

Greenhouse Gas Production (CO₂)

Introduction

Carbon dioxide (CO₂) is a colourless, non-combustible, atmospheric gas. It is produced by people, animals and plants in the process of breathing. The problem arises in its overproduction, especially when burning fossil fuels such as coal, oil and natural gas. A significant share of fossil fuel combustion is represented by means of transport, such as aircraft, cars, trucks, boats or buses. Over the past decades, we have produced such a large amount of CO₂ that its volume has created an invisible layer that retains heat in the atmosphere, causing global warming. This process is also called the greenhouse effect. As a result, climate change is becoming an increasing problem, so it is the time to act.

Learn about the problem

Use the internet, (scientific / popular) literature or in collaboration with experts to find available information on CO₂ production using different modes of transport. Also focus on the following questions:

- What causes increased CO₂ in the atmosphere?
- What are the main sources of CO₂ production in your country / region / city?
- What percent of your country's emissions are generated by transport?
- What is the traffic density in your city / municipality?
- What are the alternative transport fuels and are they being used locally?
- Which European cities support the use of bicycles? What about your city?
- How many kilometres of bike paths are in your city / town?

Recommended resources

[Source 1:](#)

CO₂ emissions from transport



[Source 2:](#)

Greenhouse gas emissions from transport



[Source 3:](#)

A European strategy for low-emission mobility



[Source 4:](#)

Range of life-cycle CO₂ emissions for different vehicle and fuel types



[Source 5:](#)

Transport and public health



[Source 6:](#)

Green choices: policymakers, investors and consumers



Verify the occurrence of a problem in your area with your own research

Goal

Students can calculate the amount of CO₂ emissions they produce from travelling to and from school. Students are aware of the impact of increased CO₂ in the atmosphere and are considering ways to reduce production to help achieve higher air quality.

Tools & Materials

- online maps (e.g. Google maps) or GPS device to measure distance
- recording card
- map to mark individual student routes (additional)
- a board / flipchart / tablet or similar
- calculator
- camera / mobile to record activity

Implementation

At the beginning, set a monitoring period (e.g. week / month). The chosen period should represent the students' travel habits to the maximum extent. Alternatively, implement the monitoring repeatedly in different seasons. You can compare the results of individual monitored periods with each other and propose such solutions that are suitable for a particular season of the year, or weather.

Measurement

Each student records the route to and from the school on a daily basis and the method of transport used. If you are transferring to another method of transport during your journey to / from school, write down the place where this is happening.

Use the map or GPS device to find out the length of the route for each of the methods of transport you used on your day's route to / from school.

Based on the length of the route and the method of transport used, calculate the amount of emissions you produced on that day.

At the end of the monitored period calculate the average daily production and compare it to the average daily production of the entire group. You can also convert the CO₂ produced to the number of trees needed to process your CO₂ volume at different times (1 day, 1 month, 1 year).

Analysis of results and proposal of solution

How many kilograms of CO₂ did you produce as individuals and as a class? How do you perceive this quantity? Together, discuss how you could reduce CO₂ emissions while travelling to / from school. Write down your suggestions. Think about whether your solutions are feasible. Is there a solution that could be applied by each group member?

Implementation of the solution and evaluation

Try to implement the selected design and then repeat the monitoring. Have you managed to improve your results in repeated monitoring? How did the environment react to your solutions? Are there other solutions that you could apply? Do you have advice on how to convince others to reduce their CO₂ production?

How would you evaluate your feelings after implementing the selected solution?

Frustrated	Disappointed	Rather Negative	Neutral	Rather Positive	Satisfied	Enthusiastic
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Publicity

Record and share photos on social networks with [#mybioprofile](#) during the activity. Help others to join us.

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TEACHING
GREEN



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Recording card												
Name	John Doe				Class				9.B			
School	Victoria's Elementary School				City				London			
Date	Day 1		Day 2		Day 3		Day 4		Day 5		Total production of CO ₂ [g]	
Mean of Transport	to school	from school	to school	from school	to school	from school	to school	from school	to school	from school	to school	from school
foot or bicycle	2		2				2	2	2	2	2	0
	Length of route in km (L)											
	CO ₂ production in g = L * 0 g/km											
tram or trolleybus	3		0				3	3	3	3	3	0
	Length of route in km (L)											
	CO ₂ production in g = L * 42 g/km											
electric car	126						126	126	126	126	126	504
	Length of route in km (L)											
	CO ₂ production in g = L * 43 g/km											
minibus												
	Length of route in km (L)											
	CO ₂ production in g = L * 55 g/km											
diesel train												
	Length of route in km (L)											
	CO ₂ production in g = L * 60 g/km											
electric train or metro	11		11				11	11	11	11	11	3575
	Length of route in km (L)											
	CO ₂ production in g = L * 65 g/km											
bus	715		715				715	715	715	715	715	207
	Length of route in km (L)											
	CO ₂ production in g = L * 69 g/km											
moped												
	Length of route in km (L)											
	CO ₂ production in g = L * 73 g/km											
hybrid car												
	Length of route in km (L)											
	CO ₂ production in g = L * 84 g/km											
motorcycle												
	Length of route in km (L)											
	CO ₂ production in g = L * 94 g/km											
small car												
	Length of route in km (L)											
	CO ₂ production in g = L * 110 g/km											
medium car	18		18		18		18	18	18	18	18	7182
	Length of route in km (L)											
	CO ₂ production in g = L * 133 g/km											
big car											18	6588
	Length of route in km (L)											
	CO ₂ production in g = L * 183 g/km											
Source	841	2394	922	2394	2394	2394	841	841	841	841	3294	18 056
	Total production of CO ₂ [g]											

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