



Conversion Project – Carbon Emissions

In this project, you will estimate how much CO₂ you cause to be produced each year from the various sources of your energy usage; you will estimate the cost associated with that energy usage; and you will develop a realistic strategy for reducing your CO₂ by 1000 lbs. per year with a projected cost savings.

Spreadsheet 1

Create a spreadsheet which calculates the CO₂ produced in a year from your electricity and gasoline consumption using the outline below. You will list each of your sources of electricity usage, each source of stand-by power usage, and your gasoline consumption. You will enter estimates of usage for each line item and use Excel formulas to calculate the CO₂ produced. It is important to properly use Excel to perform the calculations, so that you can use this spreadsheet to develop a reduction strategy later. ***You will be graded on your use of formulas in the spreadsheet.***

Clearly Label your column headings. Read through the requirements below and map out how you will organize your spreadsheet. The project worksheet table included in these instructions can help get you started.

Name your spreadsheet and provide your own name in your spreadsheet.

Electricity Usage

- List at least 10 appliances you use regularly
- List at least 2 “energy vampire” appliances which apply to you
- Enter the wattage for each appliance. *You can either use the wattage reported in the book, or check your own appliances for exact wattage (refer to pages 102 and 103)*
- Enter your estimate of daily hours of usage for each appliance in your spreadsheet
- Use Excel formulas to determine an annual estimate of usage in kilowatt-hours for each appliance
- Use Excel formulas to convert your annual kilowatt-hours to pounds of CO₂ produced

Gasoline Consumption (refer to pages 98, 99):

- Estimate the miles you drive (daily or weekly) and your fuel efficiency in miles per gallon (this can be found at <https://www.fueleconomy.gov/feg/findacar.shtml> or similar website). If you do not drive yourself, estimate the mileage you ride in automobiles to the best of your ability and address this in your reflection paper.
- **Use Excel formulas** to determine how many gallons of gas you use.
- **Use Excel formulas** to convert your gasoline consumption to pounds of CO₂ produced in a year.

Calculate the total pounds of CO₂ produced from your electricity and gasoline by using Excel. Be sure to clearly label this total. Create a pie chart from the items in your spreadsheet (not vehicle). What can you say about the overall use?

Estimate the annual cost for each of your listed appliances, for your energy vampires, and for your gasoline consumption. Use a cost of \$.12 per kWh for power consumption. Estimate your annual cost for gasoline by using the most recent price you paid at the pump. *(Note: If you used mileage to determine your CO₂ consumption for gasoline, you will now need to calculate the gallons of gasoline that you use!)*

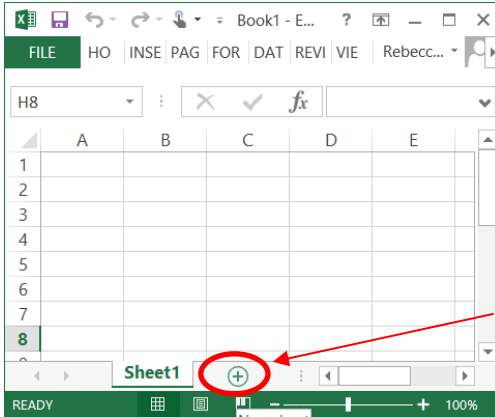
Calculate the total cost of your electricity and gasoline using the summation function in Excel. Be sure to clearly label this total.

Spreadsheet 2

Develop a strategy to reduce your CO₂ usage by 1000 lbs. per year. You can copy your first spreadsheet into another Excel sheet by creating a new tab (See the photo below on how to do that). Make changes to the hours of electricity and amount of gasoline that you currently estimate for yourself. If you have entered formulas correctly, the spreadsheet will automatically update the changes in the amount of CO₂ and the costs. For example, suppose your TV usage produces 100 lbs. of CO₂ each year. If you reduce your television viewing by half in favor of reading novels for entertainment, then

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your CO₂ should decrease by 50 lbs. Your strategy must be realistic! You are not allowed to stop using all refrigerators or vehicles/busses to achieve the 1000 lb goal! Create a Pie Chart from your reduced usage data.



Click on this + button to add a sheet to your Excel file, then copy your entire Sheet 1 and paste it into Sheet 2 to make your changes.

Also estimate the cost savings from your strategy. Again, if your formulas are entered correctly, the spreadsheet should do the calculations for you, and you can see how much the cost decreases. For example, suppose your first spreadsheet shows an annual cost of \$100 in electricity to operate your TV. If you decrease your television viewing by half, then your annual cost should decrease by \$50.

Highlight your strategic changes in this second spreadsheet. Clearly label your CO₂ reduction and associated cost savings.

Reflection Paper

Write a reflection paper which is at least one page in length or 350 words. You should have many things to say about this project! Be sure to include the following:

- *What were some of the appliances you picked for this project?*
- *Justify why your hours of usage values for your appliances are accurate. Give a reasonable argument in favor.*
- *Justify why your miles driven value is accurate. Give a reasonable argument to explain why.*
- *How did you calculate CO₂ production from electricity? Be specific in describing your spreadsheet.*
- *How did you calculate CO₂ from gasoline consumption?*
- *What was your strategy to reduce your CO₂ footprint?*
- *Why is your plan feasible? Explain with FACTS why the reduction is possible, not unjustified guessing.*
- *What is the cost reduction is from your strategy?*
- *What have you learned from doing this project?*
- *Reflect on a larger group of people (family, class, city population, etc). What could this project apply to them?*

In addition to addressing the statements above, your paper should:

- ☐ Be well organized and easy to follow.
- ☐ Have clearly labeled columns and statistics.
- ☐ Have titles and labels on graphs. Use appropriate representations (tables, color, formatting) that help the reader understand the project. Is it easy to read your data on the spreadsheet?
- ☐ The paper should be in paragraph form (NOT just bulleted answers!).
- ☐ Be clear to someone who is not familiar with the project.
- ☐ Provide support for your statements e.g. explain how values were found. Give specific values (i. e. quantify statements).

- ☐ **Project should be your original work. Copying someone else's work is cheating. Sharing your work with someone else is cheating.**

Getting started worksheet

	Appliance	Wattage	Usage Estimate
Electricity Usage from Appliances (hours)			
Stand-by Power Usage (hours)			

Gasoline Consumption (Select one) Use Table 3 for conversions	Gallons of Gas or	
	Miles Driven	

Project checklist:

- Put your name on your spreadsheet
- Give your spreadsheet a title
- Clearly label your columns in your spreadsheet
- List at least 5 appliances you use regularly
- List at least 3 energy vampires which apply to you
- List your estimated gasoline usage
- Use an Excel formula to convert your usage to your annual usage for each source (each line)
- Use an Excel formula to convert usage to CO2 production for each source
- Create a Pie Chart from the CO2 usage
- Estimate your CO2 from gasoline consumption
- Use an Excel formula to sum your CO2 for the year
- Clearly label your total CO2 estimate for the year
- Use an Excel formula to estimate the cost associated with each source
- Clearly label your cost estimate for the year
- Copy spreadsheet 1 to another "sheet" and re-name this sheet as your strategy for reducing your CO2
- Use this second spreadsheet to alter your estimated activity time and usage to develop a reduction of CO2 by 1000 lb. for a year
- Create a new Pie Chart from this reduced usage. Explain any differences.
- Clearly label your strategic changes
- Write a reflection paper about this project which includes your current CO2
- Summarize your strategy to reduce CO2 in your written report
- Be sure to include your cost savings in your report