### **Final Project CO2 emissions Report**

### **1.** **The biggest predictor of a large CO2 output per capita of a country**

#### **Introduction**

The objective of this analysis is to determine the biggest predictor of a large CO2 output per capita of a country. To achieve this, we used datasets that include:

1. Annual CO2 emissions per capita for various countries over multiple years.
2. GDP per capita for these countries.
3. Population data for these countries.

The datasets were cleaned and merged based on the country (Entity) and year (Year). Missing values in GDP per capita and Population were filled with the mean values of the respective columns.

#### **Results**

##### Exploratory Data Analysis (EDA)

##### Summary statistics and histograms were generated for the key variables: Annual CO2 emissions per capita, GDP per capita, and Population.

##### Correlation Analysis: this analysis was computed and visualized to understand the relationships between CO2 emissions per capita, GDP per capita, and population.

##### Regression Analysis: A regression model was built to identify significant predictors of CO2 emissions per capita. The scatter plots with regression lines were created to visualize the relationships between the variables and CO2 emissions per capita.

1. **GDP per capita vs. CO2 emissions per capita:**
2. **Population vs. CO2 emissions per capita:**
3. **GDP per capita and Population combined vs. CO2 emissions per capita**

#### **Conclusion**

GDP per capita is identified as a significant predictor of CO2 emissions per capita. Countries with higher GDP per capita tend to have higher CO2 emissions per capita. Population, however, does not appear to be a significant predictor in this model. This highlights the complexity of CO2 emissions and the need to consider additional variables such as energy consumption patterns, industrial activities, and specific policies in place.

### **2. Analysis of Biggest strides in decreasing CO2 emissions**

### **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 country in our list is the United Kingdom.

**3. Prediction of Non-Fossil Fuel Energy Technologies**

### **Introduction**

This report aims to analyze and predict the future prices of various non-fossil fuel energy technologies. The technologies considered are solar, wind, hydro, biofuels, and nuclear energy. The analysis uses historical data and applies linear regression to predict future trends.

### **Results**

1. **Solar Electricity**: The historical data indicates a steady increase. The predictions suggest a continued upward trend in solar electricity production.
2. **Wind Electricity**: Similar to solar, the historical data shows growth, and the predictions indicate a continued increase.
3. **Hydro Electricity**: The production of hydroelectricity has been relatively stable. The predictions suggest a slight increase but at a slower rate compared to solar and wind.
4. **Biofuel Consumption**: The historical data for biofuel consumption shows a gradual increase, with predictions indicating a continued but moderate rise.
5. **Nuclear Electricity**: Displays steady growth, indicating its continued importance in the energy mix.

### **Conclusion**

From the analysis and predictions, it appears that **solar and wind energy** technologies will have the best future prices due to their significant projected growth