

Carbon Footprint & Sustainability Analysis — Final Report

Introduction

This report provides a clear and professional overview of global CO₂ emission trends, per-capita emission levels, sustainability indicators, and regional differences across countries. The analysis highlights long-term environmental patterns useful for research and policy decisions.

Dataset Summary

The dataset contains **5,677 rows** covering:

- **Country**
- **Region**
- **Date**
- **Kilotons of CO₂**
- **Metric Tons Per Capita**

Dates were cleaned and converted into a **Year** field to enable accurate time-series trend analysis.

Data Cleaning — MICE Imputation

Missing numeric values were handled using **MICE (Multiple Imputation by Chained Equations)** with a **Bayesian Ridge** estimator.

This method preserves statistical integrity and avoids bias that would occur from dropping incomplete records.

Key Performance Indicators (Most Recent Year)

- **Total CO₂ Emissions:** 33.87M kilotons
- **Average CO₂ Per Capita:** 4.14 metric tons
- **Number of Countries Represented:** 190

Global CO₂ Trends

Global CO₂ emissions show a consistent upward trend, with peaks in the most recent years. Developed regions exhibit stabilization, while emissions in developing regions continue to rise due to rapid industrial growth.

Regional Trends

- **Asia:** Highest overall emissions; strong upward trend.
- **Europe:** Slight but steady decline over time.
- **Americas, Africa, Oceania:** Show moderate but stable emission patterns.

Country-Level Findings

Countries with the highest **per-capita** CO₂ emissions include **Qatar, UAE, Kuwait, and Bahrain**. These nations show high energy consumption relative to their population size.

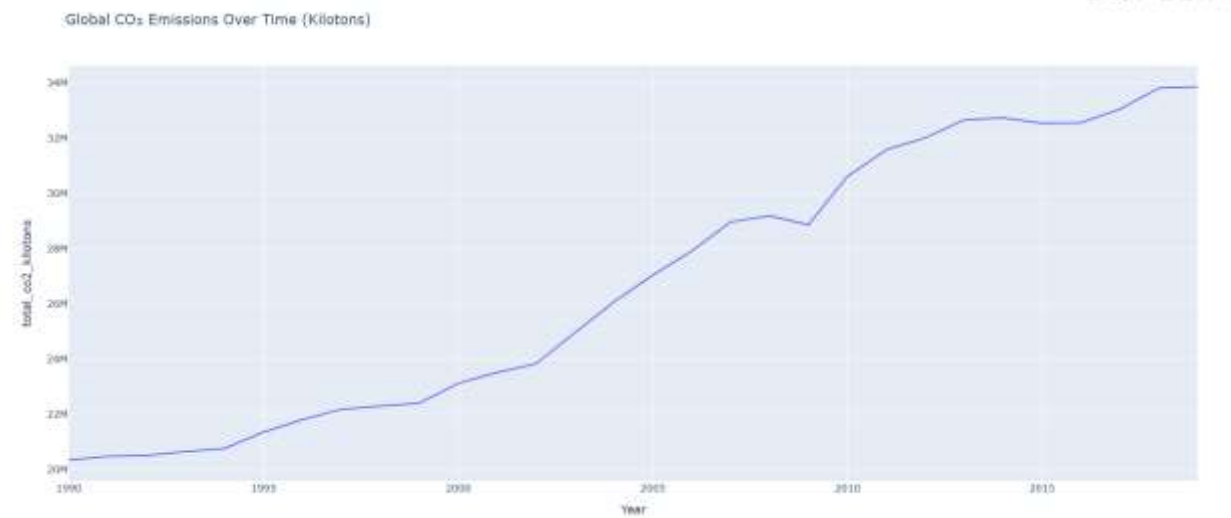
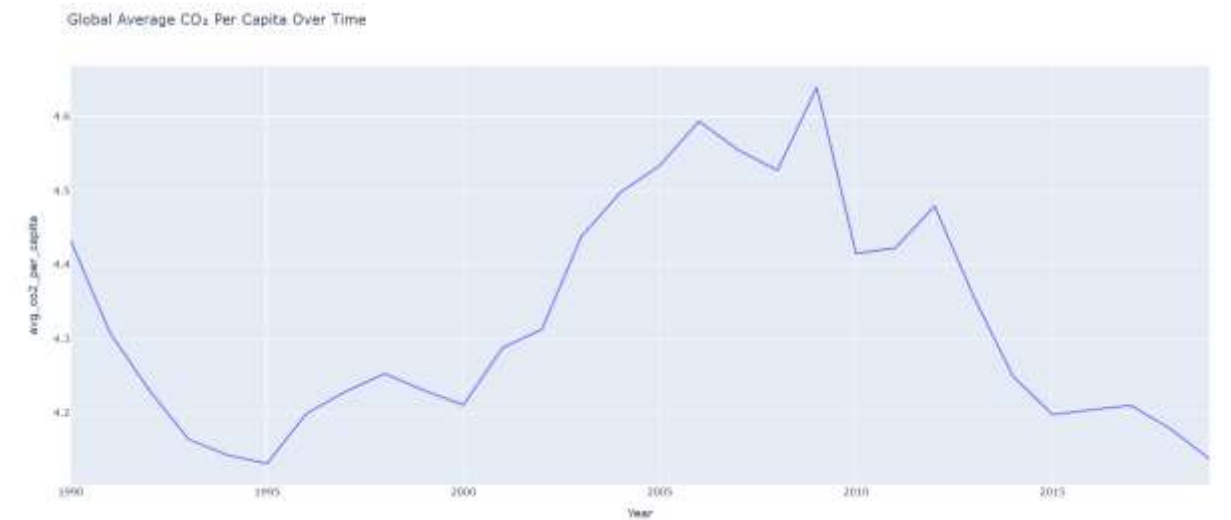
Correlation Insights

The correlation between **total CO₂ kilotons** and **per-capita CO₂ emissions** is **0.19**, indicating a **weak positive relationship**. Population density and size significantly influence national emissions.

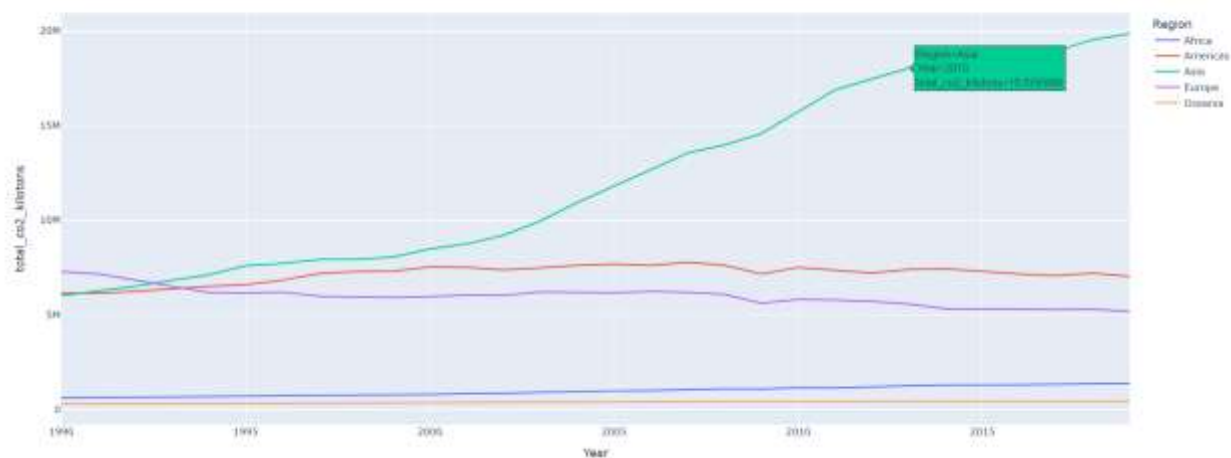
Conclusion

This analysis delivers a concise summary of global and regional sustainability performance. The insights can support environmental planning, carbon-reduction strategies, and policy development for long-term climate sustainability.

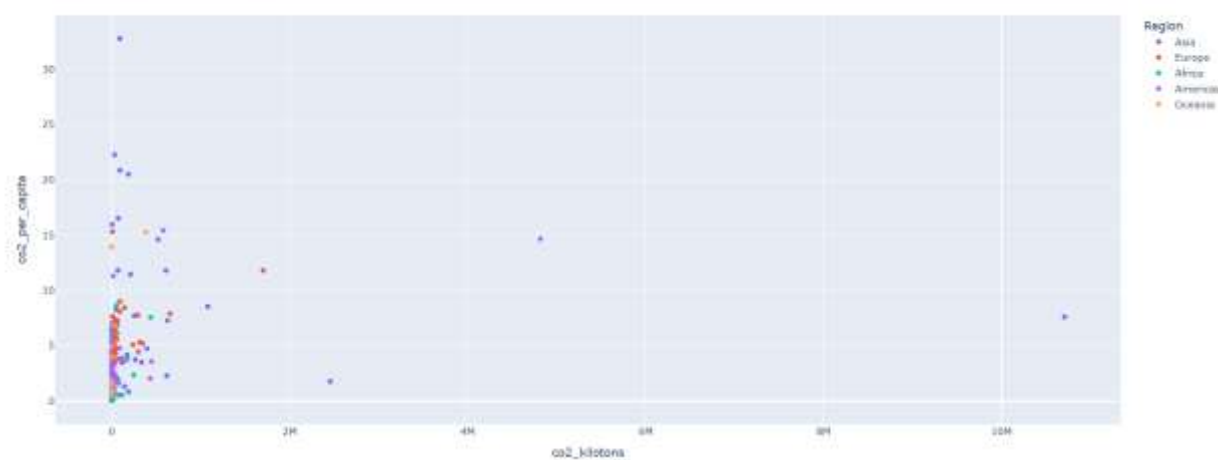
OUTPUTS:



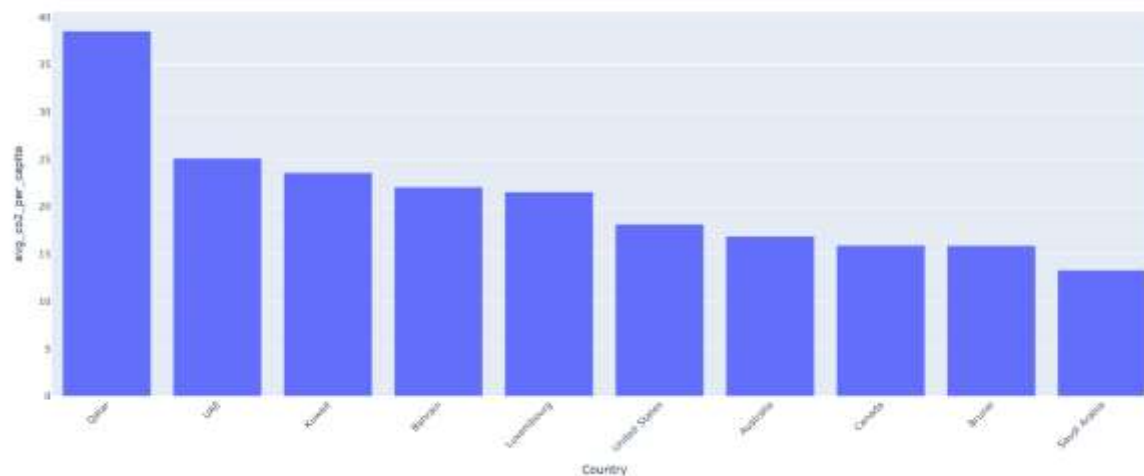
Regional CO₂ Emissions Over Time



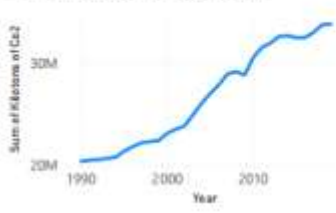
CO₂ Kilotons vs Per Capita (2019)



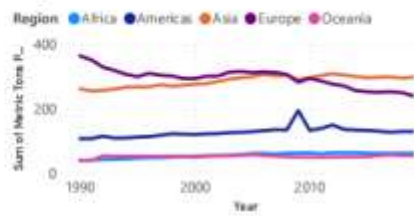
Top 10 Countries by Average CO₂ Emissions Per Capita



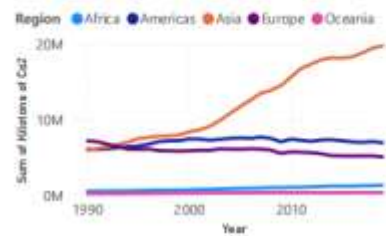
Sum of Kilotons of Co2 by Year



Sum of Metric Tons Per Capita by Year and Region



Sum of Kilotons of Co2 by Year and Region

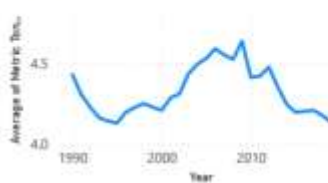


Number of Countries

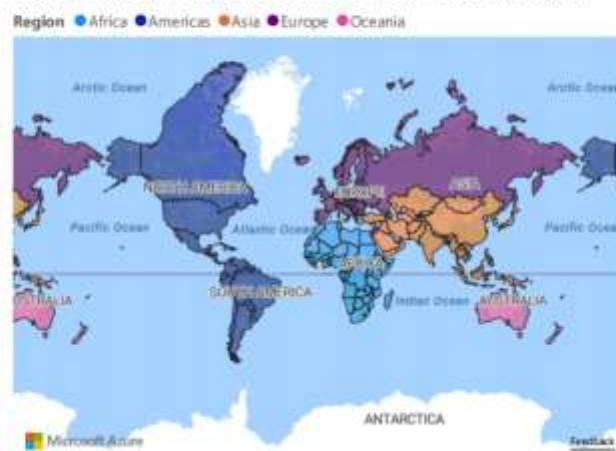
190

Count of Country

Average of Metric Tons Per Capita by Year



Average of Metric Tons Per Capita, Sum of Kilotons of Co2, First Region, Count of Country and Count of Year by Country and Region



Total CO₂ Emissions (Latest Year)

33.87M

Sum of Kilotons of Co2

Avg CO₂ Per Capita (Latest Year)

4.14

Average of Metric Tons Per Capita

Sum of Metric Tons Per Capita by Country

