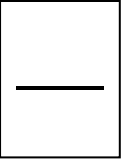


Ch. 16 Overview – Energy Efficiency & Renewable Energy

Core Case Study –



1. What is the Rocky Mountain Institute (RMI)?
2. How much energy is supplied by solar energy :
Hot water – _____ Daytime lighting – _____ Household electricity – _____
3. How much is the building’s heating bill every year? _____
4. How long did it take for the purchase of energy efficient appliances (such as lights, refrigerators, computers, and other electrical devices and solar cells) to repay their initial costs _____

Section 16.1 – Why is Energy Efficiency and Important Energy Resource?

5. What is energy efficiency?
6. _____% of all commercial energy used in the United States is wasted
How is the other 43% of that wasted unnecessarily?
7. According to Levine, unnecessary energy waste costs the United States an average of about _____ per minute
8. How much does this cost the United States in a year? _____
Show work:
9. What % of Americans commute to work every day in cars? _____
How many use mass transit? _____
10. List the 7 things reducing energy waste will cause:

11. We waste large amounts of energy and money by relying heavily on four widely used devices:

- a. The incandescent lightbulb uses only _____ of the electricity it draws to produce light, while the other _____ is wasted as _____.
- b. The internal combustion engine which propels most motor vehicles and wastes about _____ of the energy in its fuel.
- c. A nuclear power plant produces electricity for space heating or water heating. It wastes about _____ of the energy in its nuclear fuel
- d. A coal-fired power plant which wastes about _____ of the energy that is released by burning coal to produce electricity.

Section 16-2 How Can We Cut Energy Waste?

12. Industry accounts for about _____ of U.S. energy consumption, mostly for production of metals, chemicals, petrochemicals, cement, and paper.

13. **Cogeneration**, which involves using a **combined heat and power (CHP)** system.

In such a system, two useful forms of energy (such as _____ and _____) are produced from the same fuel source

- a. The energy efficiency of these systems is _____
- b. The United States gets only _____ of its electricity from CHP.

14. How are energy-wasting electric motors inefficient?

15. What should they be replaced with and why?

16. What is the 3rd way for industry to save energy and money? Give the example of steel.

17. Compared to an incandescent bulb, fluorescent bulbs

uses _____

lasts _____

saves _____

18. How much less energy are LEDs and how long can they last compared to incandescent bulbs?

uses _____

lasts _____

How long can LED lights last? (figure 6) _____

19. According to Amory Lovins, the best way to improve energy efficiency in utilities would be for :

■ **Case Study: Saving Energy and Money with a Smarter Electrical Grid**

20. What are grid systems?

21. What is the smart grid?

22. What could Smart Meters show consumers?

23. What could Smart appliances, like washers and dryers do?

24. With a smart grid, what could people who generate their own electricity using solar, wind or other devices do?

25. According to the U.S. Department of Energy (DOE), building such a smart grid would cost the United States _____

But eventually save the US economy _____

26. Transportation accounts for _____% the energy consumption and _____ of the oil consumption in the United States.

27. What is the hidden cost of gasoline for US customers? What do these hidden costs include?

The Real Cost of Gasoline

28. Do you think that the estimated hidden costs of gasoline should be included in its price at the pump? Your opinion - Explain.

29. Would you favor much higher gasoline taxes if payroll taxes were eliminated or sharply reduced? Your opinion - Explain.

30. Read about the fee-bate program on page 403. Do you agree or disagree with the program? Explain why.

31. List 5 other ways to save energy in transportation:

32. Currently most efficient hybrid cars (Like the Prius) can get _____mpg and emit _____less CO₂

33. A plug-in hybrid electric vehicle could possibly get _____ mpg for ordinary driving and _____ mpg for trips less than 40 miles

34. Why are fuel cells the next best thing?

35. What is green architecture?

36. List 7 ways a house or building can improve energy efficiency and save money.

37. Why is there so little emphasis on improving energy efficiency? List 3

38. One of nature's three principles of sustainability is to rely mostly on _____

39. Who is becoming the World's leader in renewable energy? _____

Section 16-3 What Are the Advantages and Disadvantages of Using Solar Energy?

40. What is passive solar heating?

41. What is active solar heating?

42. What are 4 disadvantages to passive or active solar heating?

43. What are solar thermal systems? Where are these normally used and why?

44. What are 3 advantages of Solar Energy for High-Temperature Heat and Electricity?

45. What are 3 disadvantages of Solar Energy for High-Temperature Heat and Electricity?

46. What are photovoltaic(PV) cells/solar cells and how do they work?

47. What are 4 advantages of Solar Cells?

48. What are 4 disadvantages of Solar Cells?

Section 16-4 What Are the Advantages and Disadvantages of Using Hydropower?

49. What is *Hydropower*?

50. What is the most common approach to harnessing hydropower?

51. What are microhydropower generators and how do they work?

52. What are 4 advantages of Large-Scale Hydropower?

53. What are 3 disadvantages of Large-Scale Hydropower?

Section 16-5 What Are the Advantages and Disadvantages of Using Wind Power?

54. How is wind produced?

55. What are 2 advantages of building wind farms offshore?

56. What are 5 advantages of Wind Power?

57. What are 4 disadvantages of Wind Power?

Section 16-6 What Are the Advantages and Disadvantages of Using Biomass as an Energy Resource?

58. What is Biomass?

59. What % of poorer, less-developed countries rely on biomass as fuel? _____

60. What is a fuelwood crisis?

61. What are 4 advantages of Burning Solid Biomass?

62. What are 4 disadvantages of Burning Solid Biomass?

63. What is biodiesel? _____

64. What are 4 advantages of Biodiesel?

65. What are 4 disadvantages of Biodiesel?

66. What is ethanol made from?

67. What are 3 advantages of using Ethanol Fuel?

68. What are 3 disadvantages of using Ethanol Fuel?

Section 16-7 What Are the Advantages and Disadvantages of Using Geothermal Energy?

69. What is geothermal energy?

70. Basically how does a geothermal heat pump work?

71. What are 3 advantages of using Geothermal Energy?

72. What are 3 disadvantages of using Geothermal Energy?

Section 16-8 What Are the Advantages and Disadvantages of Using Hydrogen as an Energy Resource?

73. What is the basic formula for hydrogen fuel cells?

74. What are 4 advantages of using Hydrogen?

75. What are 4 disadvantages of using Hydrogen?

Section 16-9 How Can We Make the Transition to a More Sustainable Energy Future?

76. In considering possible energy futures, scientists and energy experts who have evaluated energy alternatives have come to three general conclusions. List the 3 general conclusions:

77. Governments can use three strategies to help stimulate or reduce the short-term and long-term use of a particular energy resource. List the 3 strategies:

78. Write down the chapter's 3 big ideas: