

Energy: Renewable and Non-Renewable Resources

A Review

I. What is energy?

- A. Energy is the ability to do things, to do work
- B. Energy is the driving force behind getting things done
- C. We use energy for everything that we do, from cooking and eating dinner, to driving, and even to watch Psy
- E. An energy source is something that can be tapped to provide heat, chemical, mechanical, nuclear, or radiant energy

II. Categories of Energy

- A. The sun was the first energy source
  - 1. It provides light and heat during the day
  - 2. Energy from the sun is called **solar energy**. (*Sol* means sun)
- B. Our focus will be sources of energy:
  - 1. Non-renewable Resources – a resource that does not replenish itself at a pace that is as fast as it is being consumed
  - 2. Renewable Resources – a resource that has the ability to replenish itself over time through natural processes

III. Non-renewable energy resources.

- A. Non-renewable energy resources cannot be replenished naturally in our (or many) lifetimes
- B. Most of our energy comes from non-renewable energy sources
- C. The main sources of non-renewable energy sources are:
  - 1. Fossil fuels: coal, petroleum (crude oil), and natural gas
    - Called fossil fuels because they were formed over millions and millions of years ago
    - Heat from the Earth's core and pressure from rocks and soil on the fossils of dead plants and creatures created fossil fuels as we know and use them today
  - 2. Nuclear power: Uranium (specifically U-235) is mined and then it is used to produce energy for electricity

IV. Non-Renewable Energy Resources: Fossil Fuels

- A. Coal:
  - 1. Mined
  - 2. Used to generate electricity, make cement and steel, and heat buildings

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### Unit: Earth's Natural Resources

3. Used to produce about 21% of our total energy consumption

#### B. Petroleum (aka oil):

1. Pumped from the ground by a pumpjack or an oil rig
2. Used to make gasoline, diesel, jet fuel, kerosene, asphalt, and tar
3. Produces about 37% of our total energy consumption → we are very dependent upon petroleum

#### C. Natural Gas:

1. Drilled from the ground and then travels through thousands of miles of pipelines
2. Heats our homes, cook food, and fuel our cars
3. About 25% of our energy resources are from natural gas

### V. Non-Renewable Energy Resource: Nuclear Power

#### Uranium:

1. Radioactive metal found in rocks around the world
2. Mined from the earth and taken to nuclear power plants where nuclear fission occurs
3. Nuclear fission is when atoms are split apart to form smaller atoms → releases energy → produces electricity
4. Nuclear power plants generate about one-fifth of our total energy

### VI. Renewable Resources

A. Renewable resources are able to replenish themselves naturally.

#### B. Main sources of renewable resources:

1. Solar energy
2. Wind energy
3. Hydro power energy
4. Biomass energy
5. Geothermal energy

### VII. Renewable Resources

#### A. Solar Energy:

1. The sun's solar radiation that hits Earth → the sun's rays are converted into energy for heat and electricity through PV devices (solar panels) or solar thermal power plants.
2. Solar energy can be used to heat buildings, water, or converted to electricity

3. The amount of sunlight that shines on Earth for one hour could meet the energy needs for Earth for an entire year!

B. Wind Energy:

1. Wind turbines use blades to capture the winds' kinetic energy
2. Energy is then used to compose electricity

C. Hydropower Energy:

1. Produces the most energy out of the renewable energy sources
2. Energy is created through moving water
  - The amount of energy is determined by the water source's fall or flow
3. Hydropower is one of the oldest sources of energy
  - First hydropower used to make electricity was in 1880 at the Wolverine Chair Factory in Grand Rapids, Michigan.

VIII. Renewable Resources

A. Biomass:

1. Organic material from plants and organisms
2. Contains stored energy from the sun
3. When we burn biomass, we release that energy

B. Geothermal Energy:

1. Heat from within the Earth
2. Deep wells are used to pump underground heated water to Earth's surface
3. This energy is recovered as steam or hot water and it is used to heat buildings or generate electricity

IX. US's Energy Consumption in 2011

A. Used a total of 97.5 quadrillion Btu

1. Btu is the measurement for energy, it stands for British Thermal Unit
2. A quadrillion is one with fifteen zeros behind it

B. Most of our energy was from petroleum (or oil) at 37%.

C. Renewable energy only accounted for 8% of the US's total energy consumption

- Biomass was the leading resource at 53%.

X. What's the big deal? Who cares?

A. Investing in renewable energy resources will:

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1. Help to keep our air clean
2. Have the potential to reduce the production of carbon dioxide -- a leading contributor to global climate change
3. Help to create jobs for American workers
4. Reduce our dependence on imported oil, which could help to establish the United States as a world leader and exporter of renewable power technologies.