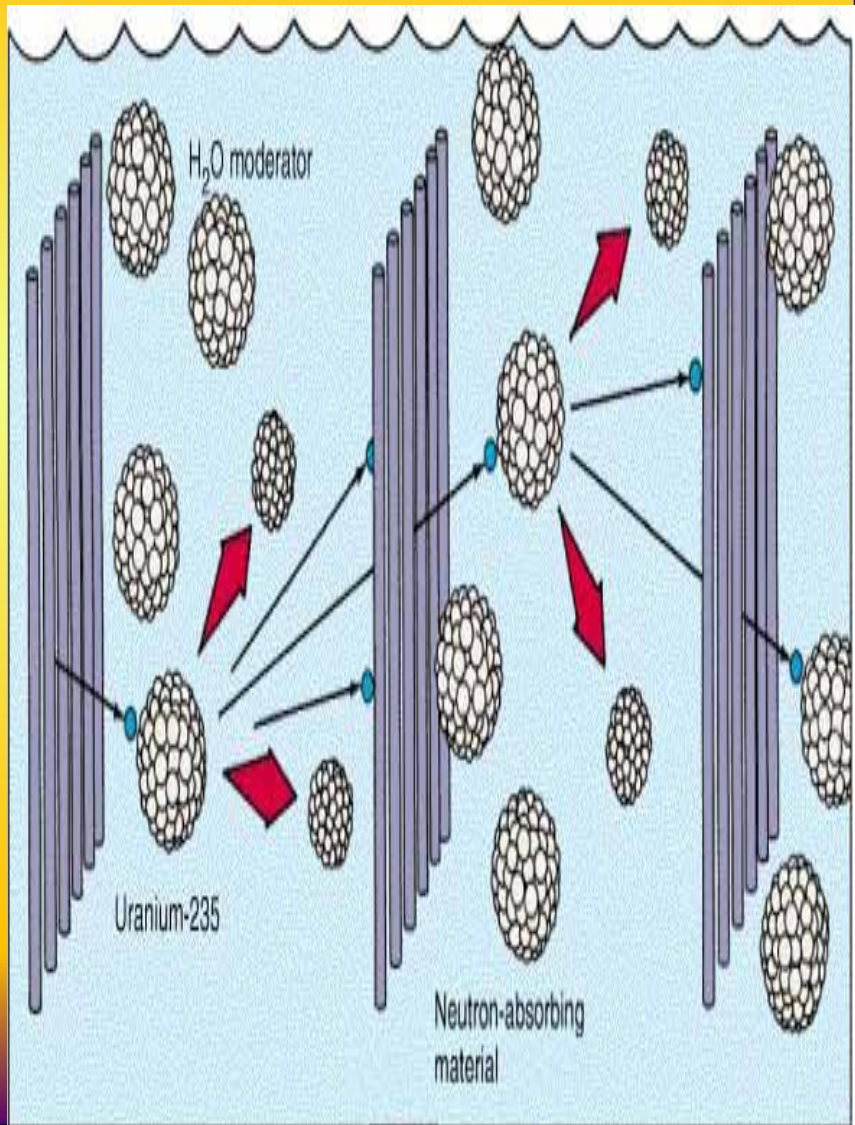
- Nuclear reactors use mined **Uranium to convert to Plutonium through fission (splitting of atoms)**

PROS

- **Large fuel supply**
- **Low CO_2 emissions**

CONS

- Accidents – Japan and Chernobyl
- Reactors last only 40 years
- **Expensive**



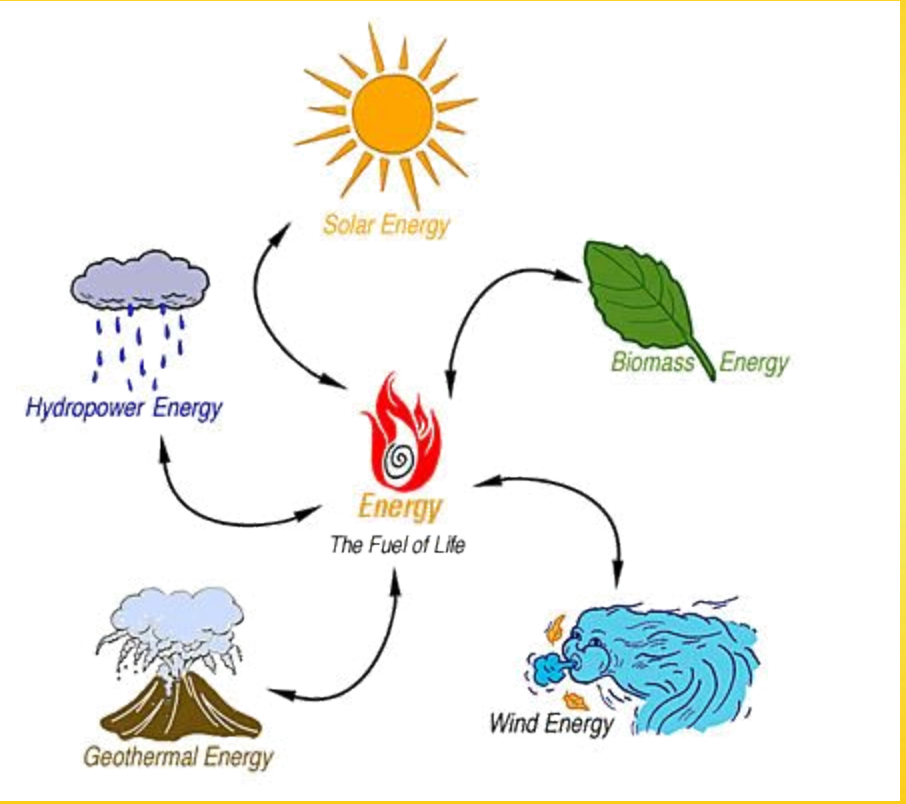
Day 2

Renewable/Alternative Energy

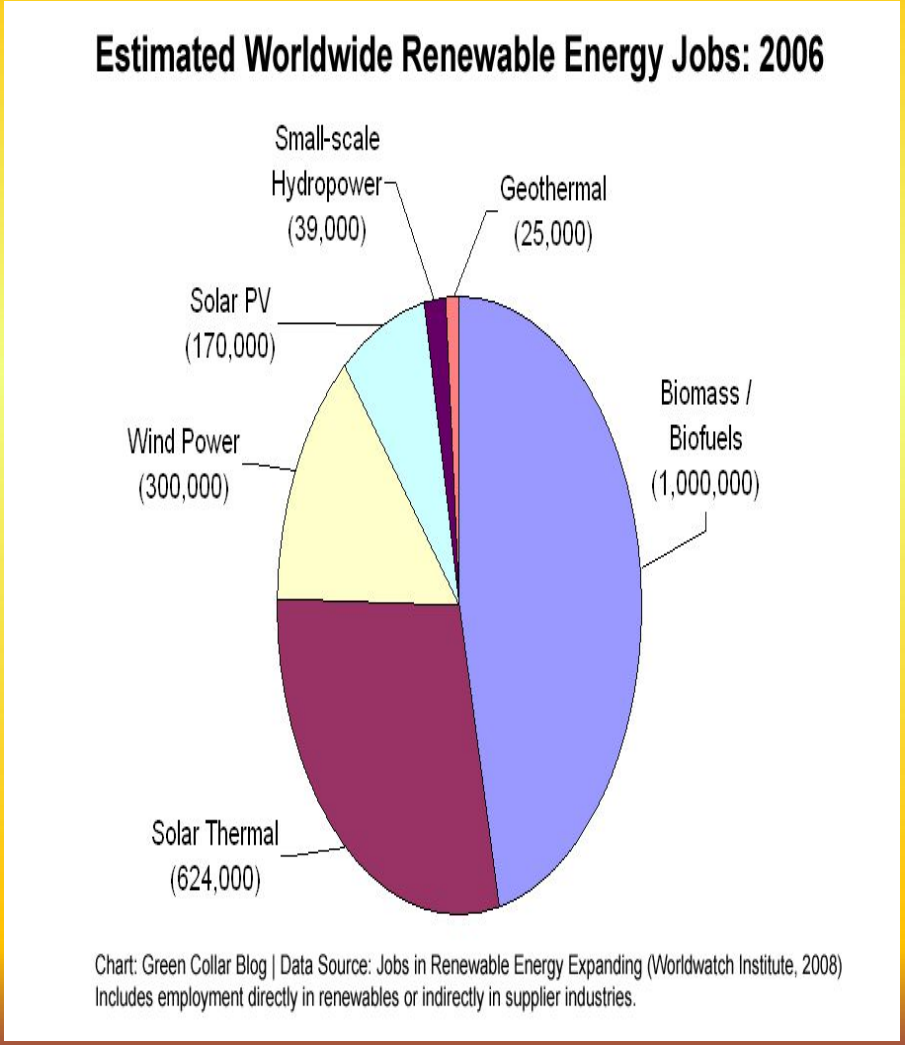
- **Objective**
  - I can explain the pros and cons of different types of renewable energy sources

What is Renewable Resources?

- **Can be replenished over a fairly short period of time**
- Ex
  - Plants
  - Wind
  - Water
  - Solar Energy



Types of Renewable Energy

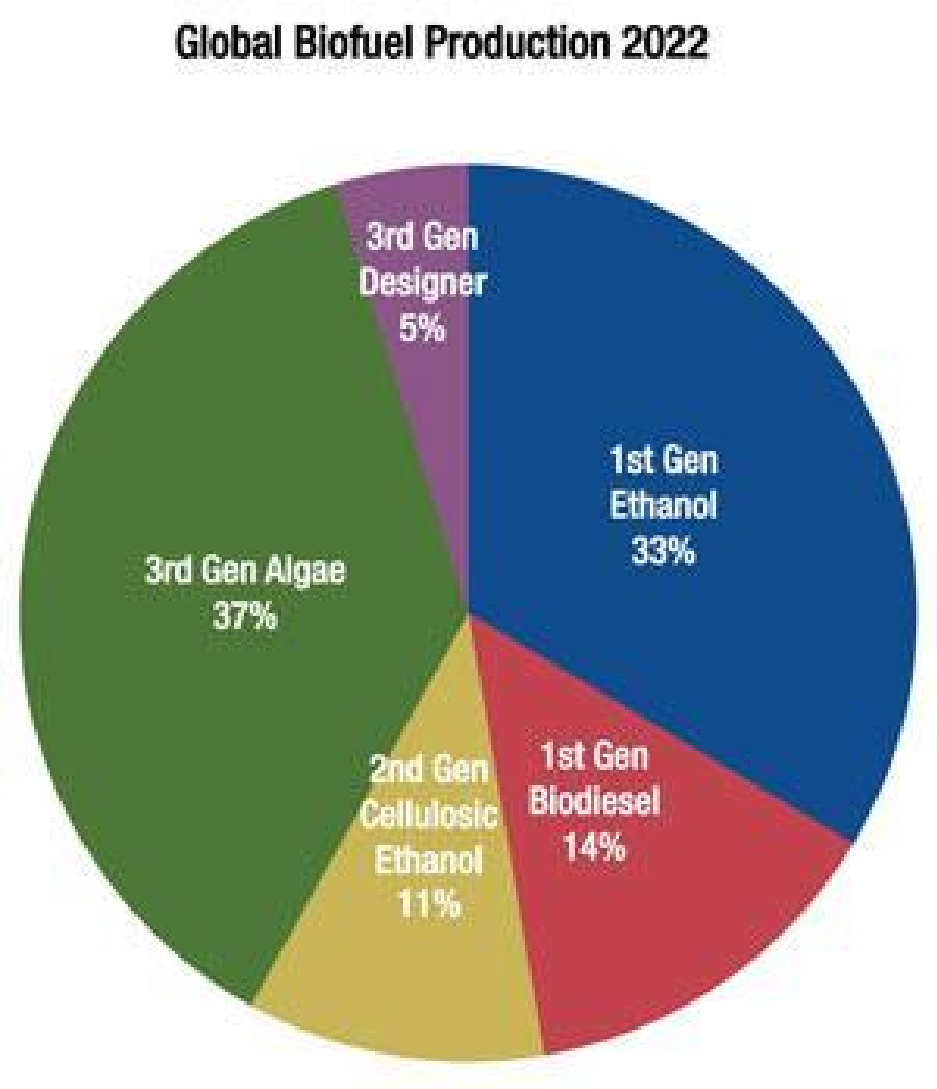


- **Biofuel**
- **Geothermal**
- **Hydroelectric Power**
- **Hydrogen Fuel Cells**
- **Solar Power**
- **Tidal Power**
- **Wave Power**
- **Wind Power**

What is Biofuel?

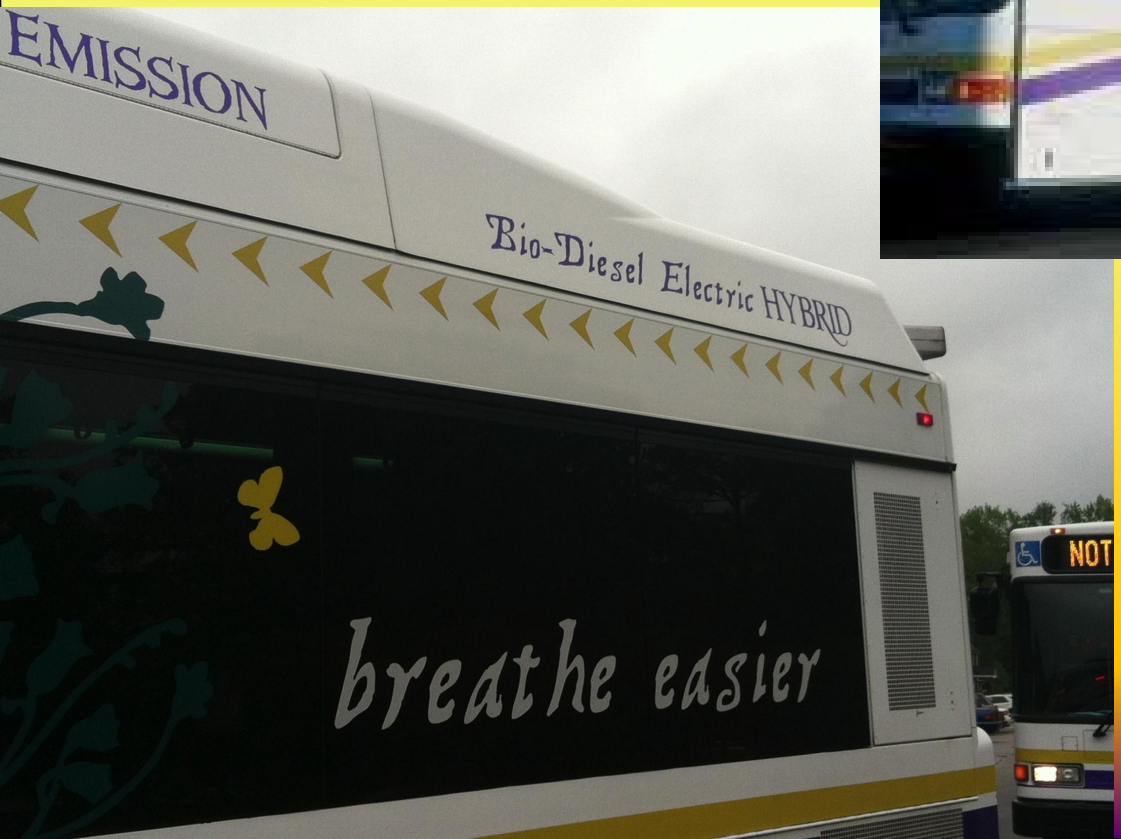
- Uses plant material and animal waste that is converted into fuel

Using Biofuel



- **Pros**
  - Tree farms can restore degraded lands
  - Large potential supply
- **Cons**
  - CO_2 emissions if harvested and not planted back
  - Soil erosion, water pollution, and loss of habitat

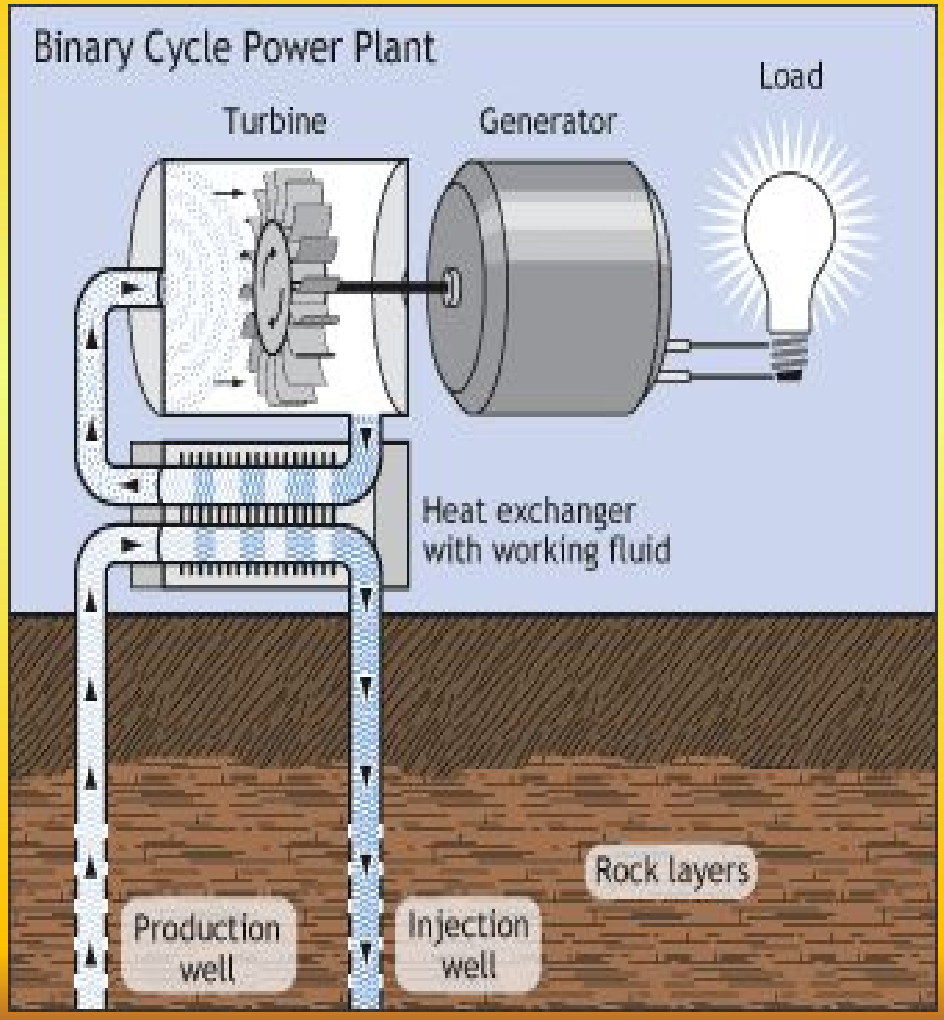
ECU 35 – Biodiesel / Hybrid



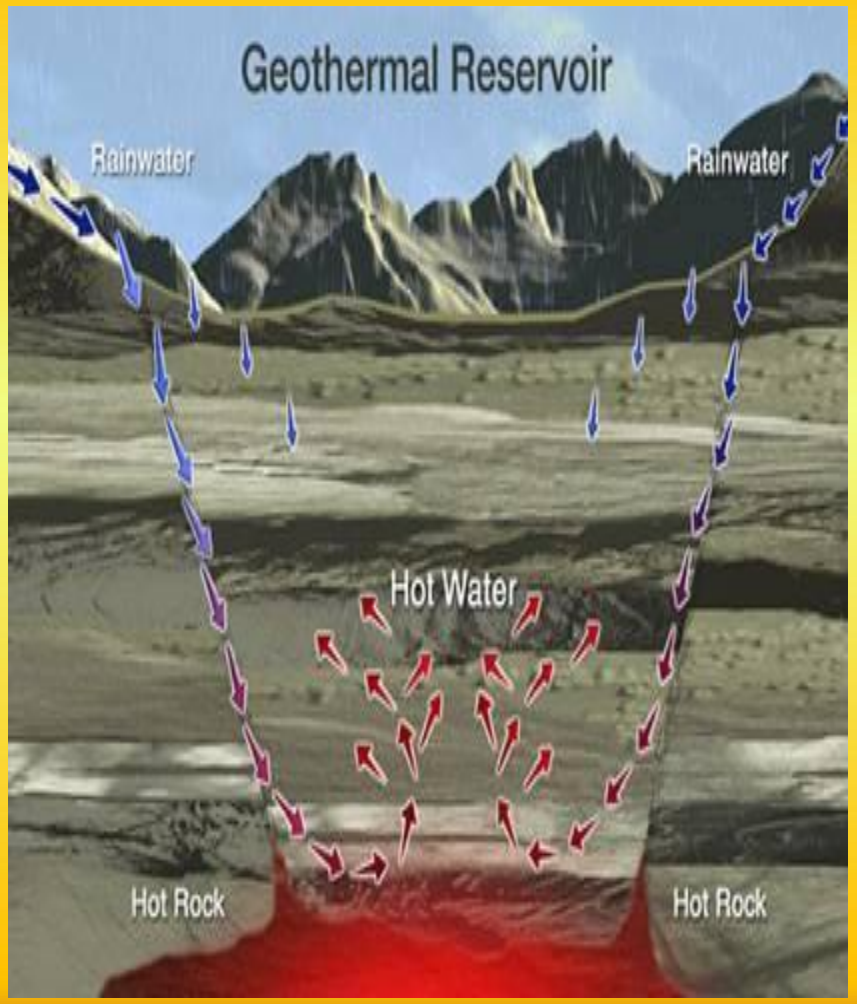
ECU 51 – BRT Clean Diesel Hybrid

What is Geothermal Energy?

- Energy is harnessed by trapping natural underground reservoirs of steam and hot water
- Used to turn turbines to generate electric power

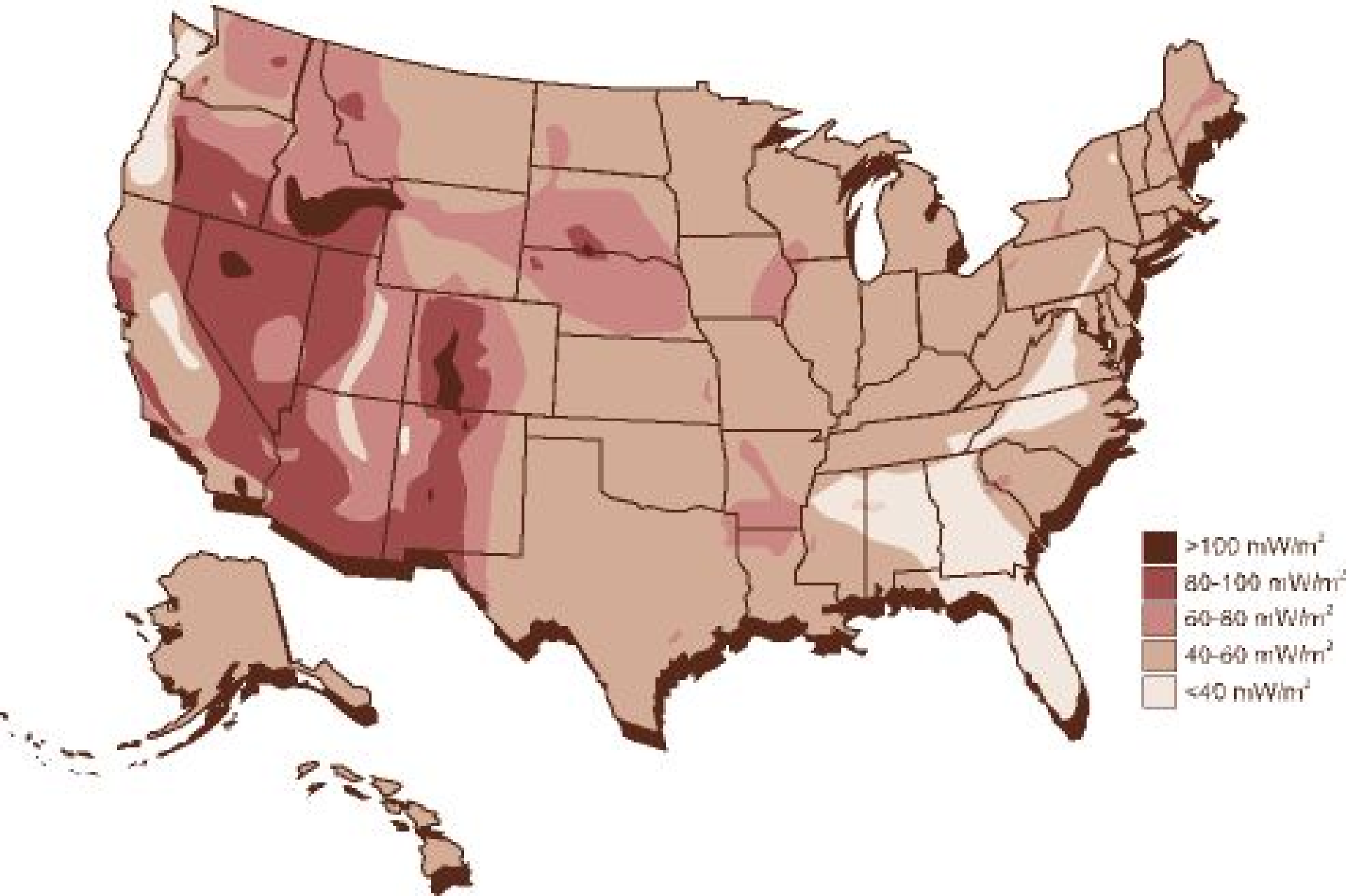


Using Geothermal Energy



- **Pros**
  - Available 24/7
  - Little emissions of CO_2 and natural gas
- **Cons**
  - Only available near geological activities
  - Habitat destruction when building it

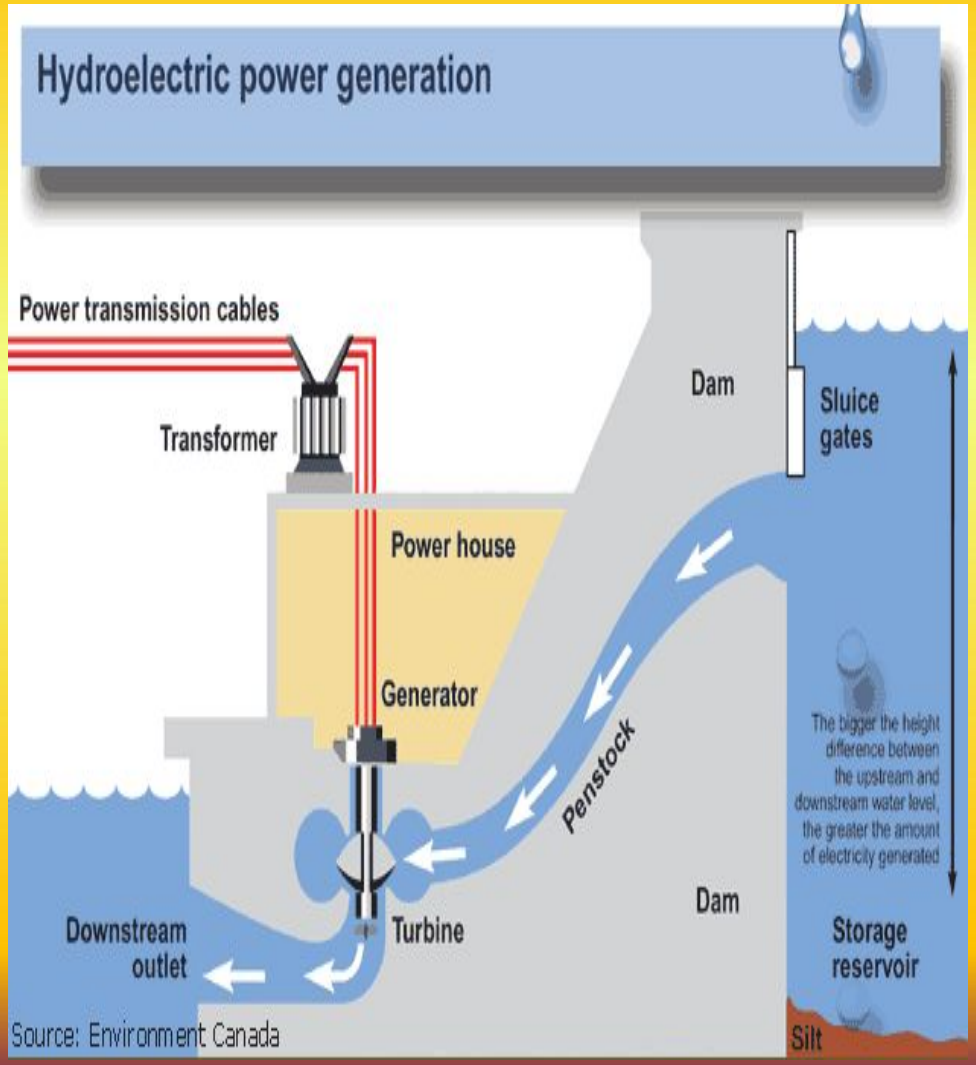
Geothermal Resources



The Geysers

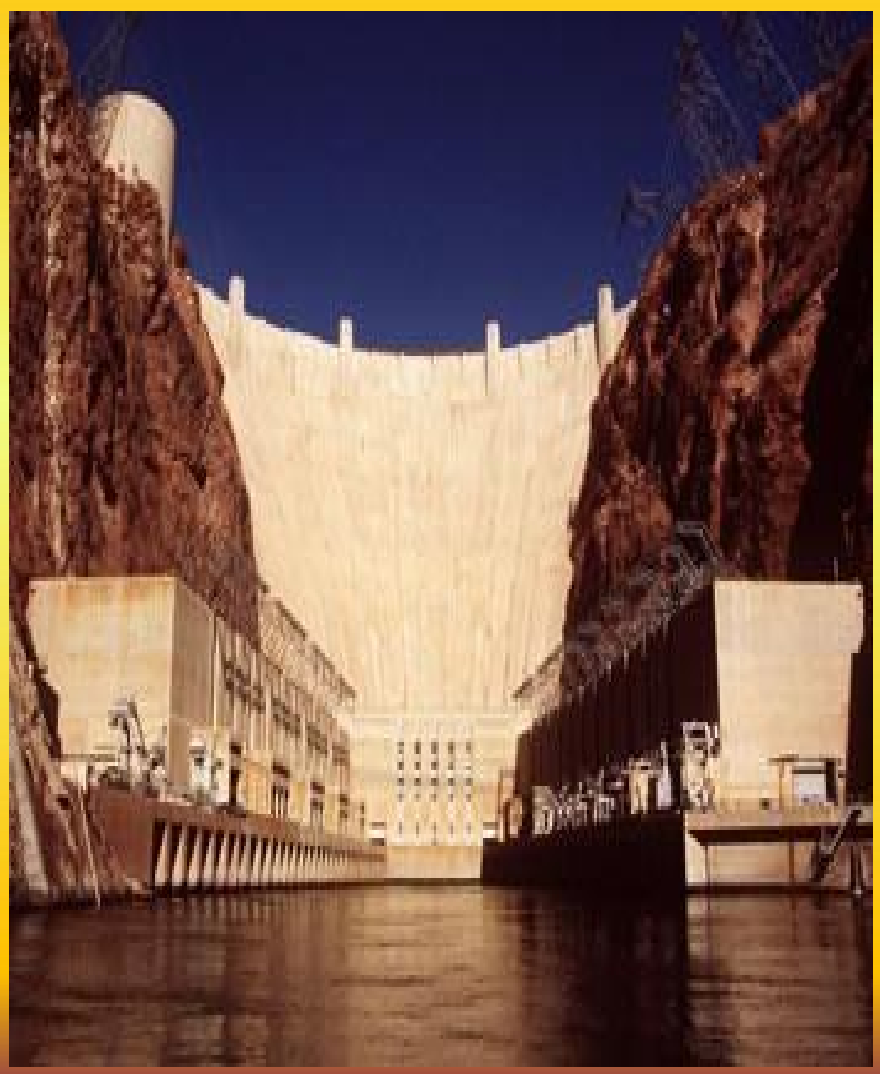
What is Hydroelectric Power?

- Water is stored behind a dam and released periodically
- Falling water turns turbines which produce electricity

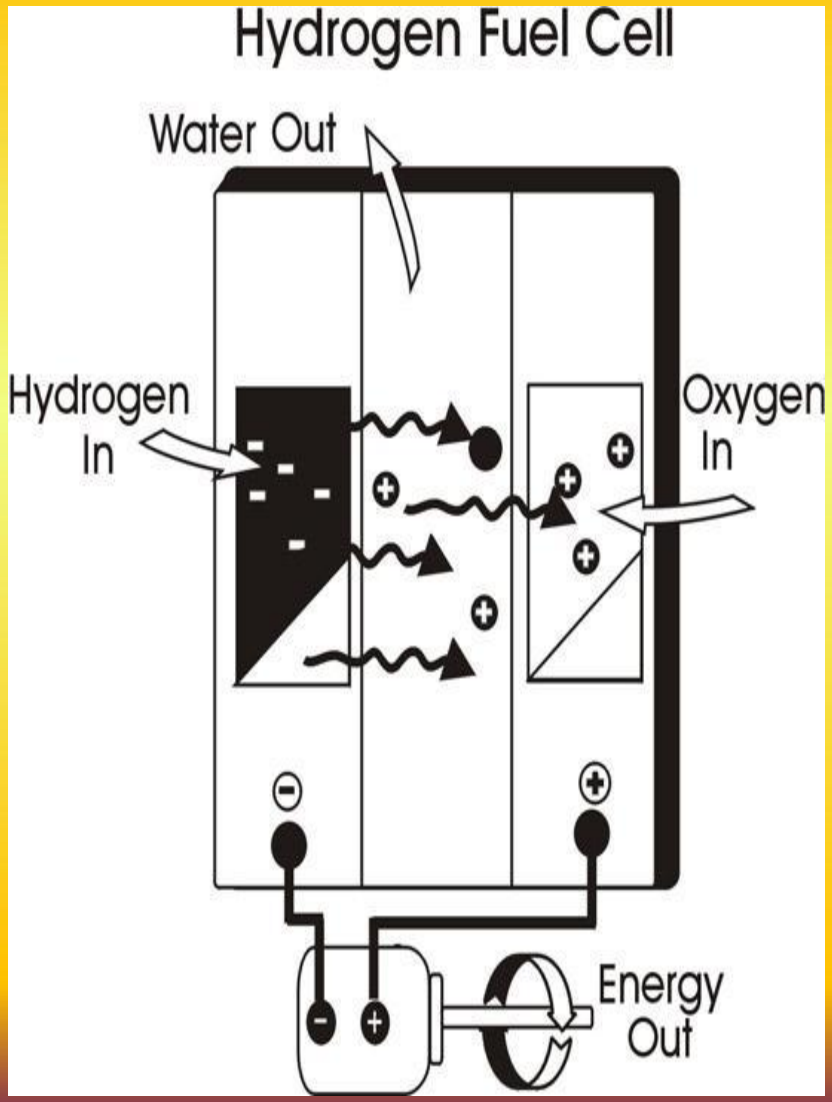


Using Hydroelectric Power

- **Pros**
  - Long life span
  - No CO_2 emissions
  - Flood control method
  - Provides water for year round irrigation
- **Cons**
  - Expensive
  - Convert land to water habitat
  - Danger of it collapsing
  - Decrease fish spawning

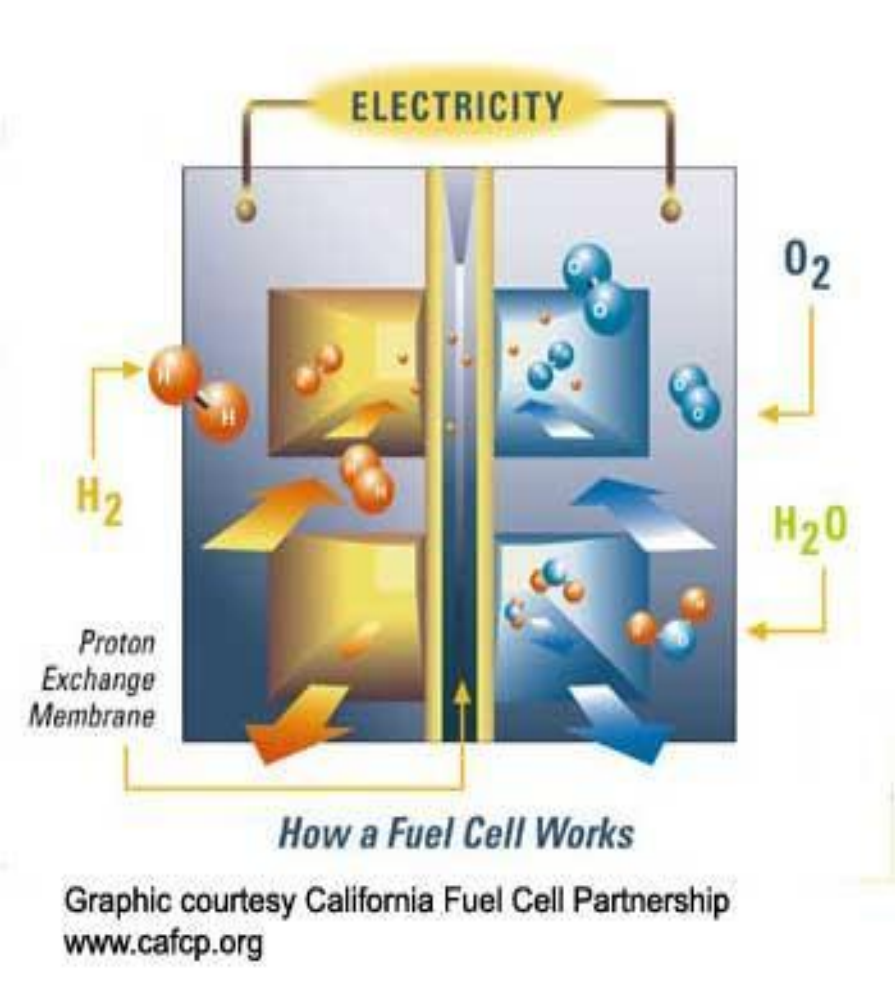


What are Hydrogen Fuel Cells?



- A device that converts chemical energy into electrical energy
- Splitting water atoms to extract the hydrogen for energy use

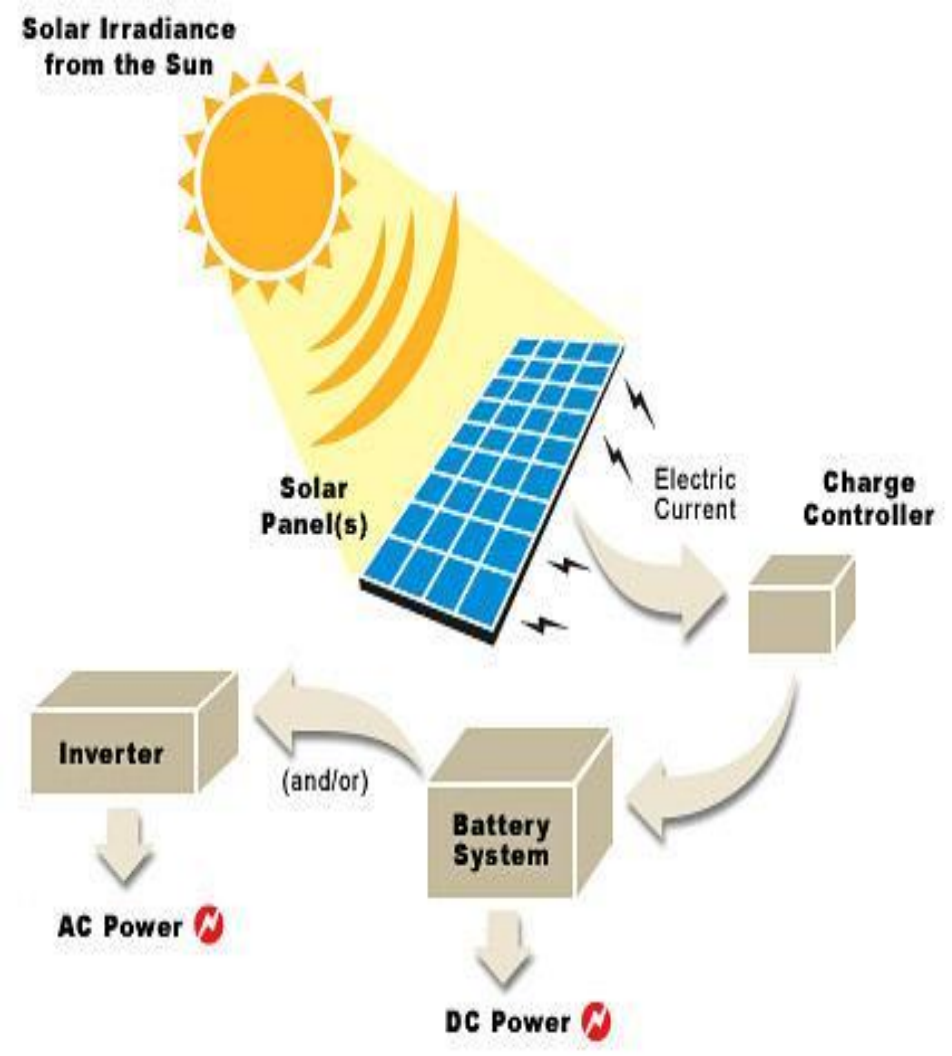
Using Hydrogen Fuel Cells



- **Pros**
  - No CO_2 emissions
  - Safe
  - Low environmental impact
- **Cons**
  - High Cost
  - Doesn't last long when made
  - Not readily available

What is Solar Energy?

- Uses energy from the sun to produce energy



Using Solar Energy

- **Pros**
  - Free
  - No CO_2 emissions
  - Low air and water pollution
- **Cons**
  - Need access to sun 60% of time
  - Need a heat storage system
  - Collection system is expensive

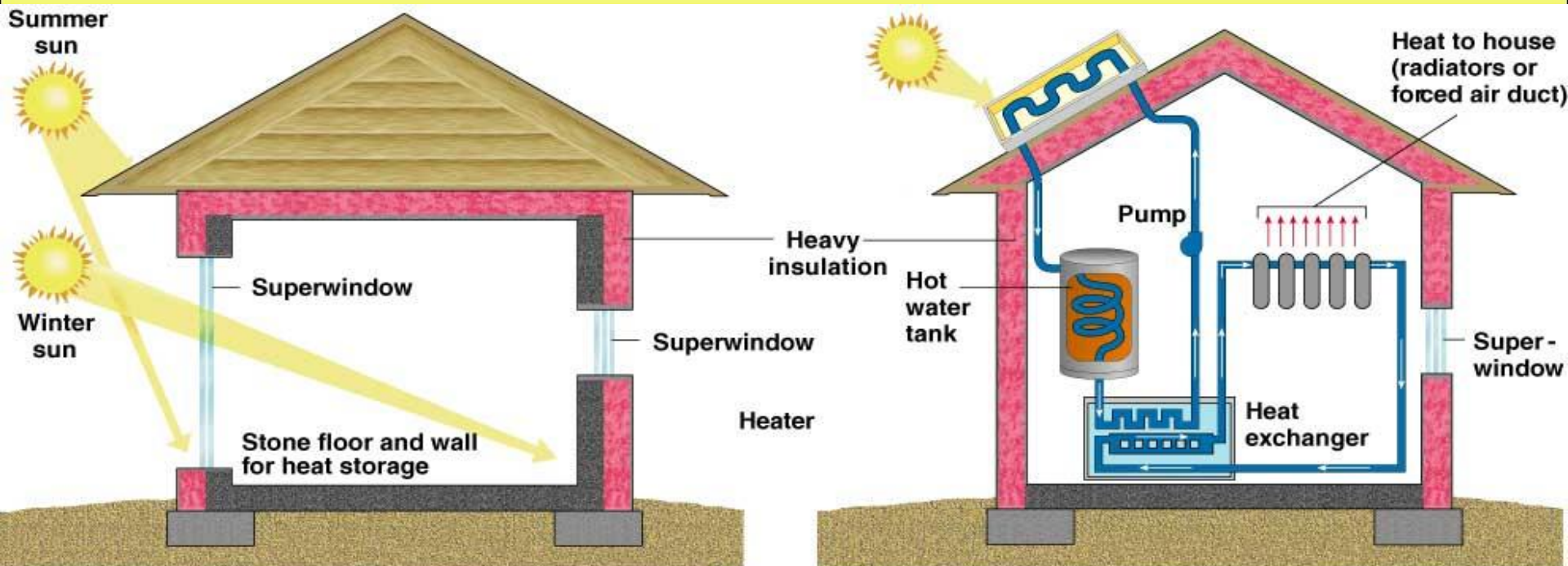
Types of Solar Energy

Passive system:

Absorbs & stores heat from the sun directly within a structure

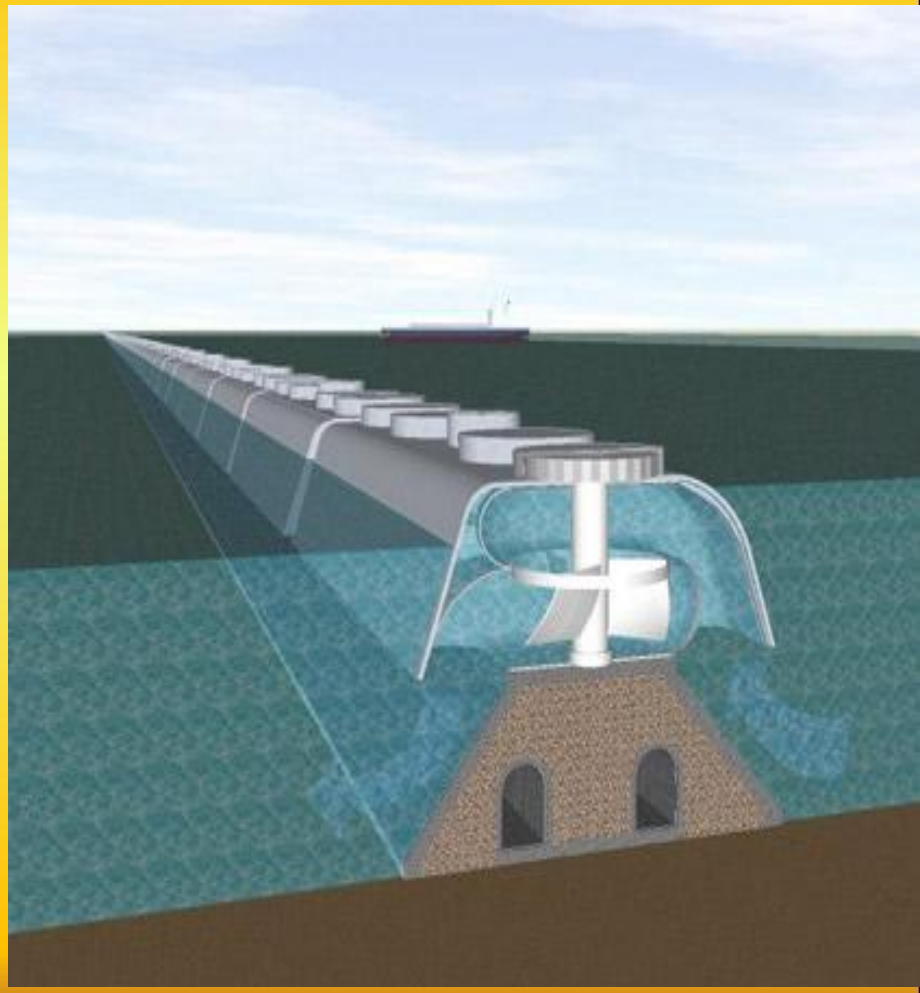
Active system:

Collectors absorb solar energy, a pump supplies part of a buildings heating or water heating needs.



What is Tidal Power?

- Uses the force of water during high tide to turn a turbine to create energy

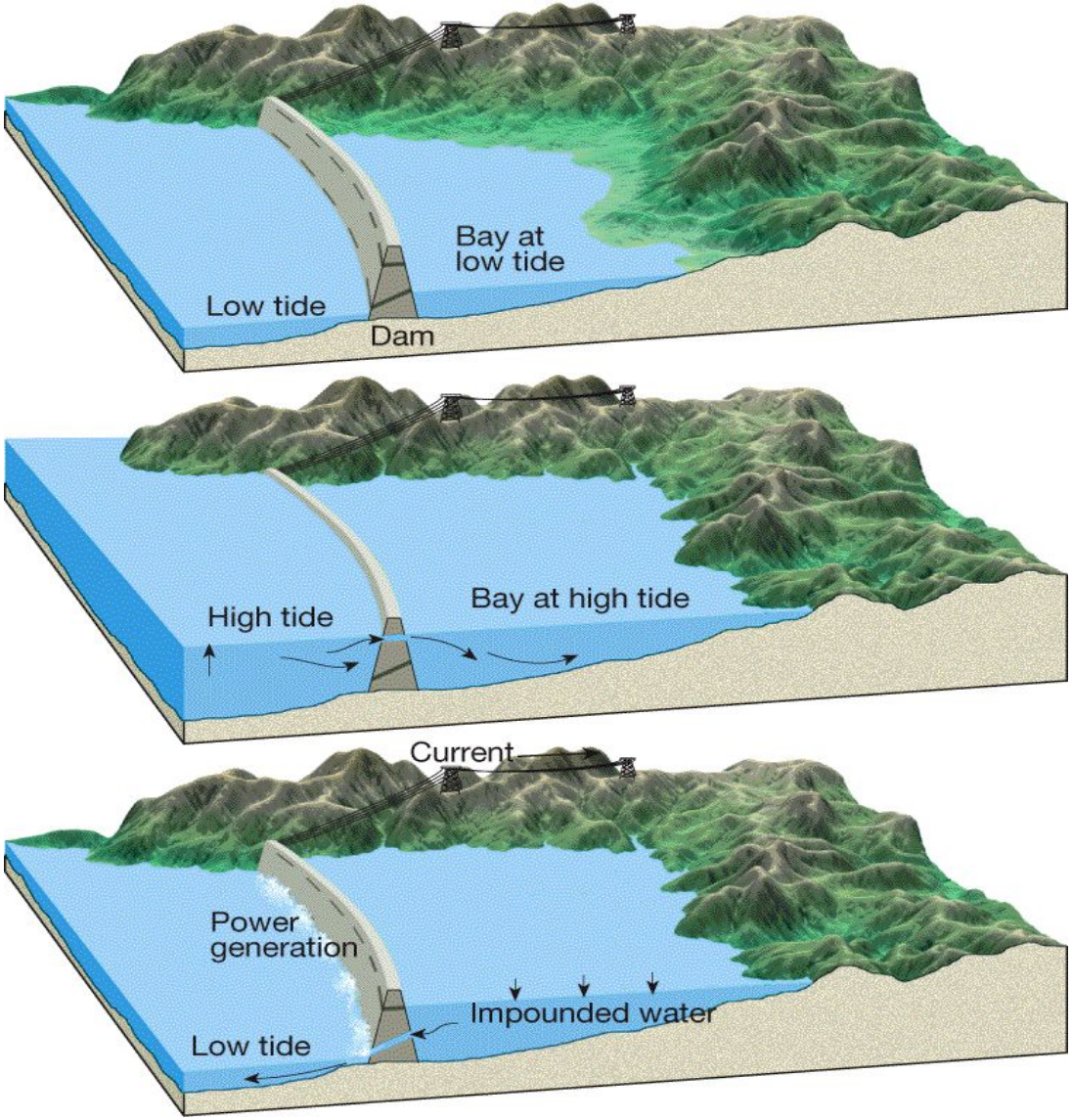


Using Tidal Power

- **Pros**
  - Know when daily high tides
  - No CO_2 emission
- **Cons**
  - Unreliable on west coast of U.S.
  - Expensive equipment

Tidal Dam

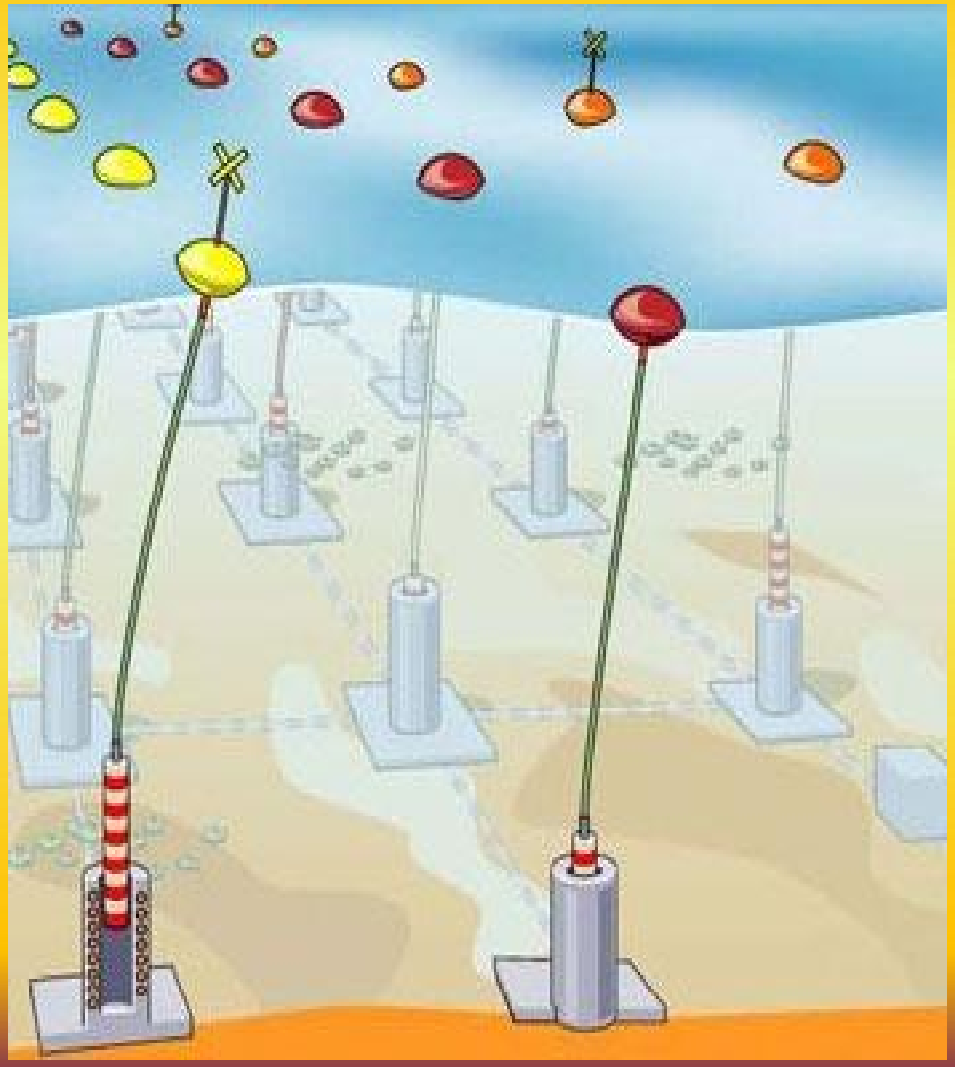
Why is a large tidal range need to produce power?



What is Wave Energy?

- The motion of wind driven waves at the ocean's surface is converted into electricity

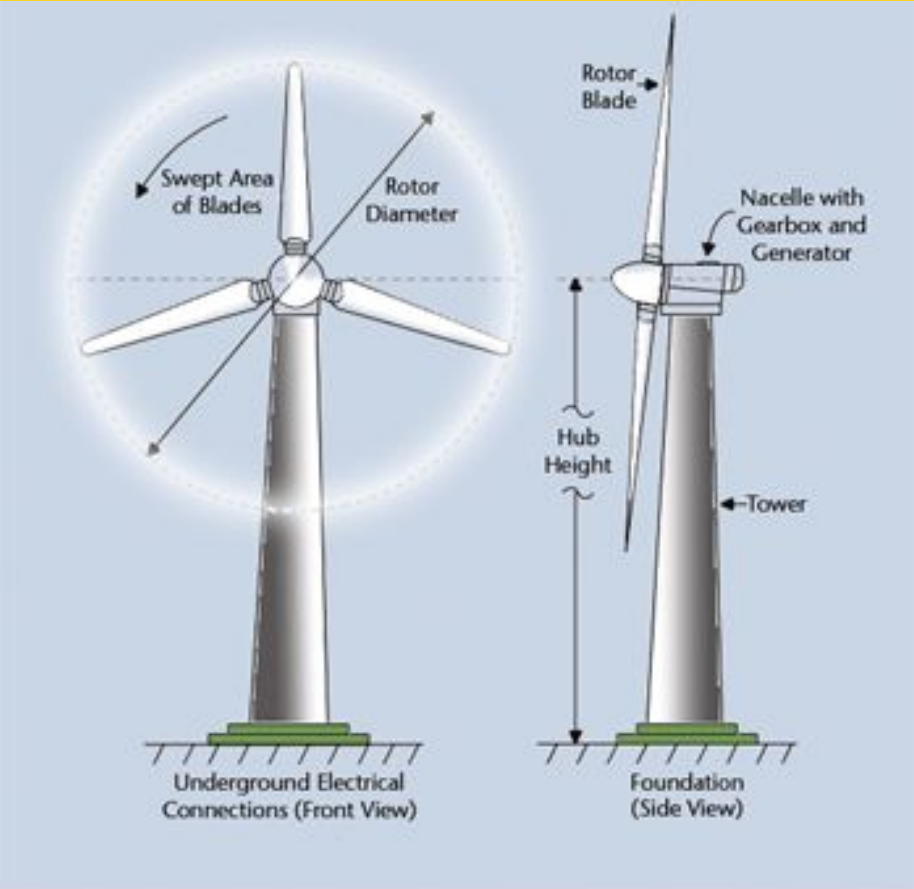
Using Wave Energy



- **<u>Pros</u>**
  - No CO_2 emission
  - Works during day and night
- **<u>Cons</u>**
  - Expensive
  - Machines break down and corrode in water

What is Wind Energy?

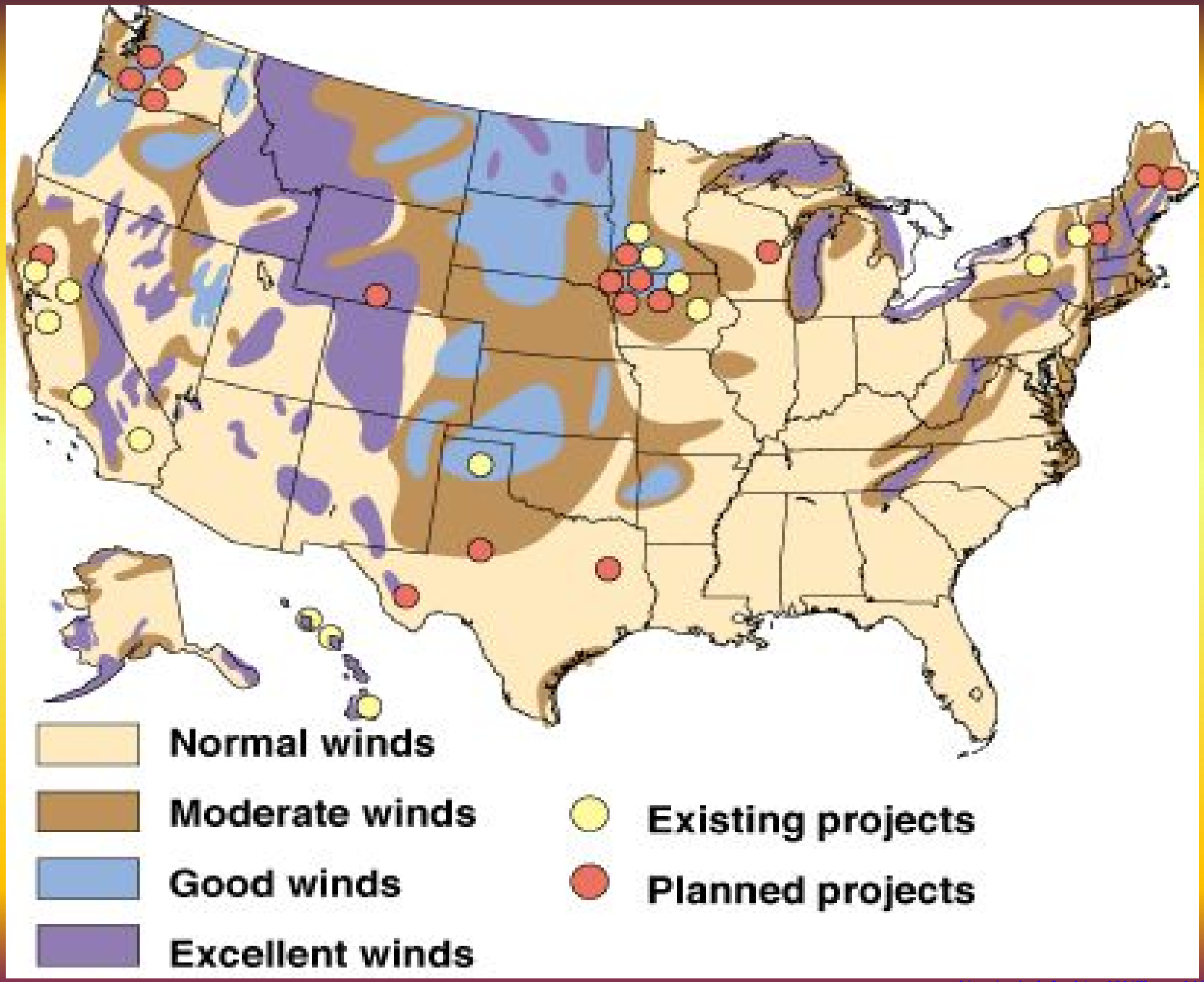
- Uses wind to turn a turbine to create energy
- In 10 years, 10% of the country's demand for electricity could be meet by wind power



Drawing of the rotor and blades of a wind turbine, courtesy of ESN

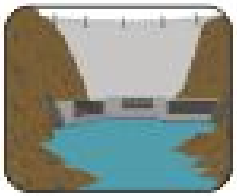
Using Wind Energy

- **Pros**
  - High efficient
  - Low environmental impact
  - No CO_2 emissions
  - Quick construction
- **Cons**
  - Need steady winds
  - Noise and Visual Pollution
  - Damage/death to animals (birds)


Normal winds
Moderate winds
Good winds
Excellent winds
Existing projects
Planned projects

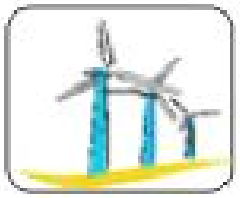
U.S. ENERGY CONSUMPTION BY SOURCE

BIOMASS 2.9%
renewable
Heating, electricity, transportation



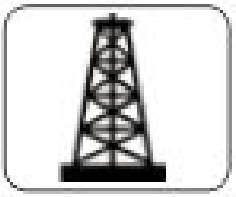
HYDROPOWER 2.7%
renewable
Electricity

GEOTHERMAL 0.3%
renewable
Heating, electricity



WIND 0.1%
renewable
Electricity

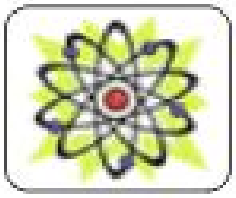
SOLAR & OTHER 0.1%
renewable
Light, heating, electricity



PETROLEUM 38.1%
nonrenewable
Transportation, manufacturing

NATURAL GAS 22.9%
nonrenewable
Heating, manufacturing, electricity

COAL 23.2%
nonrenewable
Electricity, manufacturing



URANIUM 8.1%
nonrenewable
Electricity

PROPANE 1.7%
nonrenewable
Manufacturing, heating

Day 3

- **Objective:**
  - I can explain how the use of resources is affecting the Earth

What is the problem??

- Natural resources are depleting
- They will soon be gone if we don't do anything about it

What can we do?

Sustainability

- **Conservation** – the careful use of resources

What is Sustainability?

Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

How you can save Energy?

- Recycle when possible
- Let the sun in on bright winter days to warm rooms
- Use energy-saving fluorescent bulbs
- Turn off lights when you leave a room
- Turn off radio, TV or computer when not in use
- Walk or ride a bike when you can
- Find and use “Energy Star” products

The “3R” Philosophy

- Refers to Reduce, Reuse, and Recycle in the context of production and consumption
- Calls for:
  - An increase in the ratio of recycled materials,
  - The reuse of raw materials and manufactured wastes, and
  - Reduction of resources and energy used

Reduce

- Reduce the size, number, or use of nonrenewable resources
  - Don’t buy over packaged products
  - Buy in bulk
  - Buy refills and concentrates
  - Choose less heavily processed products

Reuse

- To put into action or service again, instead of throwing it away.
  - Compost lawn clippings
  - Use reusable containers

Recycle

- To use again or to reuse waste material by converting it into something new
  - Use white boards to replace sticky notes
  - Reuse packaging materials

What can we recycle??

Metals

The energy saved from recycling one aluminum can will operate a computer for THREE hours.

Stack the nearly 19 billion steel cans recycled in 1996 end to end, and you would have a line stretching from here to the moon and back more than three times (based on a can height of 5 inches).

Recycling one aluminum can saves enough energy to run a TV for three hours – or the equivalent of a half a gallon of gasoline.

Americans throw away enough aluminum every three months to rebuild our entire commercial air fleet.

Plastic

Americans use 2,500,000 plastic bottles every hour. Most of them are thrown away.

Five 2-liter recycled PET bottles provide enough fiberfill for a ski jacket.

Every year, we make enough plastic film to shrink-wrap the state of Texas.

Recycling plastic saves twice as much energy as burning it in an incinerator.

Paper

The amount of wood and paper we throw away each year is enough to heat 50,000,000 homes for 20 years.

To produce each week's Sunday newspapers, 500,000 trees must be cut down.

If all our newspaper was recycled, we could save about 250,000,000 trees each year.

We throw away enough office paper annually to build a wall twelve feet high stretching from Los Angeles to New York City.

Glass

Every month, we throw out enough glass bottles and jars to fill up a giant skyscraper.

Glass can be recycled an infinite number of times.

Recycling one ton of glass saves the equivalent of 10 gallons of oil.

A modern glass bottle would take 4000 years or more to decompose – and even longer if it's in the landfill.

The energy saved from recycling one glass bottle will operate a 100-watt light bulb for four hours.

Welcome!

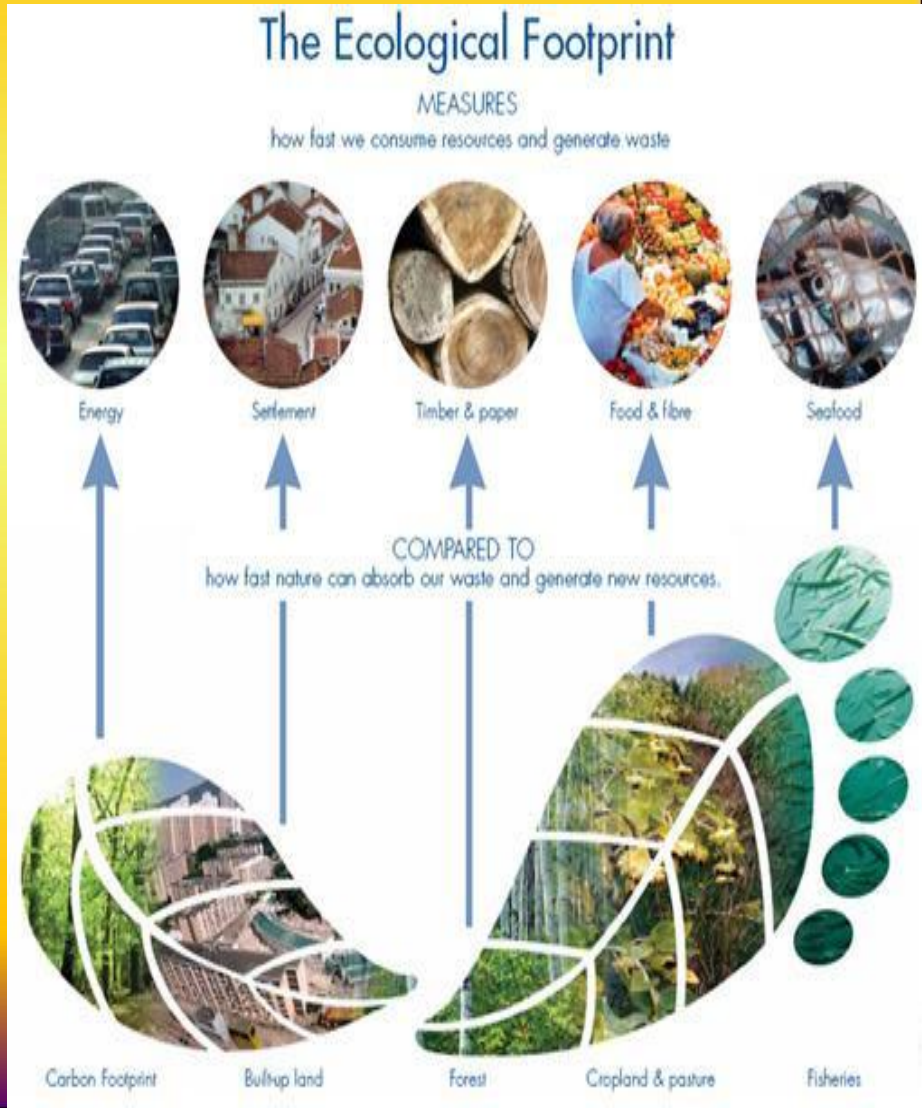
1. **Take out your notebooks and solar radiation article**
2. **Hand in your vocabulary sheet**
3. **Compare answers from article with your table partner**
4. **At 9:10, we will go over it as a class.**

Welcome!

1.

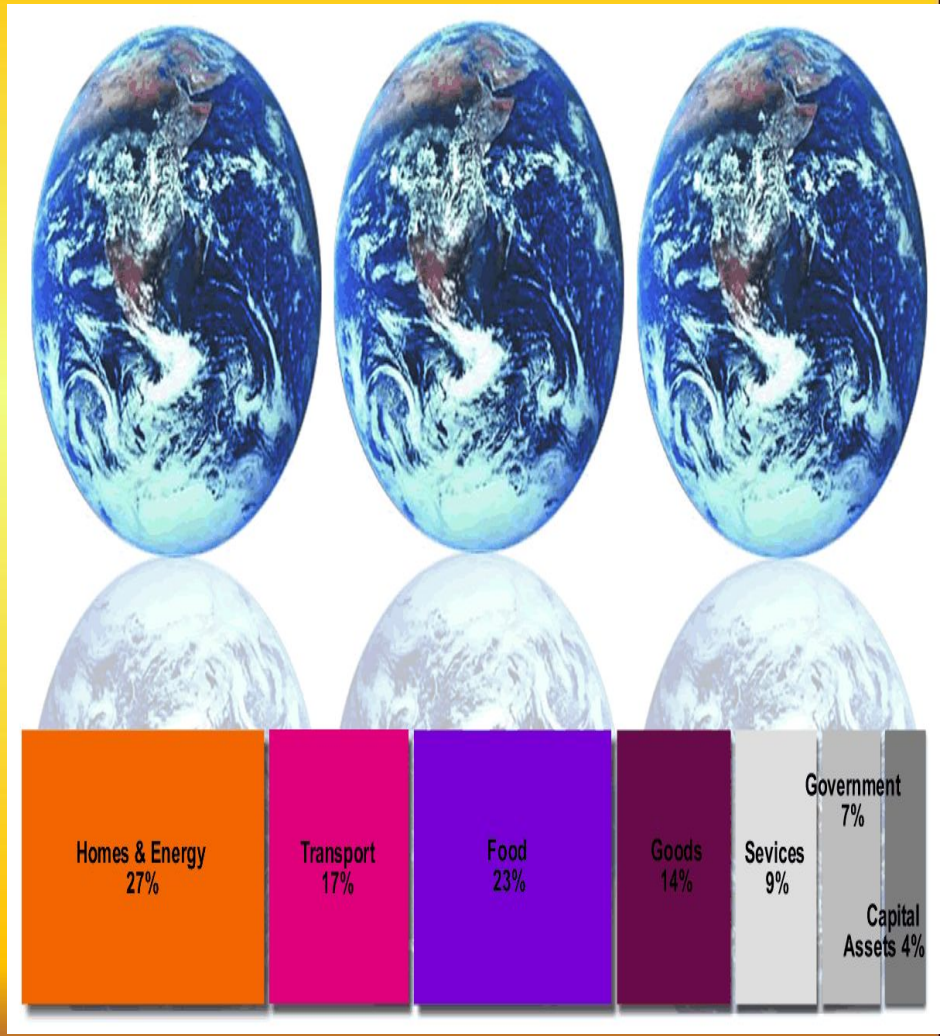
What is Ecological Footprint?

- **<u>A measure of human demand on the Earth's ecosystem</u>**
- Tracks how much land and water area a human population uses



The Future

- If current population and consumption trends continue, by the 2030's, we will need 2 Earths to support us



Producing Energy

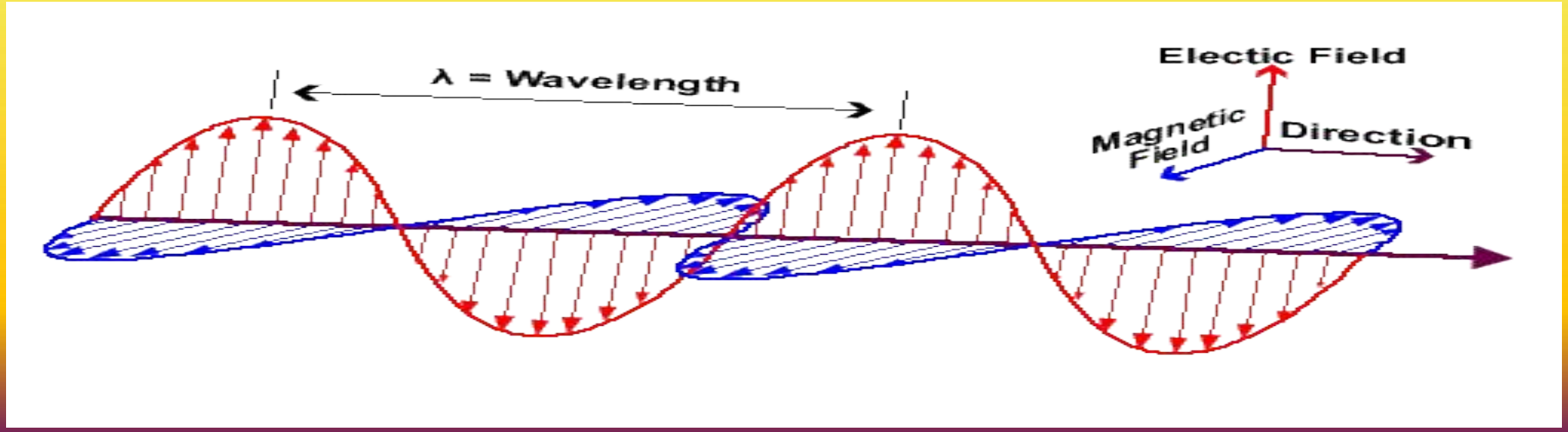
- **Fusion**
  - **Atoms combine together**
  - **Used to produce energy**
  - **Helium & Hydrogen**

- **Fission**
  - **Atoms split in two**
  - **Used to produce energy**
  - What nuclear power plants do

https://www.youtube.com/watch?v=3rn339v_Q-w

What does the Sun Emits?

- **Electromagnetic Radiation**
  - **Different waves of light based on wavelengths and frequency**
  - Arranged on the Electromagnetic Spectrum



Electromagnetic Spectrum

- **Radio Waves—lowest energy**
- Infrared waves
- Visible Light (ROY G BIV)
- UV Rays
- X-rays
- **Gamma Rays—highest energy**