

Name _____ Date _____ Period _____

Personal Energy Audit

Background

Electrical consumption has gone up in the United States over the past 50 years for a number of reasons. While the number of Americans grew by 87% from 1950-2000 their energy consumption expanded by a much greater 194 percent. We also know that Americans use about 1/4th of all of the world's oil, while producing only 8% of the world's total oil allotment.

Our personal use electricity is very small when compared to the total used by the United States, and personal consumption of fuels is equally small, however we have seen that when the small amount of individuals are added up they become very significant in a large (and growing) population.

Procedure

1. In the Chart below, indicate how many hours per day you (or your family) run each appliance on a typical day. If you don't use the appliance every day, adjust the usage so it fits for 1 day (ex: 1 hr/week = 1/7th hour per day).
2. If you use any appliance that is not listed in the table, use the blank spaces at the bottom of the chart to fill in their usage. You can figure out the power used by these devices by multiplying their volts (120 V from the wall) by the amps on their label, or by searching online.
3. Convert the Wattage to kilowatts (1 kW = 1000 W) and multiply the hours used by the kilowatts to determine the energy used per day by the appliance

Table 1: Personal Energy Usage

Appliance	Usage (Hr/day)	Power (W)	Power (kW)	Energy/day (kWh/day)
Room AC		1360		
Central Air Unit		2000		
Clothes Washer		512		
Clothes Dryer		5000		
Dishwasher		1200		
Refrigerator		795		
Blender		300		
Coffeemaker		850		
Food Processor		370		
Hot Plate		1200		
Microwave		750		
Mixer		150		
Toaster		1100		

Appliance	Usage (Hr/day)	Power (W)	Power (kW)	Energy/day (kWh/day)
Computer		60		
Radio/stereo		125		
TV		90		
DVD Player		50		
Cable Box		50		
Hair Dryer		1200		
Iron		1100		
Window Fan		200		
Sewing Machine		75		
Video Game System		75		
Vacuum		650		
Light Bulb		75 (each)		
Total Energy Usage				

Calculations and Questions (show all work)

Conversion Factors

$$1 \text{ kWh} = 3410 \text{ BTU}$$

$$1 \text{ BTU} = 2.93 \times 10^{-4} \text{ kWh}$$

$$1 \text{ BTU} = 1,055 \text{ J}$$

$$12,000 \text{ BTU} = 3.52 \text{ kWh} = 1.27 \times 10^7 \text{ J}$$

$$1 \text{ lb coal} = 12,000 \text{ BTU}$$

$$1 \text{ barrel oil} = 5.6 \times 10^6 \text{ BTU} = 5.91 \times 10^9 \text{ J}$$

$$1 \text{ ft}^3 \text{ nat gas} = 1,030 \text{ BTU} = 1.09 \times 10^6 \text{ J}$$

$$1 \text{ g Uranium} = 4.0 \times 10^7 \text{ BTU} = 4.22 \times 10^{10} \text{ J}$$

- How much electrical energy do you consume each day, on average? How much would that be for a year (365 days)?

2. Suppose the electricity in your region was supplied by the burning of natural gas.
 - a. How many cubic feet of natural gas is need to support your energy lifestyle yearly?

 - b. Natural gas costs about \$4.67 per 1000 cubic feet. Calculate the cost of natural gas to produce your yearly electricity.

 - c. If 1000 ft³ of natural gas produces 122 lb of CO₂ when burned, how many pounds of carbon dioxide would you produce?

3. Suppose coal were used in generators instead of natural gas.
 - a. How much coal would be burned to provide your energy for one year?

 - b. Coal costs about \$24.38 per ton. Calculate the cost of coal to produce your yearly electricity.

 - c. When coal is burned about 2.3 lb of CO₂ is produced for every kilowatt of electrical energy consumed. How much carbon dioxide would be produced by your yearly electrical use?

4. Suppose the electrical power was produced by nuclear power.
 - a. How much Uranium would be needed for your yearly consumption?

 - b. The cost for U_3O_8 , the primary nuclear reactor fuel, is \$10.15 per pound, or about \$0.022 per gram. What would be the cost of the Uranium to generate your electricity?

5. If you assume that the power company currently charges \$0.18 per kilowatt hour. What would your average monthly electrical bill be?

6. What months would you assume the bill would be the highest? The lowest? Why?

7. What are 5 ways in which you could reduce your everyday electrical use?