# Final Project CO2 emissions

This is the report for my final project in Data Analytics. This report is divided into 3 parts, for each question asked in the project. In every part of this report, I have used the same structure: the introduction is based on general information and datasets. The results explain the process we used to answer the question. The conclusion is based on our data and graphics created from the code.

**Question 1:Biggest predictor of CO2 output**

**Introduction**

This part investigates the relationship between CO₂ emissions per capita and GDP per capita. By merging datasets on CO₂ emissions and GDP, the analysis aims to explore how economic prosperity (measured as GDP per capita) correlates with environmental impact (measured as CO₂ emissions per capita).

**Results**

**Summary Statistics**: The merged dataset provided insights into the average, minimum, and maximum values of CO₂ emissions per capita and GDP per capita across different countries and years.

**Distribution of CO₂ Emissions**: The histogram indicated a skewed distribution of CO₂ emissions per capita, with most countries having relatively low emissions but a few having significantly higher values.

**Scatter Plot and Correlation**: The scatter plot showed a positive relationship between GDP per capita and CO₂ emissions per capita.

The Pearson correlation coefficient was calculated to be corrdpg, indicating the strength and direction of the linear relationship.

**Regression Analysis:** The regression model summary provided details on the coefficient estimates, standard errors, and goodness-of-fit measures.

The model indicated that higher GDP per capita is associated with higher CO₂ emissions per capita, with statistical significance.

**Conclusion**

This analysis highlights a positive correlation between GDP per capita and CO₂ emissions per capita, suggesting that economically prosperous countries tend to have higher CO₂ emissions. The regression model further supports this relationship, providing a quantitative basis for understanding how economic growth impacts environmental outcomes.

**Question 2:** **Biggest strides in decreasing CO2 output**

**Introduction**

This part investigates changes in CO₂ emissions per capita over time, focusing on identifying countries that have achieved the largest decreases in CO₂ emissions per capita. The analysis leverages datasets on CO₂ emissions per capita and population to calculate and analyze these changes.

**Results**

1. **Summary Statistics**:
   * The merged dataset provided insights into the CO₂ emissions per capita and population data for various countries across different years.
2. **Total CO₂ Emissions Calculation**:
   * Total CO₂ emissions were calculated by multiplying CO₂ emissions per capita by the population for each country-year.
3. **Changes in CO₂ Emissions**:
   * The dataset was sorted by 'Entity' and 'Year', and the change in total CO₂ emissions over time was calculated for each country.
   * The total change in CO₂ emissions per capita was then aggregated for each country.
4. **Top 10 Countries with the Largest Decrease**:
   * The countries were ranked based on the total decrease in CO₂ emissions per capita.
   * The top 10 countries with the largest decreases were identified.

**Conclusion**

This analysis highlights the countries that have achieved the largest decreases in CO₂ emissions per capita. The top 10 countries with the largest decreases have made significant strides in reducing their carbon footprint, which could be attributed to various factors such as policy changes, technological advancements, and shifts towards more sustainable practices. The first one in our list is Curacao.

**Question 3:** **Best future price for non-fossil fuel energy**

**Introduction**

The aim of this analysis is to determine which non-fossil fuel energy technology is projected to have the best price in the future. Utilizing datasets on levelized cost of energy (LCOE), we analyze various technologies to identify trends and forecast future costs. The primary focus is on technologies such as Solar Photovoltaic, Onshore Wind, Offshore Wind, Hydropower, Geothermal, and Concentrated Solar Power.

**Results** The analysis revealed the following insights:

* **Cost Trends**: The trends for each non-fossil fuel technology were visualized, showing how costs have changed over time.
* **Best Price in 2022**: The non-fossil fuel technology with the best (lowest) price in 2022 is **Onshore Wind** in Brazil, with a levelized cost of energy of **0.02367 USD/MWh**.

**Conclusion**

This analysis indicates that Onshore Wind is currently the most cost-effective non-fossil fuel energy technology, making it a promising candidate for future energy investments. The historical trends and the latest cost data suggest that Onshore Wind technology is leading in terms of cost-efficiency among the analyzed non-fossil fuel options.