

Lesson Planning Tool for Climate Change

Title of Lesson: Lesson 6B: Carbon Emissions and Carbon Footprint

Grade Level: 7th, 8th

Subject: Climate Change Science, Environmental Science

Source(s) of the lesson: US. EPA

Essential Question(s): If most of the energy humans use comes from the burning of fossil fuels, how does this create carbon emissions? What is a carbon footprint and how can we use it to educate and inform ourselves of carbon emissions?

Massachusetts Curriculum Frameworks Science Standards:

7.MS.ESS3-4: Construct an argument supported by evidence that human activities and technologies can mitigate the impact of increases in human population and per capita consumption of natural resources on the environment. Clarification Statements: • Arguments should be based on examining historical data such as population graphs, natural resource distribution maps, and water quality studies over time.

Content Objectives	Practice Objectives	Language Objectives
Students will analyze through reading text how human activities in our daily lives create carbon emissions.		I can read and discuss the various ways carbon dioxide is produced.
Students will evaluate their own human activities in their daily lives in order calculate their carbon footprint.		I can discuss the various ways my actions contribute a carbon footprint.

Important Vocabulary:

Tier 2 - coal, petroleum, natural gas, solar power, wind, biomass, geothermal, renewable energy, non-renewable energy, climate change, consumption, carbon footprint

Materials Needed: Article titled: [Climate Change Overview of Greenhouse Gases by EPA.](#)

Other Resources: (websites, videos, books, etc.)

Background Information for Teacher: Energy use by the United States can be found through the Environmental Protection Agency (EPA). Teacher should read the article to be best informed.

Background Information the Student Needs to Access the Lesson: Students should have already completed Lesson 6A: Renewable Energy Sources.

Lesson Structure

Lesson Launch (Do Now)	List at least 3 daily activities that you do that require energy as electrical, thermal or mechanical. Have students share out when time is up.
Background Instruction (pre-activity)	Present this question: If most of the energy humans use comes from the burning of fossil fuels, how does this create carbon emissions? Elicit answers from students and then explain that the article from the EPA will help answer the question.
Activity	<ol style="list-style-type: none">1. Pass out the article to each student and either do a read aloud with the class or an independent reading. While students are reading instruct them to highlight the main idea from each sentence that best answers or supports the essential question.2. Explain: Oftentimes we don't think that we have an impact on the earth, but even at the individual level an impact is made if one uses fossil fuels as energy somehow. This multiplied by millions of people, industries, business and human needs has led to the additional increase of CO₂ into the atmosphere.3. Ask class to consider what a carbon footprint means?4. Explain carbon footprint as the amount of carbon an individual produces through their own daily activities that rely on the burning of fossil fuels.5. Ask: Why do you think we call it a carbon footprint?6. Explain: Carbon footprint is not a real footprint we can see, but rather a way to describe our own carbon emissions. The more energy we use that produces CO₂, the larger our carbon footprint. The less energy one uses that produces CO₂, the smaller their carbon footprint. We want to create as small of a carbon footprint as possible since the earth already naturally creates carbon dioxide through the carbon cycle. It is likely that an individual living without access to electricity or in a country or place without many modern day things has a smaller carbon footprint than someone living in a first world nation with cars, electricity and elaborate housing.7. If individual laptops or tablets are available instruct students to go to the following website to calculate their own carbon footprint.

Discussion/ Debrief	Engage the class in a discussion on their carbon footprint results: Questions to ask: a) What is your carbon footprint? b) What factors made yours higher compared to someone else? c) What factors had a chance of lowering yours? What do you think the carbon footprint would be of someone living out on a farm in a very rural area? Higher or lower than you? Why?
Formative Assessment	Provide the Essential Question as the Exit Ticket to assess student learning and understanding.

Notes: