Energy Resources & Consumption
AP Environmental Science
Chapter 12 Study Guide

AP Outline as it relates to this chapter:

Energy Resources and Consumption (10–15% of AP Test)

A. Energy Concepts
(Energy forms; power; units; conversions; Laws of Thermodynamics)

B. Energy Consumption
1. History (Industrial Revolution; exponential growth; energy crisis)
2. Present global energy use
3. Future energy needs

C. Fossil Fuel Resources and Use
(Formation of coal, oil, and natural gas; extraction/purification methods; world reserves and global demand; synfuels; environmental advantages/disadvantages of sources)

D. Nuclear Energy
(Nuclear fission process; nuclear fuel; electricity production; nuclear reactor types; environmental advantages/disadvantages; safety issues; radiation and human health; radioactive wastes; nuclear fusion)

E. Hydroelectric Power
(Dams; flood control; salmon; silting; other impacts)

F. Energy Conservation
(Energy efficiency; CAFE standards; hybrid electric vehicles; mass transit)

G. Renewable Energy
(Solar energy; solar electricity; hydrogen fuel cells; biomass; wind energy; small-scale hydroelectric; ocean waves and tidal energy; geothermal; environmental advantages/disadvantages)

Vocabulary –

- Nonrenewable
- Capacity
- Energy intensity
- Fossil fuels
- Capacity factor
- Hubbert curve
- Nuclear fuels
- Cogeneration
- Peak oil
- Commercial energy sources
- Coal
- Fission
- Subsistence energy sources
- Petroleum
- Fuel rods
- Energy carrier
- Crude oil
- Control rods
- Turbine
- Oil sands
- Becquerel (Bq)
- Electrical grid
- Bitumen
- Curie
- Combined cycle
- CTL (coal-to-liquid)
- Nuclear fusion

Also know these Energy Terms:

Calorie
Watt
Kilo
Mega
BTU

Key Ideas:

- Describe how energy use and energy resources have varied over time, both in the U.S. and worldwide
- Compare the energy efficiencies of the extraction and conversion of different fuels
- Explain the various means of generating electricity
- Discuss the uses and consequences of using coal, oil natural gas, and nuclear fuels
- Describe projections of future supplies of our conventional energy sources

Chapter 12 Checkpoints:

12.1 – pages 315-322
1. What are three examples of energy sources used by humans?
2. Describe the difference between energy efficiency and energy quality.
3. How do we determine the overall efficiency of energy use in a system?

12.2 – pages 322-325
1. What is the basic process by which the energy in a fuel is converted into electricity?
2. What are the major fuels that are used to generate electricity in the U.S.?
3. What is a combined cycle plant?
4. What is cogeneration?

12.3 – pages 325-330
1. How are the different types of coal formed?
2. How is oil formed, and why does it need to be refined?
3. What are the major advantages and disadvantages of using coal, oil, and natural gas?

12.4 pages 330-332
1. Explain the relationship between energy intensity and energy use per capita?
2. Describe the Hubbert curve and its significance.
3. What are the major considerations involved in the future of fossil fuels?

12.5 pages 332-336
1. How does a nuclear reactor work, and what makes it a desirable energy option?
2. What are the two major concerns about nuclear energy?
3. What are the promising aspects of and problems with nuclear fusion?

Solve the following Questions:

1. Many college students have a mini fridge in their dorm room. A standard mini fridge costs roughly $100, uses about 100 watts of electricity, and can be expected to last for 5 years. The refrigerator is plugged into an electrical socket 24 hours a day, but is usually running only about 12 hours a day. Assume that electricity costs $0.10/kWh.

(a) Calculate the lifetime monetary cost of owning and operating the refrigerator.

(b) Assume that the electricity used to power the refrigerator comes from a coal-burning power plant. One metric ton of coal contains 29.3 GJ (8,140 kWh) of energy. Because of the inefficiency of electricity generation and transmission, only one-third of the energy in coal reaches the refrigerator. How many tons of coal are used to power the refrigerator during its lifetime?

(c) Assume that 15 percent of the mass of the coal burned in the power plant ends up as coal ash, a potentially toxic mixture that contains mercury and arsenic. How many tons of coal ash are produced as a result of the refrigerator's electricity use over its lifetime?

Do the "Do the Math" on page 336