



Quarterly Problem

- Green Edition -

CO₂ Budget



CO₂, climate crisis - everyone knows by now that we have a problem. To deal with it properly, we also need to understand the math behind it.

The greenhouse gases that make our earth warmer stay in the atmosphere for a very long time. The question of how much further the average temperature will rise therefore essentially depends on how many of these gases we will still emit in total.

It is thus possible to assign a so-called CO₂ budget to each temperature increase. To ensure that warming does not exceed 1.5°C compared with pre-industrial times, for example, we may only emit a total of around 300 gigatons, or 300,000 million tons, of CO₂ worldwide. Or more precisely: if this much CO₂ is still emitted from 2020 onward, there is an 83% chance that warming will remain below 1.5°C, according to the Intergovernmental Panel on Climate Change. For 2°C, that's 900 Gt CO₂.

In the chart on the extra sheet, time is plotted on the x-axis and annual CO₂ emissions are plotted on the y-axis.

Approximately how much CO₂ was emitted in total from 2010 to 2021? How might the curve continue so that a total of 300 Gt or 900 Gt of CO₂ will be emitted in total from 2020 on? Draw different progressions in the diagram.

Brainstorm Box

Do you think we can manage to limit global warming to 1.5°C or 2°C? How much should we be willing to do to achieve this?



Which method is the best?

To calculate the total emissions, you can of course add up all the values from 2010 to 2021. But you can also roughly estimate the area under the curve. Compare your approaches: How do you get the best estimate as easily as possible?

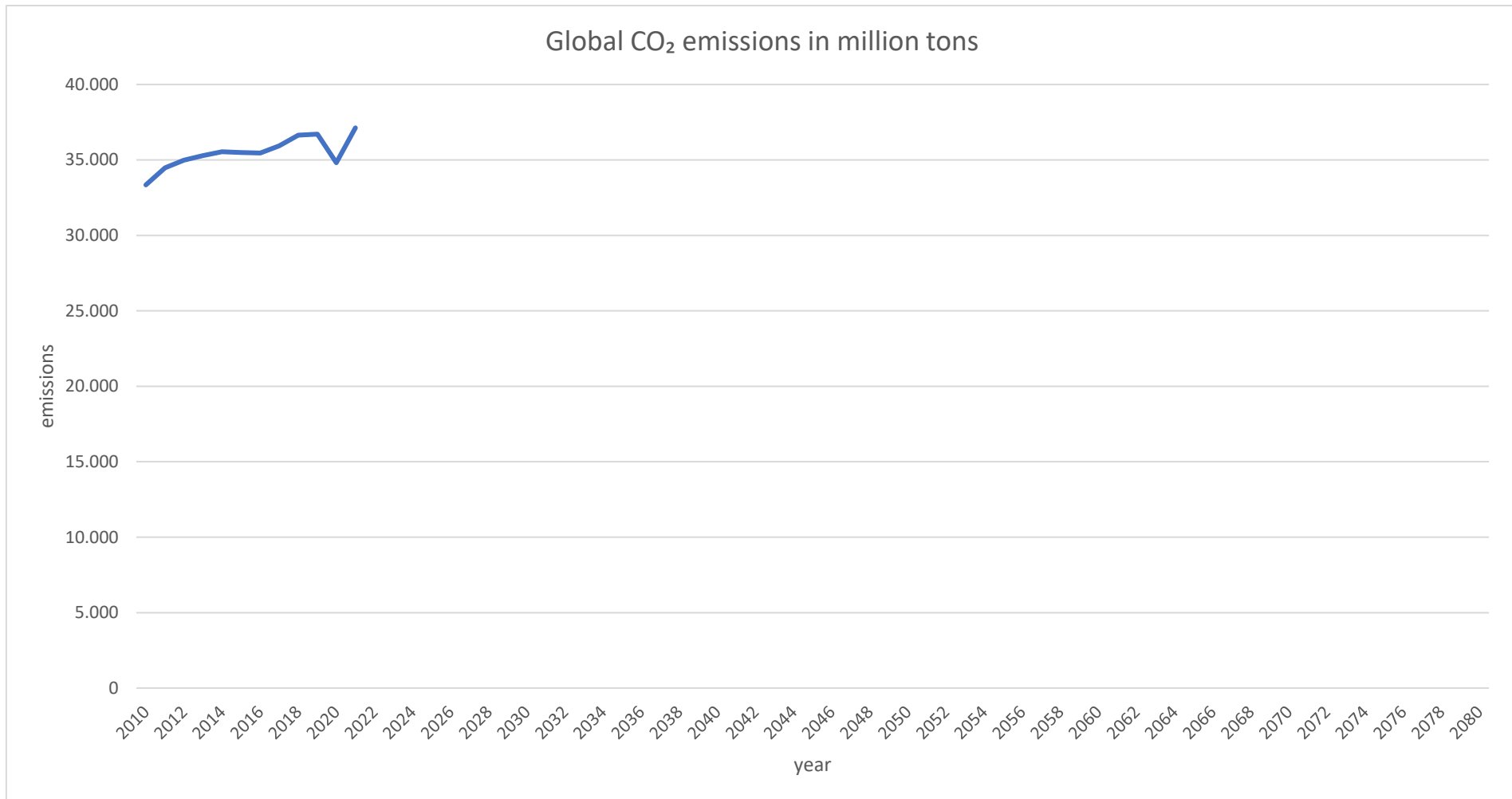
© Rahel Brugger/International Centre for STEM Education (ICSE), 2023

CC-BY-NC-SA 4.0 License granted

Picture Source: Pixource/Mohamed Hassan auf Pixabay



Quarterly Problem: *CO₂ Budget*



Data source: <https://de.statista.com/statistik/daten/studie/37187/umfrage/der-weltweite-co2-ausstoss-seit-1751/>