

APPENDIX IV: How Much Carbon Dioxide Is Emitted from My Home?

First, let's assume that the electricity you use in your home is generated from a coal-burning power plant. (Over half of the electricity used in the U.S. is produced from fossil fuels.) Each electric appliance that you use will be responsible for emitting a certain amount of CO₂ depending on how long that appliance is in use for. You can calculate the number of kilowatt-hours (kWh) that an individual appliance uses, then work out how many pounds of CO₂ emission that corresponds to. Generally, about 1.5 lb CO₂ is emitted per kilowatt-hour (kWh) of electricity consumed. For example, if an appliance uses 3.5 kWh of electrical energy, this would produce an emission of:

$$(3.5 \text{ kWh}) \times (1.5 \text{ lb CO}_2 \text{ per kWh}) = 5.25 \text{ lb CO}_2$$

At room temperature and sea level, every pound of CO₂ occupies 8.75 cubic feet, which is about half the size of a household refrigerator. If you know how many pounds of CO₂ are emitted from the different items in your house, it is possible to estimate the corresponding volume of CO₂. This volume can be visualized in terms of how many refrigerators full of CO₂ that would be! Let's assume that on average, one household refrigerator has a volume of 17.5 cubic feet, which would be equivalent to the emission of 2 lb of CO₂. So, using the example above, 5.25 lb of CO₂ would occupy 45.9 cubic feet or around two-and-a-half refrigerators full of CO₂!

Let's put that in perspective. A 100 W light bulb that is on for 24 hours a day, say illuminating a sign in a shop window, would use 2.4 kWh of energy. (This comes from 100 W x 24 h/1000 = 2.4 kWh). That is an emission of 3.6 lb of CO₂ or 31.5 cubic feet, which is 1.8 or nearly two refrigerators of CO₂ each day! Just from one 100 W light bulb!

A household that uses an average of 1,145 kWh per month would be responsible for emitting 1,717.5 lb of CO₂ or 15,028 cubic feet or 859 refrigerators full of CO₂ each month!

Carbon dioxide is a greenhouse gas and, along with other greenhouse gases, has been implicated in bringing about global warming. By designing an energy conservation plan for your home, you will not only be saving money on the cost of electricity but also be helping the planet as well!

So just how much carbon dioxide is your household emitting? Work it out! Your home energy conservation plan will reduce it!

Home Energy Audit Rubric

<p>1) List of appliances (at least 15)</p> <p>2) Wattage and usage</p> <p>3) Conversion and price</p> <p>4) Thorough discussion of the most costly items</p> <p>5) Thorough discussion of ways to reduce your energy bill</p> <p><i>*Copy of recent FPL bill</i></p>	<p>_____ (5 points)</p> <p>_____ (5 points)</p> <p>_____ (5 points)</p> <p>_____ (5 points)</p> <p>_____ (5 points)</p> <p>_____ (+2 EC points)</p>
<p>Labwork grade</p>	<p>_____</p>
<p>TOTAL 25 points</p>	

APPENDIX II: Typical Student Worksheet

Name: _____

Type of Dwelling: (single-family home, apartment, condominium, etc.) _____

Number of Occupants: _____

Procedure for Monitoring Electric Appliances

1. Carefully unplug the appliance.
2. Locate the information tag.
3. Record the watt rating of the appliance. You may have to calculate this from the voltage and amp ratings.
4. After you have ascertained and recorded the wattage of each electric item or appliance that you use in the home, you are ready to monitor the amount of use of each. You will need the cooperation of all people in the household in conducting this step!
5. Over a certain time period, say 24 hours keep a log of all the electric appliances that were used in the house and the amount of time that each one was used for. You may wish to do this for a typical weekday and a typical weekend day. That way you can work out your energy use as a weekly or monthly average.
6. For each appliance, convert the data into the number of kilowatt-hours of energy that each one uses. This can be done using the following formula:

$$\text{kWh} = \frac{(\text{watt rating}) \times (\text{total minutes used})}{60 \times 1000}$$
7. From your utility company, or from your electric bill, find out the cost of electricity per kWh for your area. Using the calculated kWh for each appliance as determined in step 6, work out the cost of using that electric item over the given time period.
8. The above data can be referred to in designing a home electric conservation plan and also in determining the carbon dioxide that would be emitted if the electricity were produced by a coal-burning power plant.

Choose at least 15 appliances!

A typical results table is shown below.

Electric Appliance or Device	Watt Rating (W)	Time Used (minutes/day)	kWh Used per Day	Cost of Use* (dollars/day)
Microwave	1,450	20	0.48	0.048
35" Color Television	135	240	0.54	0.054
Others.....				

* Based on a cost of 10 cents per kWh

The table can be modified to represent weekly or monthly use. When setting up your table of results, it may be useful to organize it into different categories of appliances.

For example..

- Major Appliances (clothes dryer, dishwasher, freezer, microwave, etc.)
- Small Kitchen Appliances (coffee maker, food processor, toaster, etc.)
- General Household Items (computer, printer, fax, vacuum, etc.)
- Home Entertainment (DVD player, VCR, television, stereo, radio, etc.)
- Lighting (light bulbs, halogen lamps, fluorescent tubes, etc.)
- Motors (water pump, furnace garage door opener, etc.)
- Workshop Items (drills, sander, etc.)
- Personal Care Items (hair dryer, shaver, sun lamp, etc.)
- Heating and Cooling Appliances (air conditioners, fans, heaters for water bed/aquarium, hot water heater, etc.)

Another column can be included in the table to show the amount of carbon dioxide emitted by each appliance, or you could produce a separate chart for this data. These are your results, so be creative in how you wish to communicate them to others!

SEE BACK!