

Chapter 13: Achieving Energy Sustainability

Key Ideas – After reading through the chapter you should be able to:

1. Define renewable energy sources.
2. Describe strategies to conserve energy and increase energy efficiency.
3. Compare and contrast the various forms of biomass energy.
4. Explain the advantages and disadvantages of hydroelectricity, solar energy, geothermal energy, wind energy, and hydrogen as energy resources.
5. Describe the environmental and economic options we must assess in planning our energy future.

Once you have read through the chapter and have a general understanding and familiarity with the material therein, please go back and answer the following questions.

1. Describe the difference between *nonrenewable* energy sources, *potentially renewable* energy sources and *nondepletable* energy sources. Give an example of each in your descriptions.
2. How does the use of energy sources, renewable and nonrenewable, compare between the United States and the rest of the world?
3. Why, even when utilizing renewable energy sources is it best to start the energy conversation and calculation with conservation? Explain.
4. What is a tiered rate system? Is this an equitable system of billing customers?
5. How might a variable rate system help reduce peak demand?
6. Describe what is meant by the term biofuel. How can burning a fuel be carbon neutral?
7. Explain the benefits of using ethanol as a liquid fuel source. What is the typical source for this ethanol? Where *could* it come from?
8. What are the drawbacks to ethanol as a liquid fuel source? Is it an efficient source?
9. Can we consider ethanol a sustainable and ethical source of renewable energy in light of its effect on food prices? Defend your answer and propose viable alternates if available.
10. Is biodiesel carbon neutral? What are the pros and cons of biodiesel as a liquid energy source when compared to ethanol?
11. List and describe the three types of hydroelectricity? How is flowing water turned into electricity?
12. While hydroelectricity can be considered renewable, it is not without its drawbacks. What are they?
13. Looking at active solar, how do PV and CST compare and contrast? Could PV be used on a large scale? Could CST be used as a residential application?
14. Compare and contrast geothermal with ground source heat pumps. Can either be used residentially? Commercially?
15. Is wind an efficient means of producing electricity? Why or why not? Describe the pros and cons of wind as a source of producing electricity?
16. Describe how a hydrogen fuel cell powered car is more efficient than a traditional internal combustion engine powered car.
17. How can TED (p338) and a smart grid be utilized in order to maximize conservation and efficiency? Explain fully, considering both the residential scale and industrial production scale.
18. Draw and label an energy efficient house which includes multiple features including passive solar, active solar, ground source heat, and at least six other measures of energy conservation that reduce the residents' need for electricity (and heat) supplied by nonrenewable sources.