

# DATA MANAGEMENT CO2 EMISSIONS

IT IS TIME TO CHANGE

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2023



OUR WORLD DATA

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# INTRODUCTION



Global warming has become one of the most pressing problems of our time, and for good reason. Increasing emissions of greenhouse gases, especially carbon dioxide, are rapidly changing the Earth's climate, causing a range of environmental, social and economic impacts. Going forward, it is important to consider how we, as individuals and societies, contribute to this problem and what steps can be taken to mitigate it.

A key aspect of this issue is its impact on consumer behavior and morals. We all have a responsibility to consider our actions and their impact on the environment. Everything we consume, from the food we eat to the products we buy, has an impact on the environment. Making informed choices is key to reducing your carbon footprint.

Another important factor is the role of companies in contributing to greenhouse gas emissions. Many companies rely heavily on non-renewable energy sources such as coal and oil to operate, often with significant environmental damage. As consumers, we have the power to support companies that prioritize sustainability and environmentally friendly practices and encourage others to follow suit.

After all, the importance of renewable energy cannot be overestimated. A transition to cleaner energy sources such as solar and wind is essential to reduce our dependence on fossil fuels and mitigate the impacts of climate change. With the right policies and investments, renewable energy has the potential to boost economic growth, create new jobs and protect the planet for future generations.

Overall, the issues of global warming and CO<sub>2</sub> emissions are complex and urgent, requiring collective action and the will to bring about major change. By understanding the role of consumers, businesses and renewable energy, we can take meaningful steps towards a more sustainable future.

# DEVELOPPEMENT



In order to address the urgent issue of global warming and promote sustainability, it is essential to understand the relationship between economic development, population growth, renewable energy use, and CO2 emissions. To that end, we have collected data from "Our World in Data" on GDP, annual CO2 emissions, annual renewable energies, and annual population for various countries.

## How could it be implemented ?



### Data retrieval :

- SCRAPING METHODOLOGY :  
IMPORT THE DATA  
IMPORTANT CLEANING :  
DATAFRAME

### Data visualisation :

- TYPE OF VISUALISATIONS :  
PLOTTING WITH GRAPHS IN  
ORDER TO MAKE STATISTICS

### Data modelling :

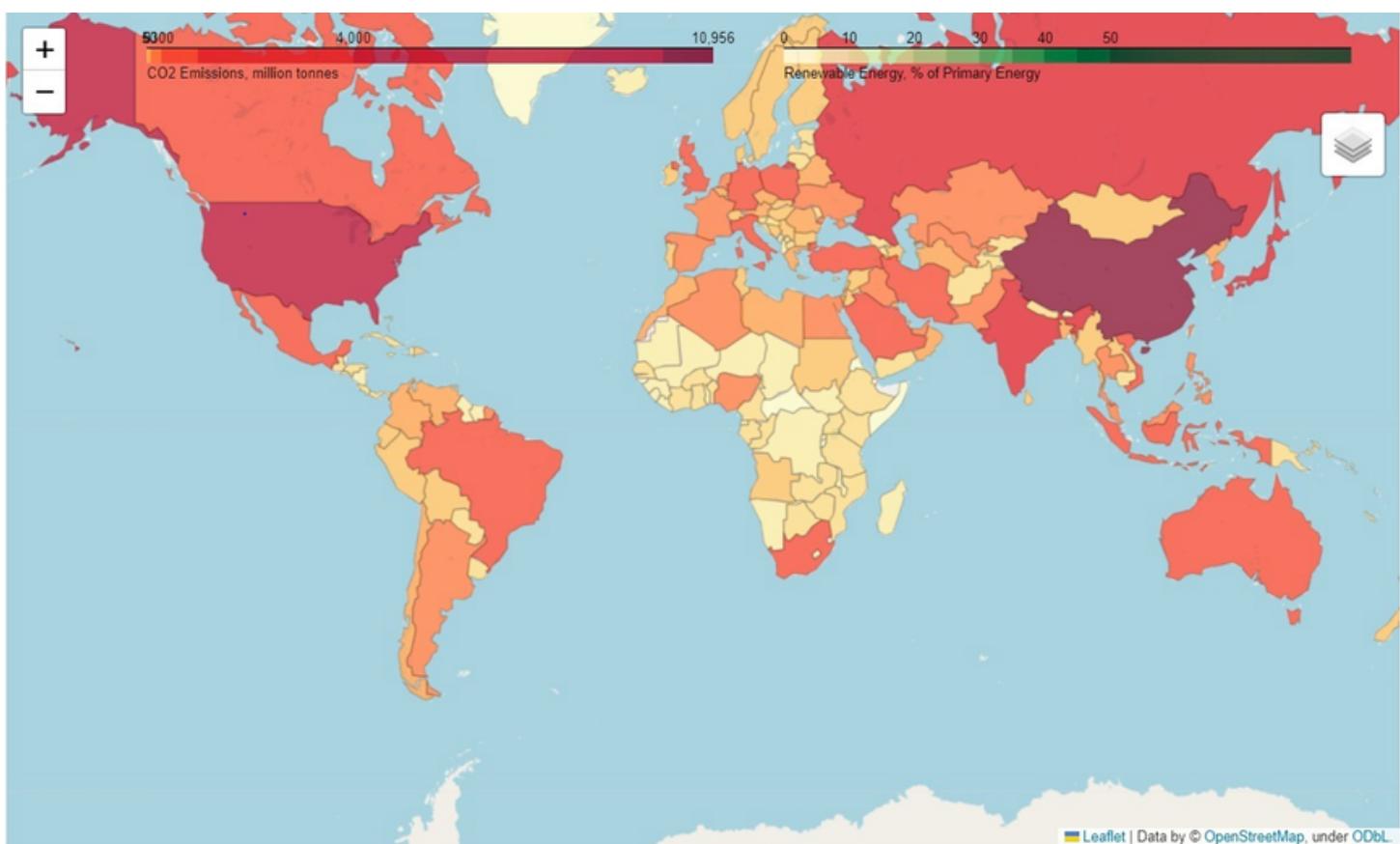
- CORRELATION BETWEEN  
EXPLAINING VARIABLES
- COMPARE THE RENEWABLE  
ENERGIES WITH CO2  
EMISSIONS
- ESTABLISH A DATAFRAME  
ABOUT WHICH COUNTRY  
SHOULD IMPLEMENT  
(CONTINUE OR START)  
RENEWABLE ENERGIES

# ACTION PLAN



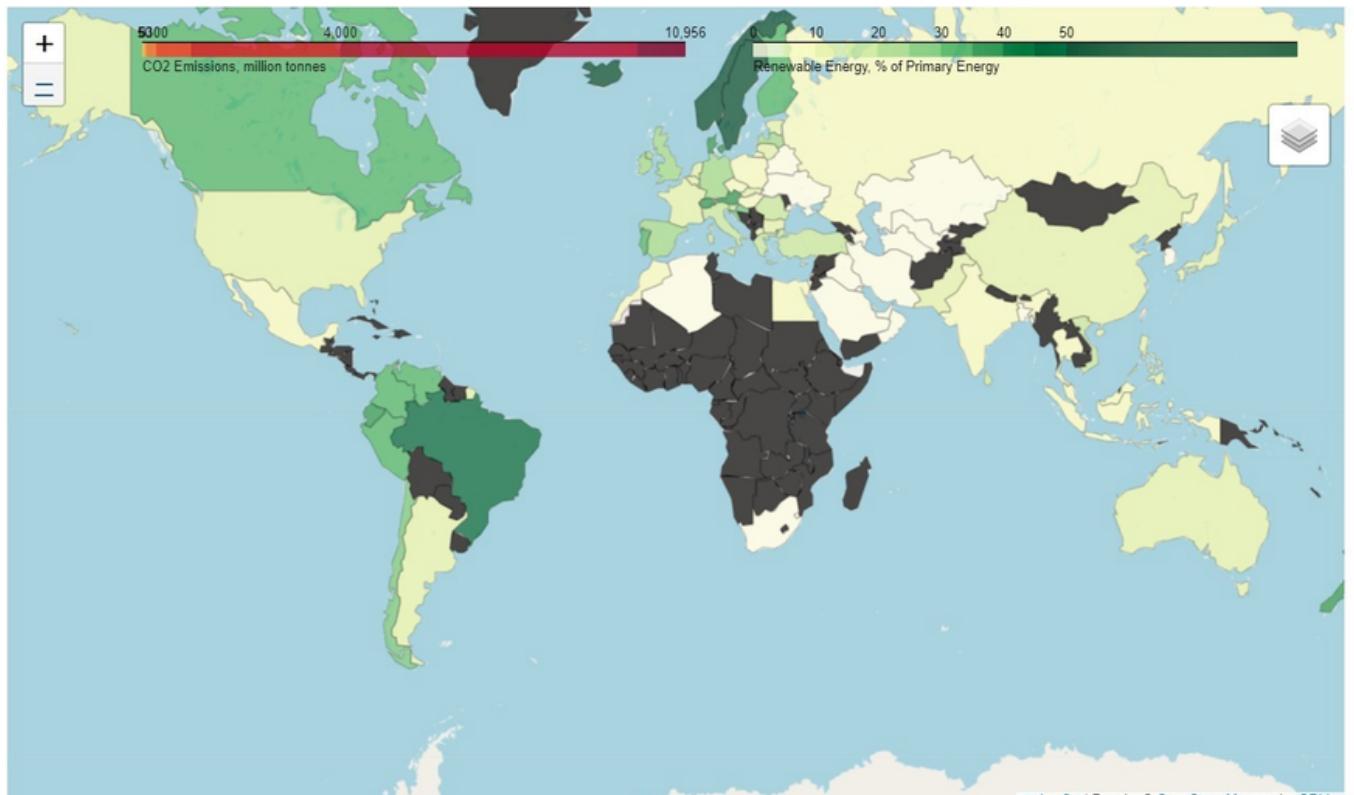
# CO2 EMISSIONS : VISUALIZATION

To visually represent the data on gas emissions and renewable energies, we have created an informative map. This map provides a graphical representation that enables us to observe trends and patterns without relying solely on numerical data. By utilizing this visual approach, we can gain valuable insights into the distribution of emissions and renewable energy sources across different regions or countries. The map serves as a powerful tool for understanding and analyzing the spatial aspects of these important factors in a clear and intuitive manner.



The initial image presented above provides an overview of carbon emissions from different countries. Notably, it is apparent that developed countries contribute significantly to global carbon emissions. However, there are also notable emissions from certain developing countries such as China and India, which possess dense populations and a large number of industrial activities. It can be hypothesized that there exists a positive correlation between population or GDP and carbon emissions, although this will require further confirmation through subsequent analysis.

Additionally, the map highlights that the African continent and Greenland exhibit comparatively lower carbon emissions. Based on this preliminary observation, a provisional ranking can be established, suggesting that China, Russia, the USA, Brazil, and Australia are among the countries with higher pollution levels. However, it is important to note that this ranking will be subjected to verification during the subsequent data analysis process.



Regarding renewable energies, it becomes evident that certain countries have missing or undisclosed information. For instance, data on renewable energy usage is lacking for the majority of the African continent, Greenland, and several other countries. However, the absence of this data does not imply that these countries do not utilize renewable energy sources. Instead, it suggests that such information has not been collected or made publicly available by their respective governments.

Nevertheless, further research indicates that these countries, particularly those facing high poverty levels, have historically had limited focus on renewable energy adoption. However, recognizing the potential of renewable energy for national transformation and economic growth, these countries are now looking to embrace renewable energy as a means of securing a prosperous future and gaining a competitive edge over developed nations.

Additionally, certain countries stand out as leaders in renewable energy utilization. Canada, Brazil, Finland, Norway, and Sweden are among those countries that have made notable strides in this regard. Moreover, in Europe, countries such as Spain and Portugal have also demonstrated significant progress in embracing renewable energy sources.

While acknowledging the data gaps, it is important to recognize the growing interest and aspirations of various countries, especially those with less-developed renewable energy sectors, to leverage these sustainable resources and forge a path towards a more prosperous and environmentally conscious future.

## CONCLUSION:

Based on the observations made regarding CO<sub>2</sub> emissions and renewable energies, several conclusions can be drawn:

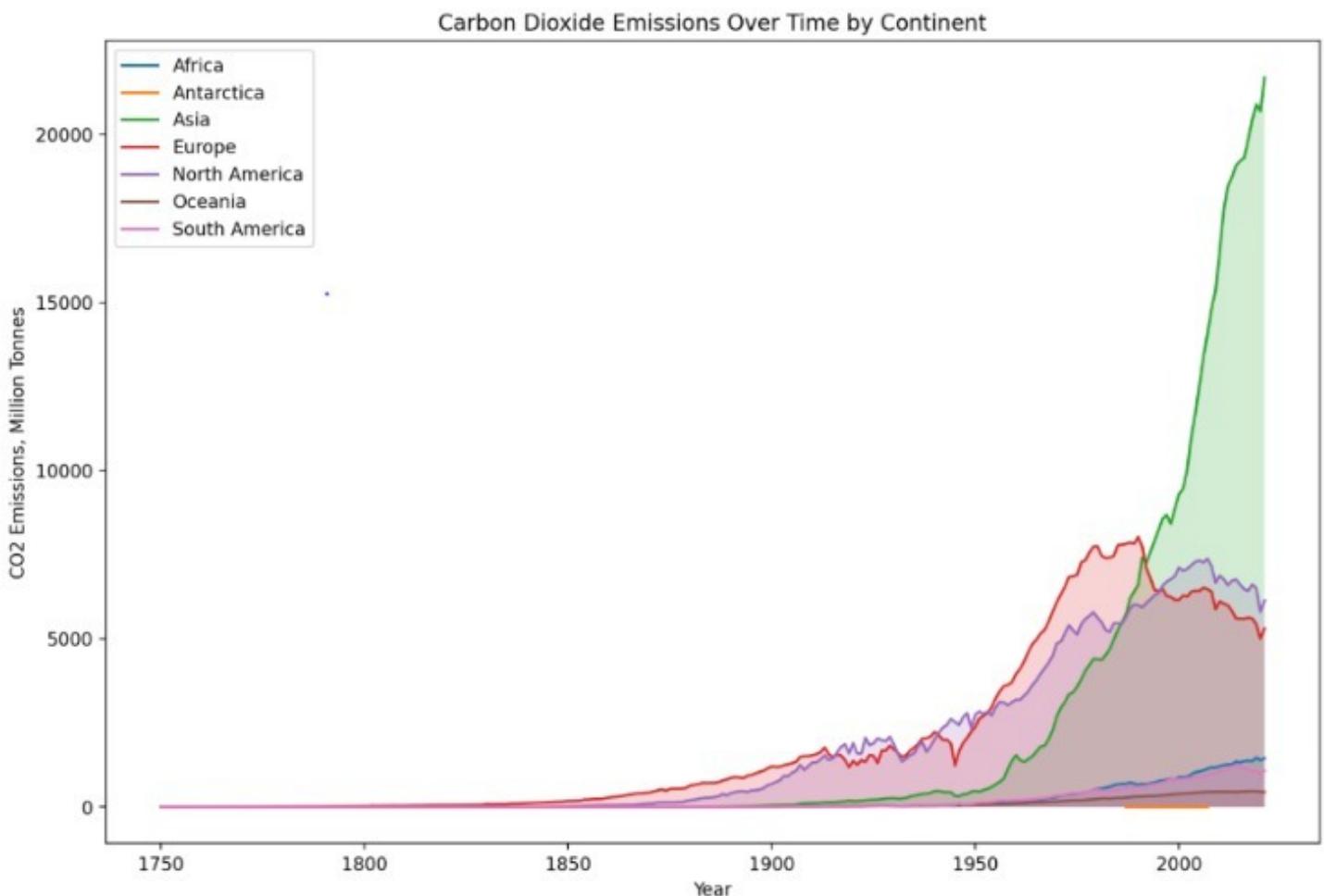
- Contribution to CO<sub>2</sub> Emissions: Developed countries, as well as some populous developing countries like China and India, make significant contributions to global CO<sub>2</sub> emissions. This suggests that economic development and industrial activities play a substantial role in carbon emissions.
- Correlation between Population/GDP and CO<sub>2</sub> Emissions: Although not confirmed through data analysis yet, there is a hypothesis that a positive correlation exists between population or GDP and CO<sub>2</sub> emissions. This implies that countries with larger populations or stronger economies tend to have higher carbon emissions.
- Disparities in CO<sub>2</sub> Emissions: There are notable disparities in CO<sub>2</sub> emissions across countries, with China, Russia, the USA, Brazil, and Australia potentially being among the top contributors. However, further analysis is needed to validate this ranking.
- Missing Data on Renewable Energies: There are gaps in the available data on renewable energy usage, particularly for certain regions like the African continent and Greenland. The absence of data does not necessarily indicate a lack of renewable energy use, but rather a lack of disclosure or collection of this information by the respective governments.

- Potential for Renewable Energy Adoption: Despite the missing data, it is evident that countries with high poverty levels have traditionally shown limited focus on renewable energy. However, further research indicates a growing interest among these countries to embrace renewable energy as a means of transforming their nations and achieving economic prosperity.
- Leaders in Renewable Energy: Countries such as Canada, Brazil, Finland, Norway, Sweden, Spain, and Portugal stand out as leaders in renewable energy utilization. These countries have made significant progress in adopting renewable energy sources and can serve as models for others.

Overall, these observations suggest the need for greater global efforts to reduce CO<sub>2</sub> emissions, particularly in countries with high levels of emissions. Embracing renewable energy sources presents a promising solution to mitigate carbon emissions, achieve sustainable development, and pave the way for a greener future.

# VISUALIZATION: DATA ANALYSIS

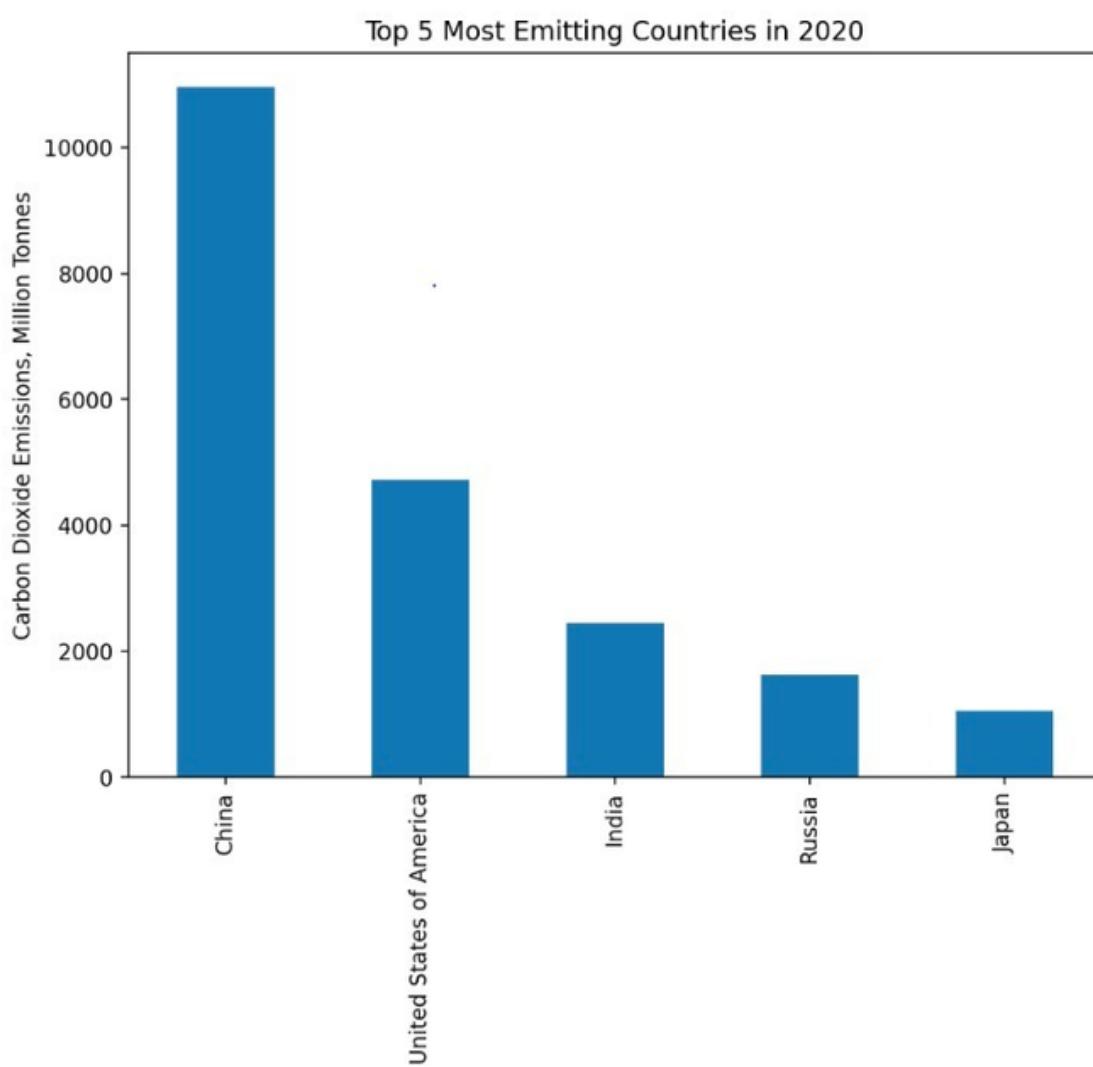
In this section, we will examine our various data from different databases in order to substantiate our earlier hypotheses. To facilitate a more illustrative representation, we have chosen to present the data in the form of graphs.



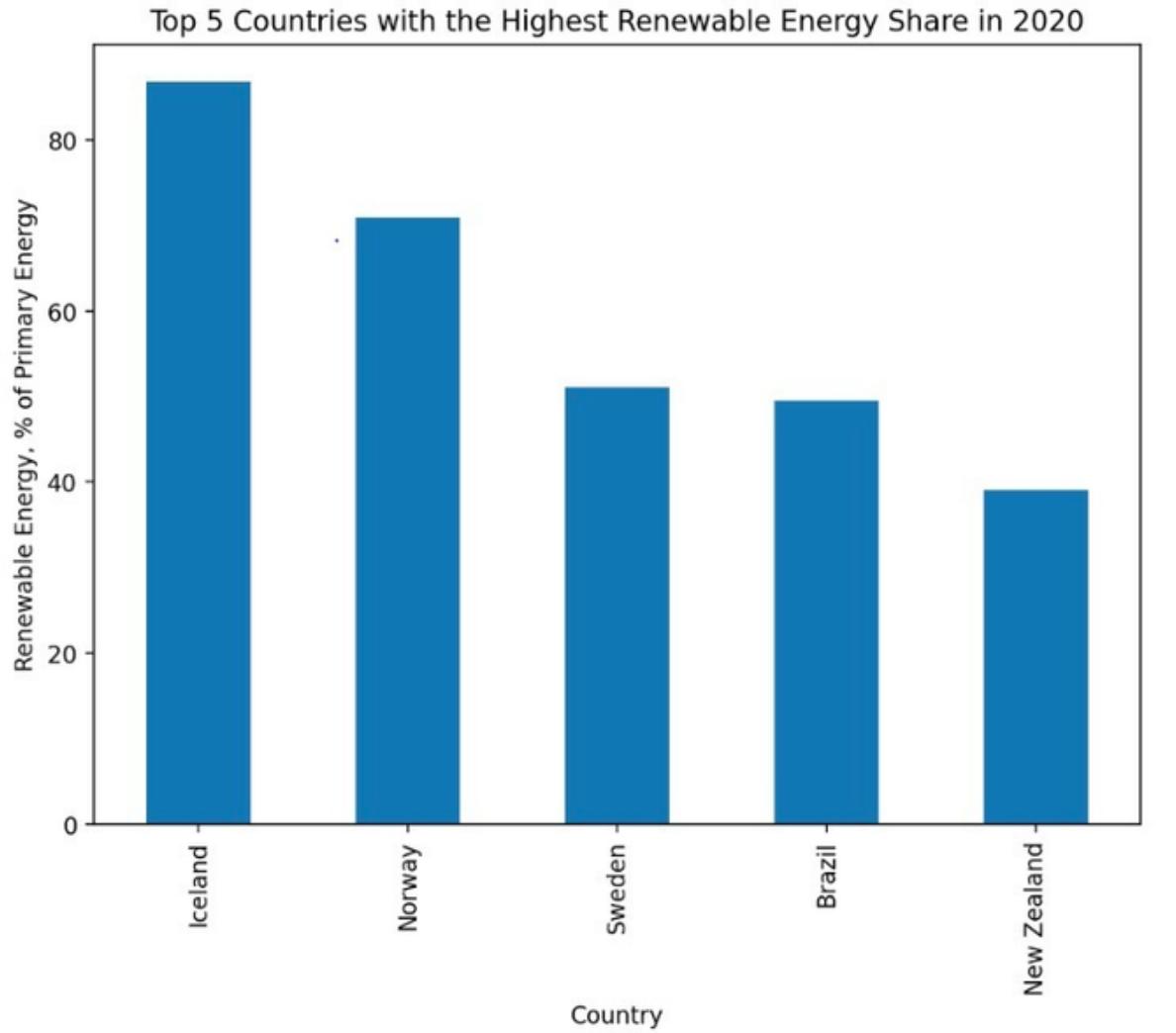
To begin with, we wanted to examine the carbon emissions of different continents. Based on the above graph, we can observe that Asia is the most polluting continent, followed by North America and then Europe, with a significant gap between them. One noteworthy observation is that Asia stands out as the highest polluter and is well above all other continents. This reinforces our hypothesis that there is a positive correlation between population and carbon emissions. Additionally, it can be inferred that there is also a positive correlation between GDP and CO<sub>2</sub> emissions. Furthermore, as we previously observed that China, Russia, and the USA are among the top polluting countries, it is not surprising to see that the three most polluting continents are Asia, North America, and Europe.

According to the Our World in Data website, the three most populous continents, namely Asia, Europe, and the Americas (North and South America combined), are precisely the three most polluting continents, with Africa additionally included. However, when we consider the continents that generate the highest GDP, it is once again the same three most polluting continents, but Africa falls behind.

These observations help explain the positive correlation between GDP and carbon emissions. However, while population can be a factor that explains the quantity of carbon emissions, we cannot assert that there is a positive correlation between population and carbon emissions, as Africa demonstrates the opposite trend.



By sorting and analyzing our data, we can observe from the above graph that the countries contributing the most to pollution are China, the USA, India, Russia, and Japan. We can further observe that population remains a factor influencing carbon emissions and that there is a positive correlation between GDP and carbon emissions. Despite being a developing country, India has a significant GDP due to a large number of businesses being located there for cheap labor.



When it comes to renewable energy, we can observe that Nordic countries, such as Iceland, Norway, Sweden are among the top performers. Additionally, countries like New Zealand and Brazil are also prominent in renewable energy adoption. There is a strong correlation between these countries and their commitment to renewable energy sources. They have implemented progressive policies, invested in renewable infrastructure, and have favorable natural conditions that allow for the effective utilization of renewable resources such as hydropower, wind, and geothermal energy. Their efforts in promoting and utilizing renewable energy have contributed to their high rankings in renewable energy usage and sustainability.

# CORRELATION MATRIX :

In order to further investigate the factors that have a positive correlation with carbon emissions, we have decided to create a correlation matrix. Previously, we established that for Africa, the correlation between carbon emissions and population is not positive. Africa is a continent that does not pollute as much compared to its population size. However, should we dismiss this correlation based on just one continent? To ensure accuracy, we have decided to create this matrix, as shown in the image below. We can observe that there is indeed a positive correlation between CO2 emissions and both population and GDP.

	CO2 emissions	Renewable energy %	Population	GDP	Gini
CO2 emissions	1	-0.1248	0.7241	0.8662	0.1353
Renewable energy %	-0.1248	1	-0.0763	-0.0889	0.1422
Population	0.7241	-0.0763	1	0.4536	0.1448
GDP	0.8662	-0.0889	0.4536	1	0.1304
Gini	0.1353	0.1422	0.1448	0.1304	1

# CONCLUSION

This report provides a comprehensive analysis of the key factors impacting CO<sub>2</sub> emissions and offers insights into the necessary considerations for countries aiming to reduce their carbon footprint. Furthermore, it highlights the crucial efforts required in the realm of renewable energy to foster sustainability.

In order to effectively decrease CO<sub>2</sub> emissions and promote the use of renewable energies, several measures need to be implemented. These measures include:

- Transitioning to renewable energy sources: Countries should prioritize shifting from fossil fuels to renewable energy sources such as solar, wind, hydro, and geothermal power. This involves investing in infrastructure development, incentivizing renewable energy projects, and promoting research and development in renewable energy technologies.
- Energy efficiency and conservation: Emphasizing energy efficiency measures is crucial for reducing CO<sub>2</sub> emissions. This can be achieved through initiatives such as promoting energy-efficient appliances and buildings, implementing energy-saving practices in industries, and encouraging the adoption of energy-efficient transportation systems.
- Carbon pricing and incentives: Implementing carbon pricing mechanisms, such as carbon taxes or cap-and-trade systems, can provide economic incentives for industries and individuals to reduce their carbon emissions. These measures encourage the transition to cleaner energy alternatives and discourage high-emitting activities.
- Sustainable transportation: Promoting the use of electric vehicles (EVs) and enhancing public transportation systems can significantly reduce carbon emissions from the transportation sector. Governments can offer incentives for EV adoption, expand charging infrastructure, and prioritize sustainable urban planning to encourage walking, cycling, and the use of public transportation.

- Reforestation and forest conservation: Protecting and restoring forests play a vital role in absorbing CO<sub>2</sub> from the atmosphere. Governments can implement policies to prevent deforestation, promote sustainable land management practices, and support reforestation initiatives to enhance carbon sinks.
- International cooperation: Addressing climate change requires global collaboration. Countries can work together to share best practices, technologies, and resources for renewable energy development, emissions reduction strategies, and capacity building.
- Public awareness and education: Educating the public about the importance of reducing CO<sub>2</sub> emissions and transitioning to renewable energy sources is crucial. Governments can launch public awareness campaigns, provide information and resources, and integrate sustainability education into school curricula to foster a widespread understanding of climate change and its solutions.

By implementing these measures, countries can significantly contribute to reducing CO<sub>2</sub> emissions and promoting sustainable development through the increased utilization of renewable energy sources.

