Project Report: Global CO2 Emissions Tracker by Sector

Introduction

The rapid increase in global carbon emissions over recent decades has become a critical concern for environmental sustainability, economic policy, and public health. Accurately tracking carbon output by country and by sector provides crucial information for policymakers aiming to reduce emissions, prioritize interventions, and monitor climate commitments. This project, "Global CO2 Emissions Tracker by Sector," was undertaken as part of a virtual internship to design and implement a data dashboard that presents sector-wise greenhouse gas emissions trends across countries and years. The dashboard aims to support both policy analysis and public understanding by enabling easy identification of top-emitting sectors and regions.

Objectives

- To construct a data-driven dashboard that visualizes CO2 emissions from key sectors—energy, transport, industry, buildings, land use, electricity/heat, manufacturing, other fuels, and bunker fuels—across multiple countries and years.
- To generate comparative metrics such as per capita emissions and emissions per unit of GDP for more insightful analysis.
- To support evidence-based policy recommendations by summarizing insights into a concise policy brief.
- To develop proficiency with modern data tools including Excel, Tableau, and Python for data cleaning, visualization, and dashboard building.

Methodology

Data Collection

The project began with the identification and collection of reputable, open-access datasets for CO2 emissions, national GDP, and population. The core emissions dataset was sourced from an open GitHub repository, ensuring sectoral breakdown and coverage of multiple years for a wide range of countries.

Data Preparation

Data preparation was carried out in Microsoft Excel. The emissions dataset was reviewed for structural completeness and merged with GDP and population datasets (sourced from the World Bank and DataHub, respectively) using composite keys (country + year). Key calculated metrics included:

- **CO2 Emissions per Capita:** Total emissions divided by national population.
- **CO2 Emissions per GDP:** Total emissions divided by national gross domestic product.

Negative land use values were maintained, reflecting carbon sequestration (carbon sinks) associated with forests and soil management.

Visualization

Data was imported into Tableau Public, where interactive maps and sector-specific bar charts were designed. Users can filter by country, year, or sector to view trends. The dashboard enables relative comparisons both between countries and between sectors within a country.

Challenges

- Data harmonization across sources was time-consuming due to name discrepancies and missing values.
- Some countries lacked complete sectoral data, requiring assumptions or exclusions from those views.

Conclusion

This project successfully developed a sector-wise, interactive global CO2 emissions dashboard, providing valuable tools for policy analysts and the public. The process improved skills in data merging, cleaning, and visualization while deepening understanding of global climate data challenges. Future extensions could include more granular regional data, additional greenhouse gases, and real-time emissions updates.