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Personal Energy Audit, page 1

An energy audit can help us determine how we use energy and how much energy we consume. With this assignment you will survey all the appliances found in your home that require electricity and take a look at your monthly electric bill. In class, you will use this data to calculate your personal energy use and consider how you may be able to conserve energy or use energy more efficiently.

Part I. Collecting Data (At Home)

Directions: Identify the different appliances that use electricity in your home. Estimate how many hours each appliance is in use during a 24-hour period. Use this information to complete the 2nd and 3rd column of the chart below.

- If there is an electrical appliance in your home that does not appear on this list, record this item under "Other" at the bottom of the chart and try to determine its wattage using the appliance's labels and manual.
- Be safe. Have an adult help you if you need to handle an appliance in order to determine its wattage.
- Some appliances may only be used for minutes at a time. Be sure to convert this time into units of an hour (for example, 15 minutes = 0.25 hours).

Appliance	Number	Hours In Use Each Day	Average Power Used (watts)[5]	Divide by 1000 to Convert Watts to Kilowatts	Total Energy Used (E = Power x time)
Air Conditioning					
Central A/C			5,000 watts	÷ 1000	
Window A/C			1,000 watts	÷ 1000	
Cell Phone Charger			5 watts[6]	÷ 1000	
Clock Radio			10 watts	÷ 1000	
Clothes Dryer			3,400 watts	÷ 1000	
Clothes Iron			1,400 watts	÷ 1000	
Clothes Washer			425 watts	÷ 1000	
Coffee Maker			1,050 watts	÷ 1000	
Computer					
Desktop			250 watts	÷ 1000	
Laptop			25 watts	÷ 1000	
Dishwasher			1,800 watts	÷ 1000	

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Appliance	Number	Hours In Use Each Day	Average Power Used (watts)[5]	Divide by 1000 to Convert Watts to Kilowatts	Total Energy Used (E = Power x time)
Fan					
Ceiling			120 watts	÷ 1000	
Window			150 watts	÷ 1000	
Furnace			750 watts	÷ 1000	
Whole House			500 watts	÷ 1000	
Game Console[7]					
Nintendo Wii			18 watts	÷ 1000	
PS2			30 watts	÷ 1000	
PS3			194 watts	÷ 1000	
Xbox			70 watts	÷ 1000	
Xbox 360			185 watts	÷ 1000	
Hair Dryer			1,600 watts	÷ 1000	
Light Bulb					
 Incandescent			60 watts	÷ 1000	
 Fluorescent			32 watts	÷ 1000	
 Compact Fluorescent (CFL)			14 watts	÷ 1000	
 LED			7 watts	÷ 1000	
 Halogen			60 watts	÷ 1000	

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Appliance	Number	Hours In Use Each Day	Average Power Used (watts)[5]	Divide by 1000 to Convert Watts to Kilowatts	Total Energy Used (E = Power x time)
Microwave			925 watts	÷ 1000	
Refrigerator			725 watts	÷ 1000	
Stereo			250 watts	÷ 1000	
Television 20-inch (LCD)			65 watts	÷ 1000	
26-inch (LCD)			110 watts	÷ 1000	
36-inch (Plasma)			250 watts	÷ 1000	
50-inch (Plasma)			350 watts	÷ 1000	
Toaster			1,100 watts	÷ 1000	
Vacuum			2,225 watts	÷ 1000	
Other				÷ 1000	

Part II. Reading Your Electric Bill (At Home)

Directions: Locate a copy of your monthly electric bill. Ask your parent/guardian for help if you do not know where to find the bill or are having trouble answering the following questions based on the bill's information.

1. How much do you pay for electricity for 1 month? *(This may be listed as "Amount Due," but check to see if your bill includes other utilities, such as gas, or if your bill covers more than 1 month.)*

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2. How many kilowatt hours of electricity did your household use in 1 month? *(This may be listed as "meter usage," "recorded demand," "kWh usage," or "electricity usage.")*

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3. What is the cost you pay per kilowatt hour? *(This may be listed along with the amount of kilowatt hours consumed. For example, "4,086 kWh @ $0.10.")* If you have trouble determining the cost you pay per kilowatt hour, you may use the national average: $0.1145.[8]

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4. Can you tell from the bill if any or all of your electricity comes from renewable energy sources? *(You may pay extra to ensure a portion of your electricity come from renewable resources.)*

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Bonus: You can get more insight into your long-term energy use patterns when you look at electric bills from multiple months. Determine an average for each of the above questions.

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Bonus: Locate and analyze your natural gas, propane, or heating oil bills. You can calculate CO_2 emissions from these bills, along with your electric bill, using one of the following websites:

- What's My Carbon Footprint?™
  www.whatsmycarbonfootprint.com
- National Geographic: The Great Energy Challenge; Personal Energy Meter
  http://environment.nationalgeographic.com/environment/energy/great-energy-challenge/global-personal-energy-meter/

Part III. Evaluating Your Energy Use (In Class)

Directions: Complete the chart from Part I by calculating the total energy used by each type of appliance using the following equation:

$$\text{Total Energy Used (in kilowatt hour)} = \frac{\text{\# of appliances} \times \text{hours used} \times \text{average wattage}}{1000}$$

Then use your findings to answer the questions below.

1. Evaluate the total amount of electricity used by different appliances. In your daily life, which type of activity seems to use the most energy? The least?

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2. Based on data from the chart, estimate how much electricity your home uses in one month.

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3. What information is not provided by your electric bill that your own calculations reveal?

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4. If you wanted to estimate how much money a certain appliance costs you, how would you do it?

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5. Energy efficiency refers to completing a task using less energy input than usual. For example, an LED light bulb produces the same amount of light as other bulbs, but with less energy. Looking at the chart from Part I, where do you see opportunities to become more energy efficient?

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6. Calculate the amount of energy you would use for lighting with and without LED light bulbs. What is the difference?

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7. Energy conservation refers to behaviors and actions that people can do to save or use less energy. For example, turning off the lights when you leave a room is an action you can take that reduces the amount of electricity you use. Can you think of actions you could take to reduce the amount of energy you use?

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8. Roberta is in the market for a new dishwasher! Her old dishwasher is leaking and she has been shopping around to find the best buy. One dishwasher she likes is energy efficient, but a bit more expensive. Using the idea of energy efficiency, what advice would you have for Roberta? Using the idea of energy conservation, can you suggest one behavior that Roberta could take to help her save electricity?

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Bonus: One kilowatt-hour (kWh) of electricity equals 3,412 British Thermal Units (Btu). However, a fossil fuel-fired power plant uses 7,000-11,500 Btu of energy to create 1 kWh of electricity.[9] On average, how energy efficient (in percent) are fossil fuel-fired power plants? The formula for calculating the energy efficiency of a machine is:

$$\text{efficiency (\%)} = \frac{\text{useful energy output}}{\text{energy input}} \times 100$$