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School Carbon Footprint Calculator

On this and the following pages, you will calculate your school's carbon footprint. For each of the four parts of your school footprint - Energy, Transportation, Food, and Recycling & Trees - you will have to collect some information. You should talk to your teacher and school principal about how to best find this information. If it is not available, you may need some time to collect and record the numbers. Since this may be difficult, it is a good idea to work in groups and share the work amongst you all. *Suggestions for how to find information are given under each heading.*

Energy

Your school probably uses electricity and one other type of fuel. You will need to find the types and amounts of each kind of energy used by your school. These numbers might appear on the school's energy bills. (Ask your teacher or principal where you can see these records.) They might also be found in the school's annual budget. The numbers you are looking for are kilowatt-hours (kWh) of electricity, **therms**, or 100 cubic feet (100 ft³) of gas, gallons of oil, and tons of coal. Multiplying each of these times the numbers in the equation will change energy units/yr. to lbs. of CO₂ /yr. If all you can find are monthly bills, you will have to multiply the amount for an average month by the number of months in the school year.

Electricity: (___ kWh/yr.) x (1.75) = ___ lbs. CO₂ /yr.

Natural Gas: (___ therms, gal. or 100 ft³ /yr.) x (11) = ___ lbs. CO₂ /yr.

Oil: (___ gal. /yr.) x (24) = ___ lbs. CO₂ /yr.

Coal: (___ tons/yr.) x (5,000) = ___ lbs. CO₂ /yr.

Total emission due to schools energy use: (___ lbs./yr.) ÷ 2000 = ___ **tons/yr.**

Please note: The calculations in this document will be done in pounds per year (lbs./yr.) of CO₂ and then converted to tons/yr. One ton = 2000 lbs.

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Transportation

First find the number of days in the school year and the average daily attendance (how many students actually attend school, not how many are supposed to attend). Next do a survey ~50 students chosen randomly, so they are scattered evenly throughout the school. For example, you could leave a survey form at every tenth locker, but don't choose the first 50 students getting off buses. The questions will be: How do you get to school? How many total miles do you travel each day on your way to and from school? If you carpool, how many students are in your carpool?

Record your results in a table with these headings:

1. Student Survey #	2. Miles Travelled by Bus	3. Miles traveled by car	4. Numbers of students in car (carpooling)	5. Column 3 Divided by Column 4
<i>For Example: #1</i>		30	2	15
#2	40	0	0	0

*Write zeroes in columns 2 through 5 for students who walk or bike to school. If you set this up as an excel file, you will save time.

To calculate your school's travel footprint:

1. Find the totals of columns 2 and 5.
2. Multiply the total of column 2 by 0.24 and the total of column 5 by 1.0.
3. Add the results in step 2 and divide the sum by the number of students surveyed. This is the average travel footprint in lbs. of CO₂ /day.
4. Multiply the result of step 3 by average attendance, then by the number of school days in a school year.
5. Divide the result of step 4 by 2000 and write the answer here: _____ **tons CO₂ /yr.** This is your school's travel footprint!

Food

Only do this calculation if your school has a cafeteria. Ask the cafeteria staff how many students eat there on an average day, if their food is organic, and if it is grown locally.

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To calculate your school's food footprint:

1. Begin with the number 8.22 lbs./student/day.
2. Subtract 0.55 if the food is organic and 0.37 if it is grown locally.
3. Multiply the result by the number of students eating there per day.
4. Multiply this by the number of days in the school year.
5. Divide the result of step 3 by 2000 and write the answer here: _____ **tons CO₂** /yr. This is your school's food footprint!

Recycling and Trees

For this calculation, you will need to find out how many tons of waste material your school sends to a landfill. You will also need to count the number of trees on the school's property.

To calculate your school's recycling footprint:

1. Begin with the number 2.18 tons of CO₂/ton of waste.
 - Subtract 0.42 if food waste is composted
 - Subtract 0.43 if paper is recycled
 - Subtract 0.25 if cans are recycled
 - Subtract 0.07 each if glass or plastic are recycled
2. Multiply the result by the number of tons of waste your school sends to a landfill each year.
3. Write the answer here: _____ **tons CO₂** /yr. This is your school's waste footprint!

Add the result above to the results for energy, transportation, and food, write the answer here: _____ tons CO₂ /yr.

Multiply the number of trees on school property by 0.020 and write the answer here: minus _____ tons CO₂ /yr.

Subtract this amount from the amount above and write the answer here: _____ tons CO₂ /yr.

This is your total school carbon footprint!

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Improving Your Schools Carbon Footprint

Look at each of these possibilities for reducing your school's carbon footprint. Some require money, personal inconvenience, or change of lifestyle. In each case, think about how students, teachers, and parents would accept the changes. Under each heading, changes are arranged roughly in order of expense and difficulty.

Energy Reduction

Replace tungsten bulbs with compact fluorescents for a reduction of 1.0 lb. of CO₂ per Watt replaced. Add up the wattage of all the bulbs you could replace and write the total here: ___ lbs. of CO₂ /yr.

Look for an Energy Star rating on all appliances, electronic equipment, and the HVAC system. Estimate how much of the school's energy footprint, in lbs./yr., is due to this equipment. Multiply that amount by 0.25 to find the reduction for replacing this equipment with Energy Star equipment and write the answer here: ___ lbs. of CO₂ /yr.

Estimate how much of the school's energy footprint goes to heating and air conditioning. If the school does not have double-pane windows. multiply that amount by 0.15 to find the reduction for installing double-pane windows and write the answer here: ___ lbs. of CO₂ /yr.

If your school has no insulation, the reduction for installing it is the same as for double pane windows: ___ lbs. of CO₂ /yr.

Install solar hot water collectors. If you cannot estimate the part of the energy footprint used to heat water, multiply the total energy footprint by 0.20 and write the answer here: ___ lbs. of CO₂ /yr.

Reduction for generating all the school's electricity with photovoltaic cells. Write the number you calculated for electricity on page 1: ___ lbs. of CO₂ /yr.

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Energy Footprint Reduction: Add up the energy reductions, divide by 2000, and write the answer here: ___ tons of CO₂ /yr.

Transportation Reduction

Gather the following numbers (some you will have to estimate):

- Average distance students traveled to school by car: ___ mi.
- Average distance students traveled to school by bus: ___ mi.
- # Days in the school year: ___
- Number of single riders who will agree to carpool: ___
- Average number students in the carpool: ___
- Number of students who will switch from car to bus: ___
- Number of students who will switch from car to walking: ___
- Number of students who will switch from bus to walking: ___

Calculate reduction for each change in travel habits:

Carpooling:

$[(\text{students changing to carpool}) \times (\text{average distance}) \times (\text{days in school year})] / (\text{average number in carpool}) = \text{___ lbs. of CO}_2 \text{ /yr.}$

Car to bus:

$(\text{students changing from car to bus}) \times (\text{average car distance}) \times (\text{days in school year}) \times (0.76) = \text{___ lbs. of CO}_2 \text{ /yr.}$

Car to walking:

$(\text{students changing from car to walking}) \times (\text{average car distance}) \times (\text{days in school year}) = \text{___ lbs. of CO}_2 \text{ /yr.}$

Bus to walking:

$(\text{students changing from bus to walking}) \times (\text{average bus distance}) \times (\text{days in school year}) \times (0.24) = \text{___ lbs. of CO}_2 \text{ /yr.}$

Transportation Footprint Reduction: Add up the transportation reductions, divide by 2000, and write the answer here: ___ tons of CO₂ /yr.

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Food Reduction

Recalculate the food footprint on page 1.

- This time make any subtractions for buying local food and organic food that you didn't make before.
- Subtract 0.40 lbs. /student/ day for each day per week that you think your school would accept meatless meals.
- Subtract the new food footprint from the old food footprint and write the answer here: ___ tons of CO₂ /yr.

Recycling and Trees

Recalculate the waste footprint and subtract any reductions for recycling that you didn't count before. Subtract the new waste footprint from the old waste footprint and write the answer here: ___ tons of CO₂ /yr.

Multiply the number of trees you think your school will plant by 0.010 and write the answer here: _____ tons CO₂ /yr.

Overall Reductions

Add the results for reductions in energy, transportation, food, and waste footprints, and the result for tree planting. Write the answer here: _____ **tons CO₂ /yr.** This is your total expected footprint reduction.

Subtract this amount from your school's total footprint and write the answer here: _____ **tons CO₂ /yr.**

This could be your school's new carbon footprint!