



RUTGERS-NEW BRUNSWICK  
School of Environmental  
and Biological Sciences



# Lesson Ten

## Carbon Footprint



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## Lesson Overview

Through the curriculum so far, students have learned about climate change, food systems, and the many ways in which food systems contribute to climate change through the production of greenhouse gases. This lesson introduces the concept of a person's carbon footprint based on the foods that someone eats. Students will learn what a carbon footprint is and engage with an online carbon footprint calculator. Students will gain experience using the online calculator to estimate the carbon footprint of the animal-based, plant forward, and plant-based eating patterns.

## Next Generation Science Standards

**3-5-ETS1-2:** Generate and compare multiple solutions to a problem based on how well each is likely to meet criteria and constraints of the problem.

### Science and Engineering Practices

- Developing and using models
- Use a model to describe a phenomenon
- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem.

### Cross Cutting Concepts

- Cause and effect
- Systems and system models

### Disciplinary Core Ideas

**ESS3.C:** Human Impacts on Earth Systems.

**ESS3.D:** Global Climate Change.

## Driving Question(s)

- What is a carbon footprint?
- What eating patterns have higher carbon footprints?
- How can I lower my carbon footprint?

## Learning Objectives

Students will be able to:

- Understand the concept of a carbon footprint, and relate this concept to personal food choices
- Use a carbon footprint calculator to estimate the greenhouse gas emissions of different eating patterns.





## Behavior Change Objectives

Students will be able to:

- Decide if they want to make any changes to move closer to a lower carbon eating pattern.

## Keywords

**Carbon footprint | greenhouse gases | eating patterns**

## Before you Begin

- Prepare to show slides to class.
- Make enough copies of handouts.
- Review Carbon Footprint Activity

## Materials

- Presentation Slides and Worksheets
- Computer/Chromebook/Technology
- Video: [youtube.com/watch?v=aGZpZfICzek&list=PLKx8NLAujm\\_nCPmzHM3eUKi-aqMvaH55Zw&index=4](https://www.youtube.com/watch?v=aGZpZfICzek&list=PLKx8NLAujm_nCPmzHM3eUKi-aqMvaH55Zw&index=4)
- Carbon Footprint Calculator [harvard-foodprint-calculator.github.io](https://harvard-foodprint-calculator.github.io)
- Exit Ticket

## Lesson

### 1st Recap and Lesson Introduction

1. Review what students learned about last class including how greenhouse gases are produced after food leaves the farm and how making changes like buying more whole foods and locally grown foods can reduce greenhouse gas emissions.
2. Introduce today's lesson by telling students that they are going to learn about the
3. Introduce students to the big ideas of the day/questions of the day:
  - A. What is a carbon footprint?
  - B. What eating patterns have higher carbon footprints?
  - C. How can I lower my carbon footprint?

### 2nd Warm Up

1. Begin by asking students what a footprint is.
2. Next ask students what they think a carbon footprint means. Review the definition of this then watch the short video clip.
3. After the video, ask students if they have any questions before moving on.



*Red italicized words are web links for more information.*



## 3rd Activity

1. Have student's breakout into groups and have them come up with a "family name."
2. Explain to the students that they are going to plan out meals for their family for the next 5 days.
  - A. For this part of the activity, the students will choose an animal-based menu, meaning there are no foods that are off limits.
3. As a class, the teacher should review the food choices that are provided on the online carbon footprint calculator website. ***harvard-foodprint-calculator.github.io*** The teacher may write out the options on the board to allow students to refer to the options.
  - A. In groups, have students open the website and select which foods they want to include on their menu and how frequently they want to consume them. Instruct students to record this on the worksheet.
4. Have students use the carbon footprint calculator to calculate the groups environmental impact in kg of Carbon, g of Nitrogen, and L of water.
5. Then have them write down how many gallons of gasoline, pounds of fertilizer, and bathtubs of water this converts to.
6. Next, have a discussion with the students. Ask them the following questions:
  - A. What observations can you make?
  - B. What eating pattern was best for the environment? How do you know?
  - C. What eating pattern would be easiest to adopt?
  - C. Which eating pattern could most people adopt with some effort? Why? Which eating pattern would be really hard for people to adopt? Why?
  - C. How can we change our own behaviors to move closer to low-carbon eating patterns?

## 4th Activity

1. Conduct a discussion/activity with the class to review the figure. Begin by asking the students what the graph is showing overall.
2. Then move onto discussing more specific questions like how the emissions differ for each food.
  - A. Have students compare the green, brown, and orange portions of the bar with the blue, red, yellow, and grey parts of the bar for each food's bar.

## Exit Ticket

1. Pass out the Exit Ticket.
2. The teacher collects exit tickets and reviews student answers. Make minor adjustments to the next lesson based on data received.



*Red italicized words are web links for more information.*