**Chapter 12: Nonrenewable Energy Sources**

**pp. 315-324, 325-332, 332-338**

1. What types of energy resources provide most of the world’s power? Why do you think this is?
2. How does energy use vary across the world?
3. Which factors contribute to increasing the amount of energy used by a country’s population?
4. How has the mixture of energy sources the US depends on changed over time?
5. What is meant by energy quality, and why is it important when examining energy resources?
6. What does the EROEI of an energy source tell us? Why is it important?
7. Why is energy use generally a very inefficient process under current world practices?
8. Electricity can be generated from many different sources. Explain how an electricity generator works to convert energy from source in to electricity.
9. What does a power plant’s capacity measure?

**Fossil Fuels**

1. Complete the following chart with information regarding fossil fuels:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **How is it formed? Which countries produce the most?** | **Advantages/Uses** | **Disadvantages/Environmental Impacts** |
| **Coal:** |  |  |  |
| **Oil:** |  |  |  |
| **Gas:** |  |  |  |

1. For each of the following fossil fuels, describe what they are and the costs and benefits associated with their use:
	1. Oil sands
	2. Oil shale
	3. CTL
2. Describe the trend in energy intensity over time and explain why this trend exists.
3. Discuss what the future of fossil fuel use looks like.
4. Explain the purpose of the Hubbert Curve.

**Nuclear Energy**

1. What is the source of heat that generates steam in a nuclear power plant?
2. Explain how fission occurs in a self-sustaining chain reaction.
3. What is the difference between fuel rods and control rods in a nuclear reactor?
4. What happens during a meltdown in a nuclear reactor?
5. Why is so much mining required to produce even small amounts of usable 235U fuel?
6. What factors led to a slowdown in the construction of new nuclear plants in the US?
7. How does the amount of CO2 released during the mining of Uranium and generation of electricity in a nuclear plant compared with the mining & use of coal in a power plant?
8. Describe what led to each of the two major accidents at nuclear plants, Three Mile Island and Chernobyl.
9. What have been the primary health impacts of the meltdowns at Three Mile Island and Chernobyl?
10. What are the 3 main types of radioactive waste, where do they each come from, and which one is most likely to cause negative environmental impacts?
11. Under current regulations, how are spent nuclear fuel rods disposed of?
12. What are the major precautions that must be undertaken in order to safely store radioactive waste?
13. In comparing the advantages and disadvantages of nuclear energy with fossil-fuel-based electricity generation plants, do you think nuclear energy represents a preferable option? Explain why or why not.
14. Explain how fusion power works:

**Chapter 12 Vocabulary List**

|  |  |  |  |
| --- | --- | --- | --- |
| **Term** | **Explanation** | **Example** | **Illustration** |
| Nonrenewable fuels |  |  |  |
| Fossil fuels |  |  |  |
| Commercial energy sources |  |  |  |
| Subsistence energy sources |  |  |  |
| Energy efficiency |  |  |  |
| Electricity |  |  |  |
| Turbine |  |  |  |
| Electrical grid |  |  |  |
| Combined cycle gas plant |  |  |  |
| Power plant capacity |  |  |  |
| Cogeneration |  |  |  |
| Coal |  |  |  |
| Peat |  |  |  |
| Lignite |  |  |  |
| Anthracite |  |  |  |
| Petroleum |  |  |  |
| Crude oil |  |  |  |
| **Term** | **Explanation** | **Example** | **Illustration** |
| Exxon Valdez |  |  |  |
| Alaska National Wildlife Refuge |  |  |  |
| Natural gas |  |  |  |
| Liquefied petroleum gas |  |  |  |
| Oil sands |  |  |  |
| Bitumen |  |  |  |
| Coal-Liquified-Fuel |  |  |  |
| Energy intensity |  |  |  |
| Hubbert curve |  |  |  |
| Peak oil |  |  |  |
| Nuclear fission |  |  |  |
| Fuel rods |  |  |  |
| Control rods |  |  |  |
| Uranium enrichment |  |  |  |
| Reactor meltdown |  |  |  |
| Radioactive waste |  |  |  |
| Nuclear fusion |  |  |  |