GLOBAL CO2 EMISSIONS TRACKER BY SECTOR

INTRODUCTION:

The Global CO_2 Emissions Tracker by Sector project provides an analytical framework to:

- Identify top polluting countries by total and per capita emissions.
- Analyze sectoral contributions from energy, transport, and industry.
- Observe emission trends across multiple years.
- Evaluate economic efficiency using CO_2 per GDP metrics.

By integrating Python for analytical data processing and Tableau for visualization, this project translates raw environmental data into actionable insights that can inform global emission reduction policies and promote cleaner energy transitions.

ABSTRACT:

This project, Global CO_2 Emissions Tracker by Sector, focuses on analyzing and visualizing global carbon dioxide (CO_2) emissions across key sectors — Energy, Transport, and Industry — to identify the world's top polluting countries and emission trends over time. The dashboard includes global maps, sector-wise bar charts, and time-series visualizations that offer clear insights into emission sources, patterns, and country-wise comparisons.

TOOLS USED:

Python (Pandas, NumPy, Matplotlib) for data cleaning , preprocessing ,metric calculations.

CSV dataset for multi year CO2 emission dataset with country, sector, population and GDP data.

Excel for data validation and exploration

Tableau for building interactive dashboard with maps, bar charts and time series visuals

STEPS INVOLVED IN BUILDING THE PROJECT:

Data Collection

- Imported the raw dataset (*Co_2_Emissions_by_Sectors.csv*) containing CO_2 emissions data by sector, year, and country.

Data Cleaning and Preprocessing (Python)

- Cleaned missing and inconsistent values.
- Computed key derived metrics:
    - CO_2 per capita = Total CO_2 / Population
    - CO_2 per GDP = Total CO_2 / GDP

Feature Engineering

- Calculated sectoral emission shares (Energy, Transport, Industry, Agriculture, and Domestic).
- Created output datasets:
    - emissions_cleaned.csv – country-level totals with derived metrics
    - emissions_timeseries_long.csv – sectoral and yearly emission data

Data Visualization (Tableau)

Dashboard Highlights:

🗺️ World CO_2 Emissions Map: Shows total emissions by country (darker = higher).

📈 Yearly CO_2 Trend Line: Displays average CO_2 growth trend over years.

📊 Sector Breakdown per Year: Compares emissions from Energy, Industry, Transport, Agriculture, and Domestic sectors.

👥 Top CO_2 per Capita Countries: Tree map showing highest emitters per person.

💰 CO_2 per GDP Chart: Compares emission efficiency by economic output.

POLICY BRIEF POLLUTERS REPORT:

Top Total Emissions

China: 299 tons, 2.67e-07 tons/person

Brazil: 299 tons, 2.97e-07 tons/person

Australia: 299 tons, 4.24e-07 tons/person

Canada: 298 tons, 2.30e-07 tons/person

USA: 298 tons, 2.47e-06 tons/person

Australia: 298 tons, 4.19e-07 tons/person

CONCLUSION:

The Global CO_2 Emissions Tracker by Sector effectively demonstrates the power of data analytics and visualization in understanding global climate trends. The results revealed that a few industrialized countries, particularly those with strong manufacturing and energy sectors, account for a major share of CO_2 emissions worldwide.

Using Python for data processing and Tableau for visualization provided a complete analytical workflow — transforming complex datasets into interactive, easy-to-understand insights. The dashboard enables users to explore emissions data geographically and sectorally, identify trends, and compare emission intensities across countries.