

## Non-renewable Energy

### General Terms:

1. \_\_\_\_\_ - an energy source with a finite supply. Once they are used up, they cannot be replenished on a human time-scale.

Two primary categories of non-renewables:

- a. \_\_\_\_\_
  - b. \_\_\_\_\_
2. Video Recap – Fossil Fuels
    - a. \_\_\_\_\_ - decomposition without oxygen
    - b. \_\_\_\_\_ - liquid fossil fuel
    - c. \_\_\_\_\_ - accumulation of partially decayed vegetation or organic matter subjected to heat and pressure
    - d. \_\_\_\_\_ - is a chemical compound composed of one carbon atom and four hydrogen atoms
    - e. \_\_\_\_\_ - limited resource in nature
  3. Fossil Fuels
    - a. \_\_\_\_\_ - extracted hydrocarbons in liquid form
    - b. \_\_\_\_\_ - 70 to 80 % methane (CH<sub>4</sub>); gaseous hydrocarbons
    - c. \_\_\_\_\_ - a solid mixture of large molecules with a H/C ratio of about 1
  4. \_\_\_\_\_ - is an intergovernmental organization of 13 petroleum-exporting nations.
  5. Hydraulic fracturing(fracking) -
  6. Natural gas mixture –
    - a. \_\_\_\_\_
    - b. \_\_\_\_\_
    - c. \_\_\_\_\_
    - d. \_\_\_\_\_

Top Producers:

7. LPG/LNG-

8. Types of coal:
  - a. \_\_\_\_\_ - a brownish-black coal of low quality with high moisture content
  - b. \_\_\_\_\_ - black lignite, is dull black and generally contains 20 to 30 percent moisture
  - c. \_\_\_\_\_ - most common coal is dense and black
  - d. \_\_\_\_\_ - hard, black lustrous coal, often referred to as hard coal/highest percentage of fixed carbon

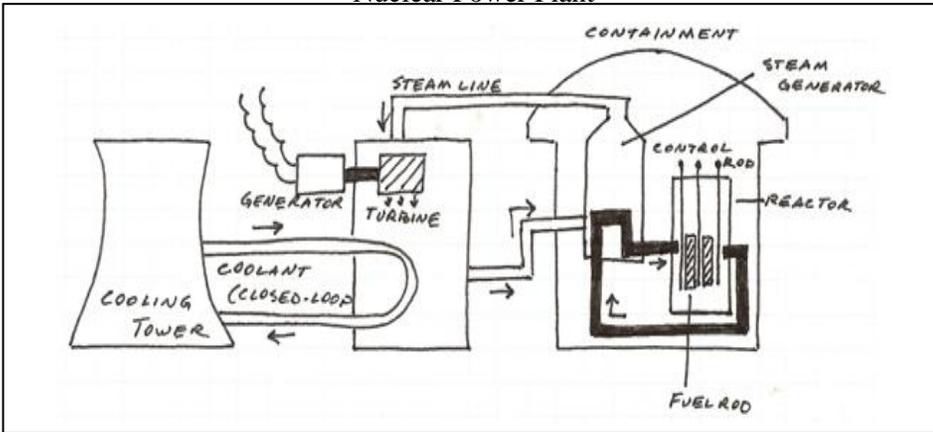
Top Coal Reserves:

9. \_\_\_\_\_ - used to retrieve shallow coal deposits
  - a. \_\_\_\_\_ - overburden is removed in strips
  - b. \_\_\_\_\_ - mountain tops are completely removed.
10. \_\_\_\_\_ - removal of deep coal deposits
  - a. Room-and-pillar
  - b. Long-wall
11. \_\_\_\_\_ - creates an electrical field to create a charge on particles which are then attracted by collection plates
12. \_\_\_\_\_ - mixture of limestone and water is sprayed over the flue gas and this mixture reacts with SO<sub>2</sub>
13. \_\_\_\_\_ - neutrons split the nuclei of atoms releasing energy and additional neutrons that split more atoms
14. Half-life -
15. Case 1: Three-Mile Island -
16. Case 2: Chernobyl -
17. Case 3: Fukushima -

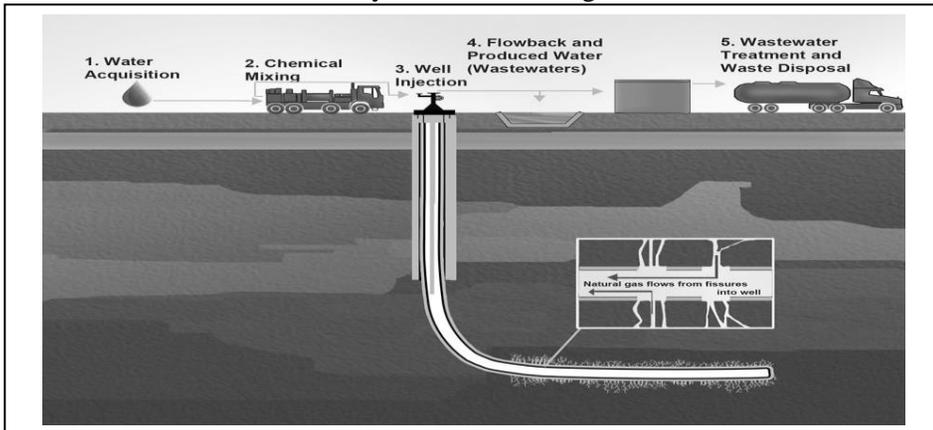


Types of Non-renewable Energy		
Type	Advantages	Disadvantages
<b>Oil</b>		
<b>Natural Gas</b>		
<b>Coal</b>		
<b>Nuclear</b>		

Nuclear Power Plant



Hydraulic Fracturing



1. Which of the following is not a nonrenewable energy source?
2. Which of the following statements regarding petroleum is correct?
3. Nuclear power plants produce electricity using energy from the radioactive decay of
4. Currently, most high-level nuclear waste from nuclear reactors in the United States is
5. A radioactive isotope has a half-life of 40 years and a radioactivity level of 4 curies. How many years will it take for the radioactivity level to become 0.25 curies?
6. Which of the following energy sources is responsible for the largest fraction of electricity generation in the United States?

**Math for Non-renewable Energy:**

One pound (lb) of bituminous coal contains 12,000 BTUs of energy. A BTU is a British Thermal Unit, or the amount of heat required to raise the temperature of one pound of water (one pint) by one degree Fahrenheit. Suppose a coal-fired power plant needs 3,400 BTUs of heat to produce one kilowatt hour of electricity. This plant has a 1 Megawatt output. Showing all steps, calculate the following:

- A. How much coal is required to produce one kilowatt hour of electricity?
- B. How much coal must be burned to keep the plant at full output for 24 hours?
- C. Assuming the coal is 2% sulfur by mass, how many pounds of sulfur would be released in a 24 hour period?