

## Teacher's Guide

## Find Your CO2

### Suggested Grade Level:

- Grades 6-8

### Subject Focus:

- Science
- Energy
- Environment
- Climate Change

### Materials & Preparations:

- Computer lab
- Internet connection
- Pen or pencil
- Notebook

### Time:

- 10 to 15 minutes to complete the carbon footprint calculator
- 15 to 20 minutes for class discussion

### Objectives:

1. Students will learn about how their daily habits at home and on-the-go affect the size of their carbon footprint and environmental impact.
2. Students will use critical thinking skills to assess their results and analyze where most their footprint comes from, compare it to their classmates, and draw reasoned conclusions about the footprint of others living elsewhere in the U.S.
3. Students will practice public speaking while reporting the information from their results with the class.
4. Students will discuss and understand the challenges related to climate change, global warming, and the technologies and solutions to reduce greenhouse gas emissions.

### Introduction & Background:

A carbon “footprint” describes the amount of carbon that is emitted as a result of personal choices. Descriptive definitions can be found on <http://shrinkthatfootprint.com/what-is-a-carbon-footprint> or on <http://science.howstuffworks.com/environmental/green-science/carbon-footprint.htm>. Our footprints are largely influenced by the energy mix in our geographic area, how much energy we use at home, and our transportation habits. Our carbon footprints are also impacted by small decisions we make daily. What we eat, how much water we use, the products we buy, and how we dispose of waste all contribute to our carbon footprints. These are difficult to quickly estimate and are not included in this calculator.

Although our daily habits have an impact on the environment, the good news is that there are many ways we can tread more lightly on the planet and reduce our individual impacts. A good example would be biking or walking instead of driving short distances. Some additional ways we can reduce our carbon footprint: switch lightbulbs to energy-saving CFLs or LEDs, better insulate and weatherize our homes, replace older appliances with those that are water and energy efficient, or eat locally grown food. This carbon calculator is one tool to find your carbon footprint, and there are other advanced tools that factor in additional emissions detail that are available. How does this calculator come up with the carbon footprint?

## Teacher's Guide

## Find Your CO2

### Subject Focus:

- Science
- Energy
- Environment
- Climate Change

### Introduction & Background continued:

- To provide the home energy use footprint, this calculator uses the building type and number of people in a household (which are used as indicators of home's size) and links that information to the average energy consumption rate for a home that size. This data is drawn from the Department of Energy's Residential Energy Consumption Survey. The calculator uses the zip code to match the home to its electricity supply region which has a specific mix of energy sources (e.g., coal, nuclear, renewables, etc.) and the associated CO<sub>2</sub> emission factors come from the Environmental Protection Agency's eGRID model. It is important to note that the resulting carbon amount is an estimate. It is possible that the home energy footprint is different thanks to the size and age of a home and the various energy-saving practices someone already does.
- To calculate the transportation footprint, the calculator includes personal transportation, personal motor vehicles (e.g., cars, trucks, motorcycles), public transportation, and commercial air travel. The calculator uses the average fuel economy for each mode, the distance traveled and factors out the associated emissions. Data is drawn from the Department of Energy and the Environmental Protection Agency.

### Procedures:

#### **Before you start:**

- Some of the questions in the Home Energy Use and Driving sections may require input from a family member. If needed, send the questionnaire worksheet (on page 4) home with students a day prior to the activity.
- Students have the option of inputting their email address to receive a record of their results. The email address is used **only** to send the calculator results and pledge list results. It is not a requirement to enter an email.
- Students may partner to help each other and take turns doing the carbon calculator if needed.

#### **To Find Your Carbon Footprint:**

1. Students should navigate to the webpage <http://carbonfootprint.c2es.org/>.
2. Read aloud the instructions below and ask students scroll along through each section of the calculator.

## Teacher's Guide

## Find Your CO2

### Subject Focus:

- Science
- Energy
- Environment
- Climate Change

- Home Energy Use Section
    - You will enter: your zip code, how many people live in your household, the type of building you live in, the fuel used to heat your home, if your home is air-conditioned or not.
  - Driving Section
    - You will enter: the type of car your family drives (click "ADD VEHICLE" if you have more than one car), how many miles your family drives per year.
  - Public Transportation Section
    - You will use the slider to enter: how many miles of different public transportation types you use per week.
  - Flying Section
    - You will enter: how many flights you take per year and whether they are short (less than one hour), medium (1-6 hours) or long (more than 6 hours).
  - Profile Section
    - You will enter: an email address to receive your carbon footprint results and pledge results.
  - Results Section
    - The calculator will show how your results compare to the local average. Scroll down the page to review different energy and carbon saving pledges. Click on the pledges you want to commit to take. The tool will add up the total amount of carbon emissions you can reduce simply by changing some of your habits.
3. Invite students to fill in the carbon calculator and note their results.

### To learn about the role of location and local energy mix:

- Instruct students to calculate the footprint of someone who lives somewhere else in the United States by inputting a different zip code. All other answers about their homes and travel habits should remain the same. For example, the zip code for Hollywood, California is 90068 and the zip code for Helena, Montana is 59601.

### Optional hands-on activity:

1. Have each student write their name on a sheet of paper and draw their footprint on the paper (they can trace an outline of their shoe or foot).
2. Encourage students to write down one or two ways they will try to reduce their carbon footprint on the paper.
3. Hang the footprint pledges in class as a friendly reminder of the students' pledges. Check back with students in a few weeks to see if they have made any progress on their pledges.

# Make an Impact!

Change Our Tomorrow



## Teacher's Guide

## Find Your CO2

### Subject Focus:

- Science
- Energy
- Environment
- Climate Change

### Class Discussion:

1. What do you notice about what makes up your personal carbon footprint?
2. How do your results compare to others in your class or someone who lives in a different zip code? Why are they different? Optional: Ask students to explore this energy map: <http://www.eia.gov/state/maps.cfm>
3. What activities are not included in this calculator that impact your footprint? Visit <http://makeanimpact.c2es.org/calculator/faqs> to get started.
4. What kinds of actions can you or your family take to reduce your carbon footprint? How do you think this will affect your daily habits?
5. Choose one page on the C2ES website <http://www.c2es.org/> that relates to carbon emissions, environmental impacts, or climate solutions. Write a short summary of the information presented and how it relates to you understanding your carbon footprint. Take turns presenting to the class or in small groups.

## Questionnaire for Calculator

Each student and family member should answer all the following questions. These questions are the same that appear in the calculator and will be used to find your carbon footprint.

### Home Energy Use Section

What is your zip code? Write your zip code below.

How many people live in your household? Circle one:

- 1
- 2
- 3
- 4
- 5
- 6+

What is the type of building you live in? Circle one:

- Single family home (detached)
- Single family home (attached)
- Apartment building (2-4 units)
- Apartment building (5+ units)
- Mobile home

What is the fuel used to heat your home? Circle one:

- Gas
- Propane
- Oil
- Electricity
- None of the above

Is your home air-conditioned or not? Circle one:

- No
- Yes

# Make an Impact!

Change Our Tomorrow



## Driving Section

What type of vehicle(s) does your family drive? Circle the type(s) below.

- Hybrid
- Plug-In Hybrid
- Electric
- Small Car
- Family Sedan
- Large Sedan
- SUV
- Minivan
- PickUp Truck/Passenger Van
- Motorcycle

How many miles does your family drive per year (per vehicle)?  
Write the miles below for each vehicle.

Vehicle 1:

Vehicle 2: