

Carbon Calculator Teacher Guide

In this activity students will:

1. Examine their personal and household habits and choices in relation to their carbon footprint.
2. Identify which personal activities and household choices produce the most CO₂ emissions.
3. Compare their carbon footprint to the U.S. and global average.
4. Identify lifestyle changes they can make to reduce their footprint.

In this learning activity, students will use a Web-based carbon calculator to determine their carbon footprint. The carbon calculator is divided into 3 general areas (**Household, Transportation, and Food**) that scientists have determined to be main contributors to CO₂ emissions at an individual and household level. Each section of the carbon calculator includes questions that will help students understand how much of an impact they are having on the environment. The carbon calculator will determine a student's carbon footprint based on the answer they provide for each question. Responses to each question will provide a cumulative carbon emission value for each section. At the top of each Web page, students will also see the total cumulative carbon emission value for all sections. Students will be able to view how sensitive each of their responses is to their total annual emissions.

Model the following procedural instructions with your students. It is recommended that you display your computer image at the front of the classroom.



Step 1: Download Data

1. Open your Web browser. Go to **www.ei.lehigh.edu/learners/cc/**.
2. Click **Carbon Calculator**.



Step 2 : Carbon Calculator Overview

The carbon calculator Web site has 4 tabs across the top - Household, Transportation, Food, and Analysis. Each tab contains a different section of the carbon calculator.

1. Beneath the first 3 tabs - Household, Transportation, and Food - are a series of questions that students will answer. Each response produces a corresponding CO₂ emissions value.

2. After students have completed their responses to all questions in a section, they can use the **Next** or **Previous** buttons to move back and forth between the different sections. In addition, students can navigate to a different section, by selecting a tab at the top of the page.

Carbon Emissions Calculator

Annual Carbon Emissions
0.00 tons
0.00 kg

Annual Carbon Emissions From Transportation
0.00 tons
0.00 kg

Household **Transportation** Food Analysis

0
1
2

Midsize
0
1
2

Large SUV/ Truck
0
1
2

Previous Next

3. In the top right corner of the Web page, the calculator displays the total annual amount of CO₂ emissions in both tons and kilograms for the displayed section (# 2) and a cumulative total of all 3 sections of the calculator (# 1).

Carbon Emissions Calculator

1 → Annual Carbon Emissions
0.00 tons
0.00 kg

2 → Annual Carbon Emissions From Household
0.00 tons
0.00 kg

Household **Transportation** Food Analysis

Not Sure

5. How often is the shower in your house used each day?
1-2 times a day
3-4 times a day
5-6 times a day
7 or more times a day

6. How many loads of laundry does your household do each week?
2 times
4 times
6 times
8 times
9 or more times

Previous Next

4. The calculator will also display the total amount of carbon produced for each student's response to a question. This is displayed in the **Carbon Emission Difference** box.

Carbon Emissions Calculator

Annual Carbon Emissions
0.39 tons
355.01 kg

Annual Carbon Emissions From Household
0.39 tons
355.01 kg

Household Transportation Food Analysis

1. How many people live in your home?

☐ 1
☐ 2
☐ 3
☒ 4
☐ 5
☐ 6 or more

+0.39 tons CO₂

2. What type of home do you live in?

☐ An Apartment
☐ Townhouse/Row Home
☐ A house

3. Do you have Energy STAR appliances in your home?

☐ Yes

- The **Analysis** section contains graphical CO₂ emissions summaries that are produced based on the students' responses to each section. Comparison graphs of US and global CO₂ emissions are also located in this section of the carbon calculator.



Step 3 : Using the Carbon Calculator

- Instruct students to answer all 18 questions in the **Household** section.
- Show students how to answer a question by selecting a radial button underneath a question (See #1 below). Show students that they can change their answer by selecting a different radial button.
- A CO₂ emissions value is associated with each answer (# 2). This value is added to the total emissions for that section and the total annual CO₂ emissions.

Carbon Emissions Calculator

Annual Carbon Emissions
0.39 tons
355.01 kg

Annual Carbon Emissions From Household
0.39 tons
355.01 kg

Household Transportation Food Analysis

1. How many people live in your home?

☐ 1
☐ 2
☐ 3
☒ 4
☐ 5
☐ 6 or more

+0.39 tons CO₂

2. What type of home do you live in?

☐ An Apartment
☐ Townhouse/Row Home
☐ A house

3. Do you have Energy STAR appliances in your home?

☐ Yes

- To help the students observe how much an activity increases their carbon footprint it will be helpful to show them an example. Have the students navigate to the **Transportation** tab and scroll down to Question # 2 - **How many times a week does your household use a car?** The students should select various responses within Question # 2 to observe the magnitude of the tons of CO₂ emission changes for each selection.
- After all of the questions are answered in the **Household** section, students should click on the **Transportation** tab and answer each question in that section. Students can navigate between

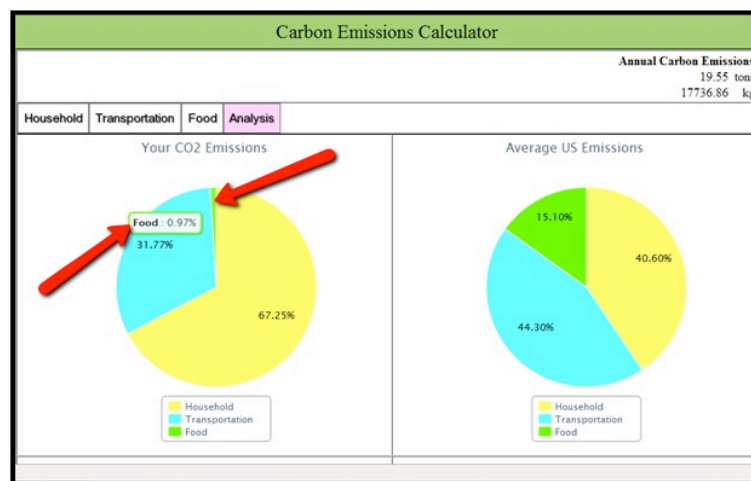
pages by selecting the tabs at the top of the page. The students can also navigate to this section by using the **Next** and **Previous** buttons at the bottom of the page.

- After all of the questions have been answered on the **Transportation** tab, instruct students to navigate to the **Food** tab. Instruct the students to answer all of the questions on this page.



Step 4 : Carbon Calculator Analysis

- After answering all questions in the 3 sections, students should navigate to the **Analysis** section.
- The **Analysis** page provides a summary of the student's total CO₂ emissions and displays their CO₂ emissions data for each section.
- The left pie chart displays the percentage breakdown of the student's total CO₂ emissions by section. Students can also compare their CO₂ emissions to the CO₂ emissions produced by the average United States citizen.
- If a CO₂ emission section is less than 5% of the total, the students will need to scroll their mouse over that section to view the breakdown. See the image below.



- The lower bar graphs display the total CO₂ emissions of the student, the average United States citizen (27 tons of CO₂ annually), and the average global citizen (5 tons of CO₂ annually). This graph is also depicted as kg of CO₂.

Implementation Suggestion: Some low-ability students may require additional support with reading and interpreting the displayed pie and bar graph data. You may wish to explicitly model how to read and interpret these data displays to assist students with answering the questions on the **Student Investigation Sheet**.

- After reviewing the **Analysis** page, instruct students to answer questions # 1-8 on the **Student Investigation Sheet**.

Important Note: The percentage of CO₂ emissions from food for middle school students will likely be higher than the percentage of CO₂ emissions from food for the average US emissions. This occurs since students' CO₂ emissions percentage from transportation is usually much less than the average US citizens' emissions percentage.