

Given: Wed, Sept 20, 2006

Due: Wed, Sept 27, 2006

Part A. Estimate your yearly carbon emission in pounds of CO₂ *

1. Number of miles traveled by car each year _____ , divide by average miles per gallon = _____ gallons of gas, multiplied by 22 lbs CO₂/gallon of gas = _____ pounds of CO₂ from car.

1a. Repeat the above for additional cars and any other fueled motor vehicles or gasoline consumption.

2. Number of miles of air travel per year _____ , multiply by 0.9 lbs CO₂/mile of air travel = _____ pounds of CO₂ (economy class)

3. Number of miles traveled on mass transit (bus, train) _____ , multiply by 0.5 lbs CO₂/mile of mass transit travel = _____ pounds of CO₂

4. Number of miles traveled by taxi or limo _____ , multiply by 1.5 lbs CO₂/mile in taxi or limo = _____ pounds of CO₂

For the following, look at household utility bills for the last 12 months (estimate quantities if necessary, and divide by the number of people sharing the bill):

5. Kilowatt hours of electricity used per year _____ , multiply by 1.5 pounds of CO₂/kilowatt-hour = _____ pounds of CO₂

6. Therms of natural gas per year _____ , multiply by 11 lbs CO₂/therm = _____ pounds CO₂

7. Add up the estimated total pounds of CO₂ emitted per year:

* Source: Vermont Earth Institute

Part B) Find the equivalent emissions due to building materials:

1) A typical concrete mix produces approximately 700 pounds of CO₂ per cubic yard (mostly due to cement production). Given this value, calculate the volume of concrete required to produce the same value of CO₂ as your estimated personal annual CO₂ emissions from the worksheet in Part A. If this volume of concrete is poured in a 12" thick square slab, what is the approximate length of one side of the slab?

2) The manufacturing of structural steel typically produces about 1.6 pounds of CO₂ per pound of steel. Given this value, calculate the volume of steel required to produce the same value of CO₂ as your estimated annual CO₂ emissions from the worksheet in part A. (Density of steel is 490 lbs/ft³) How many 20 foot-long W14x90 beams could be created with this volume of steel? (Note: A W14x90 beam weighs 90 lbs/ft of length.)

3) The manufacturing of aluminum typically produces about 8.9 pounds of CO₂ per pound of aluminum. Given this value, calculate the volume of aluminum required to produce the same value of CO₂ as your estimated annual CO₂ emissions from the worksheet in part A. (Density of aluminum is 170 lbs/ft³) If this volume of aluminum is used to create a square panel with a thickness of ¼ inch (0.02 feet), what is the approximate length of one side of the square panel?

4) The manufacturing of glass typically produces about 0.3 pounds of CO₂ per pound of glass. Given this value, calculate the volume of glass required to produce the same value of CO₂ as your estimated annual CO₂ emissions from the worksheet in part A. (Density of glass is 170 lbs/ft³) If this volume of glass is used to create 6 feet x 6 feet square plates with a thickness of ¼ inch (0.02 feet), how many glass plates could be made?