

Introduction

Monitoring carbon dioxide (CO₂) emissions from fossil fuel combustion, non-energy use of fossil fuels, and other industrial processes is essential for addressing anthropogenic climate change. CO₂ is a major greenhouse gas contributing to global warming, and its continued accumulation in the atmosphere poses severe risks to ecosystems, economies, and societies worldwide. Fossil fuel combustion, including the use of coal, oil, and natural gas, remains the largest source of CO₂ emissions. In addition, industrial processes such as cement production and gas flaring further contribute to the atmospheric burden of CO₂.

Understanding the magnitude and sources of CO₂ emissions is crucial for devising effective strategies to mitigate climate change. By systematically monitoring and analyzing CO₂ emissions, particularly across various sectors and countries, policymakers can identify key drivers of emissions and develop targeted interventions. Furthermore, tracking emissions over time allows for evaluating the effectiveness of policies and measures aimed at reducing emissions.

In this report, we examine historical CO₂ emissions data, focusing on contributions from different types of fossil fuels—solid, liquid, and gas—as well as emissions from cement production and gas flaring. We also analyze emissions on a per capita basis to assess the relative carbon footprints of different countries and how these change over time. The aim is to provide insights into the current state of global CO₂ emissions, highlight trends, and identify potential areas for emissions reduction.

Dataset Description

I merge two datasets from https://doi.org/10.3334/CDIAC/00001_V2017.

The dataset contains the following columns:

1. Year: The year for which the data was recorded.
2. Country: The country for which the data was collected.
3. Total: The total emissions (possibly in terms of CO₂ or other pollutants).
4. Solid Fuel: Emissions from solid fuel (e.g., coal).
5. Liquid Fuel: Emissions from liquid fuel (e.g., gasoline or oil).
6. Gas Fuel: Emissions from gas fuel (e.g., natural gas).
7. Cement: Emissions from cement production.
8. Gas Flaring: Emissions from the burning of excess gas during oil extraction.
9. Per Capita: Emissions per person.

10. Bunker fuels (Not in Total): Emissions from bunker fuels, which may not be included in the total value.

Five Interesting things

- **Total Emissions vs. Fuel Type Emissions:** It could be interesting to explore how much each type of fuel (solid, liquid, gas) contributes to the total emissions. There may be a strong correlation between the total emissions and one or more of these fuel types.
- **Per Capita Emissions vs. Total Emissions:** Investigating how per capita emissions relate to total emissions could reveal whether larger populations contribute proportionally more to emissions or if certain countries have disproportionately high emissions per person.
- **Yearly Trend Analysis:** Over time, we could explore how emissions have evolved across different countries, looking for trends such as increases or decreases in total emissions or shifts from one fuel type to another (e.g., moving from coal to natural gas).
- **Cement Production and Gas Flaring Impact:** Since cement production and gas flaring are more specific sources of emissions, understanding their contribution to overall emissions could be insightful for targeting environmental policies in certain industries.
- **Country-Specific Patterns:** By grouping data by country, we could see which countries are the largest contributors to global emissions and whether there are different patterns in emissions (e.g., more gas fuel use vs. coal use) depending on the country's industrial base or energy policies.