



Sustainable Development and Climate Change

Presented By

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WHO ARE WE?



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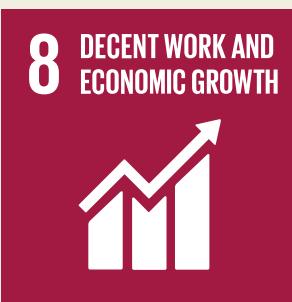
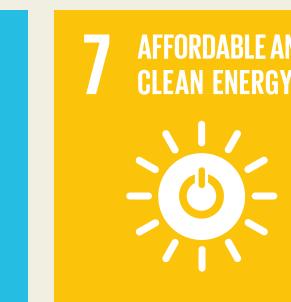
Conclusion

Introduction

A brief look into sustainable development goals, climate change and our main objective.



THE GLOBAL GOALS



The 17 Sustainable Development Goals

The Sustainable Development Goals (SDGs), also known as Global Goals, are a set of 17 integrated and interrelated goals to end poverty, protect the planet and ensure that humanity enjoys peace and prosperity by 2030.

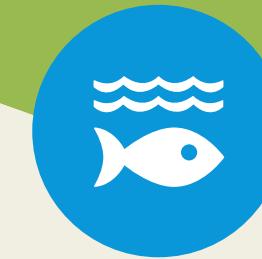
Reporting on the SDGs is important in communicating to stakeholders the company's commitment to contributing to the Global Goals; claiming accountability and responsibility to take the necessary actions; and measuring progress over time.

Our Priority SDGs



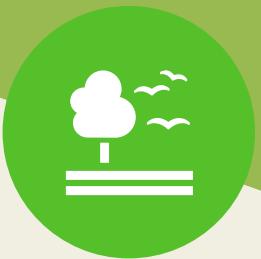
SDG 13

Take urgent action to combat climate change and its impacts



SDG 14

Conserve and sustainably use the oceans, seas, and marine resources for sustainable development



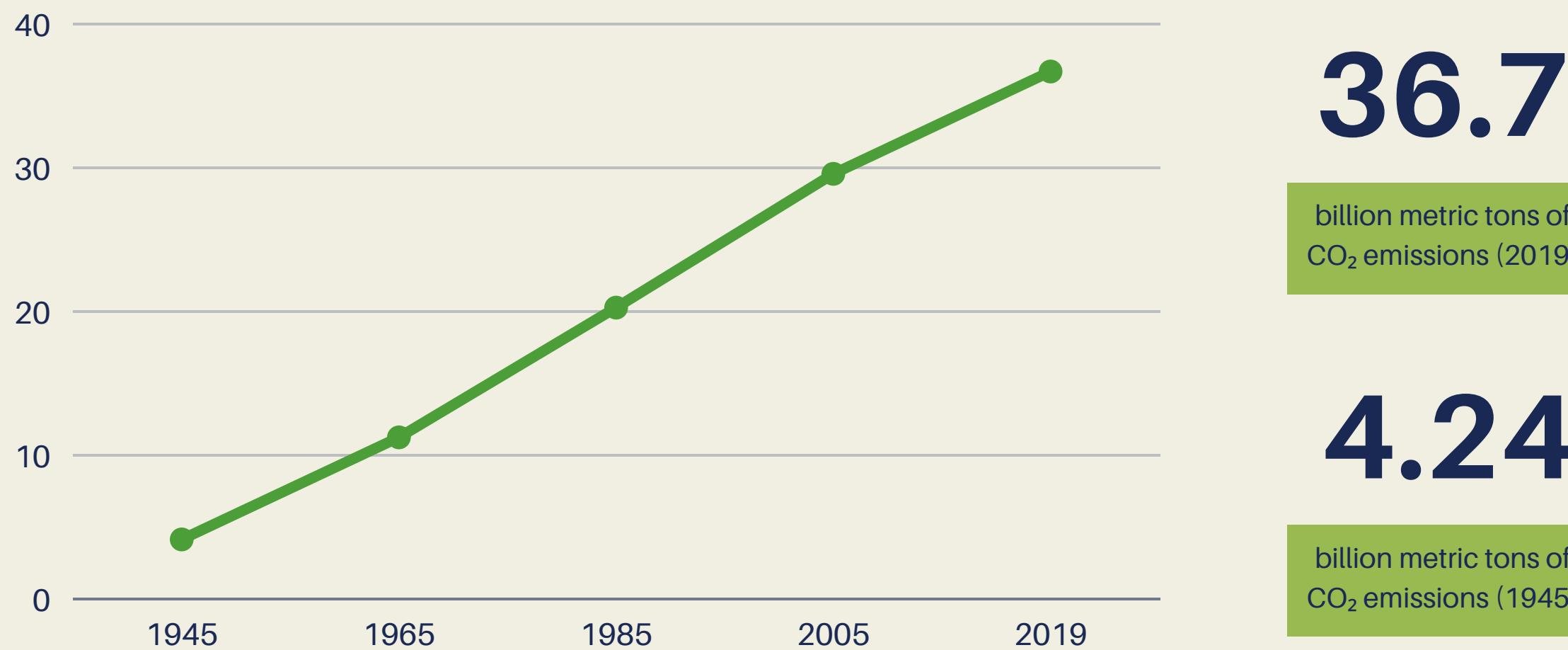
SDG 15

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

There are 17 SDGs and 169 targets in total. While they are all important and interrelated, we will focus on three goals that align perfectly with our vision as a team and with the hackathon theme.

What is Climate Change?

Climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, such as through variations in the solar cycle. But since the 1800s, human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil and gas.



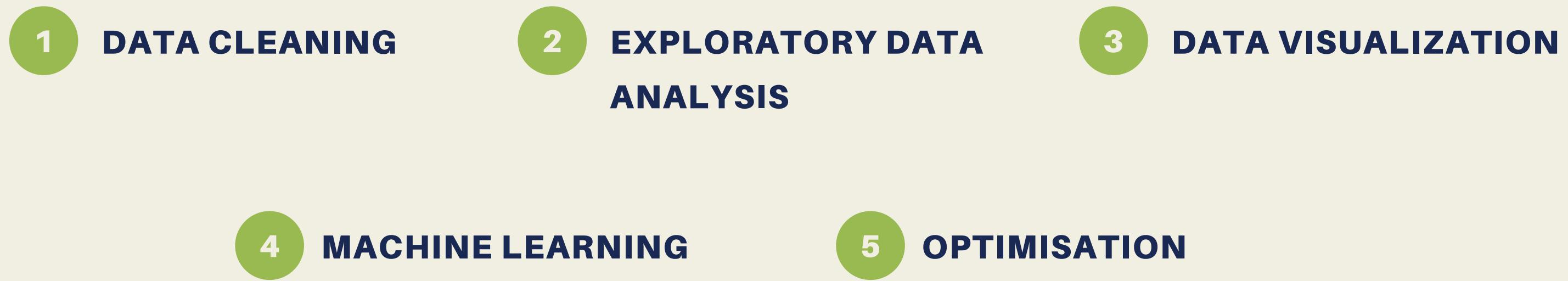
Objective

Understanding the causes, the effects and the proposed global solutions to climate change.

Studying the effects of climate change on life below water and life on land.



Project pipeline



Data Cleaning

Data cleansing or data cleaning is the process of detecting and correcting corrupt or inaccurate records.

Data Sources

The [World Bank data source](#) provides statistical and data work and maintains a number of macro, financial and sector databases. The Climate Change part of the website contains a group of featured indicators. The following indicators are examples of the main ones we used.

KEY INDICATORS

CO₂ emissions by country

CO₂ emissions by region

Total greenhouse gas emissions by country

Forest area (% of land area)

Temperatures by country

Global temperatures

Global ocean temperature anomalies (1880-2021)

Coal rents (% of GDP)

Oil rents (% of GDP)

The Data Cleaning process

-
- | | |
|---------------|------------------------------|
| STEP 1 | Checking for duplicates |
| STEP 2 | Fixing structural errors |
| STEP 3 | Dropping unnecessary columns |
| STEP 4 | Dropping unnecessary rows |
| STEP 5 | Renaming columns |
| STEP 6 | Checking missing values |
-

Data cleaning example

This example is taken from our project code. Check the notebooks for the full source code.

```
#read data (CO2 emissions in kiloton (kt) by country)
co2_by_country = pd.read_excel('CO2 emissions by country.xlsx')

#drop unnecessary columns
co2_by_country.drop(['Indicator Name', 'Indicator Code', 'Country Code'],
                     axis=1, inplace=True)

#drop NaN columns
co2_by_country.drop(co2_by_country.loc[:, '1960':'1989'], axis=1, inplace=True)
co2_by_country.drop(co2_by_country.loc[:, '2020':'2021'], axis=1, inplace=True)

#change index
co2_by_country.set_index('Country Name', inplace=True)
co2_by_country.index.name = ''

#fix data types
co2_by_country.columns = pd.to_datetime(co2_by_country.columns).year

#rotate
co2_by_country = co2_by_country.T
co2_by_country.index.name = 'year'
co2_by_country.columns.name = 'country'

#drop columns where all elements are NaN
co2_by_country.dropna(axis=1, how='all', inplace=True)
```

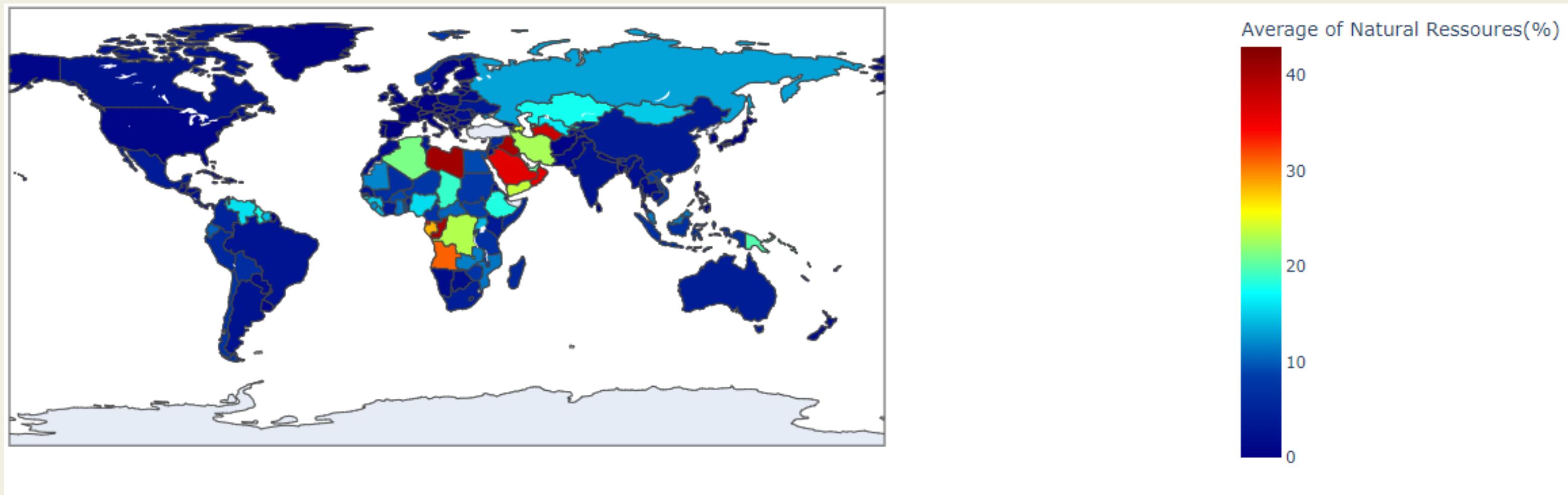
Exploratory Data Analysis

Exploratory Data Analysis refers to the critical process of performing initial investigations on data so as to discover patterns, spot anomalies, test hypothesis and check assumptions.

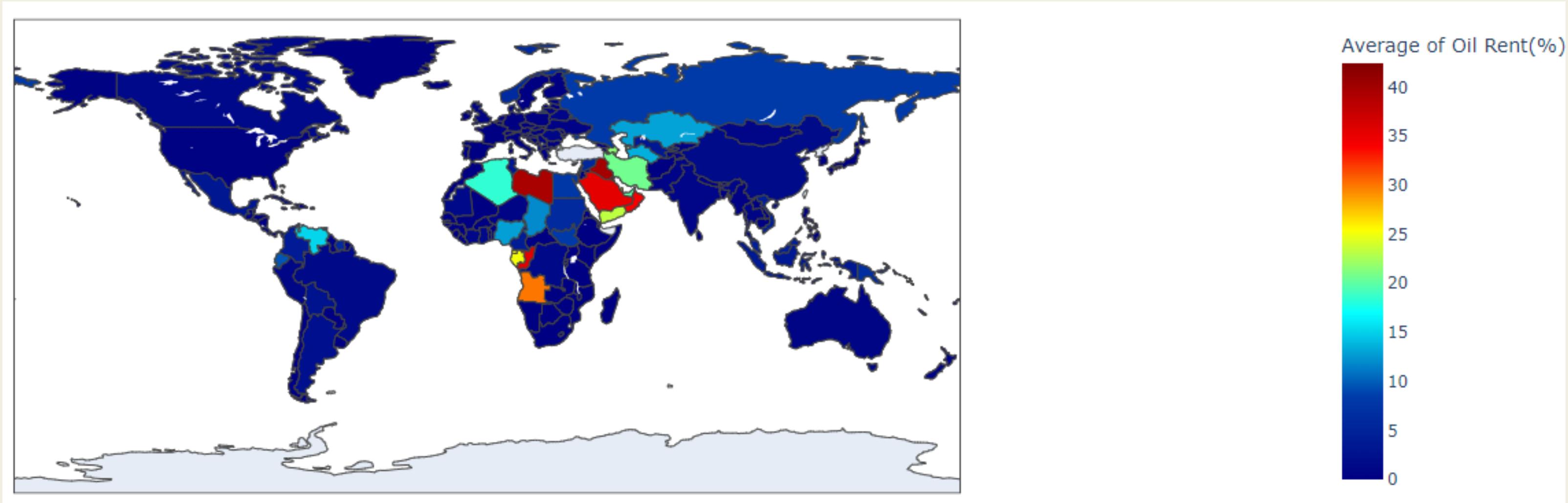
Part 1: Energy

Understanding how The rise of Food and Energy impact on the poverty,
Hunger and inequalities.

Do all countries emit the same amount of natural resources?

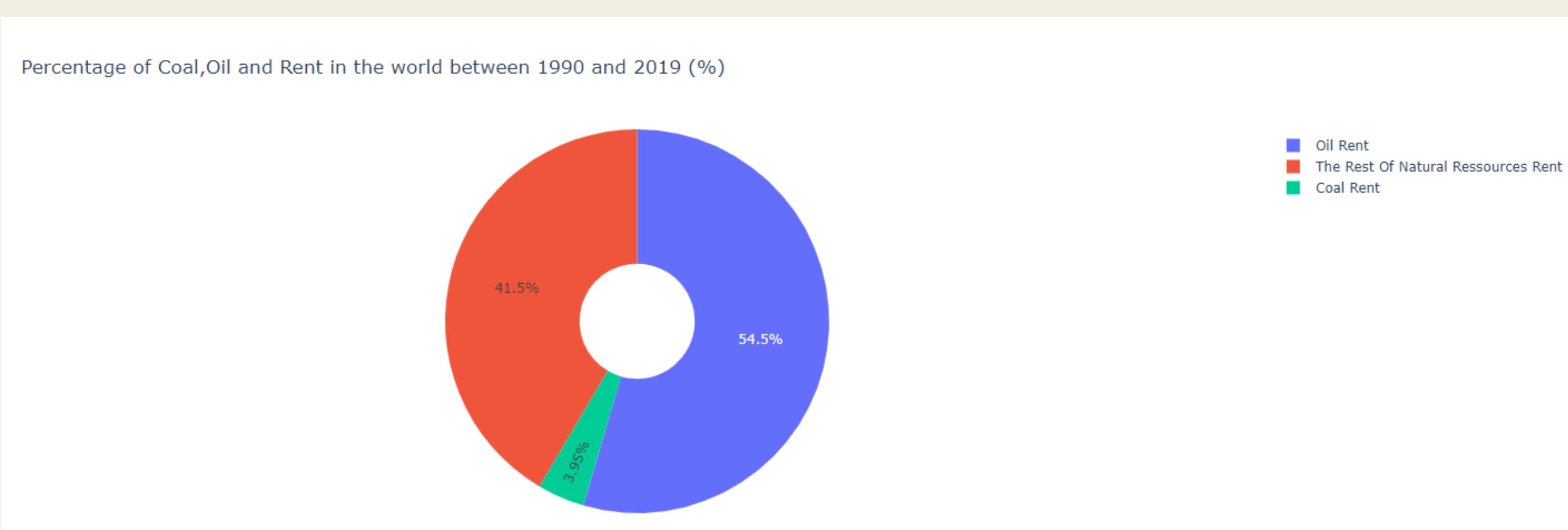


How about oil resources in particular?



How dependent are we on oil and coal energy?

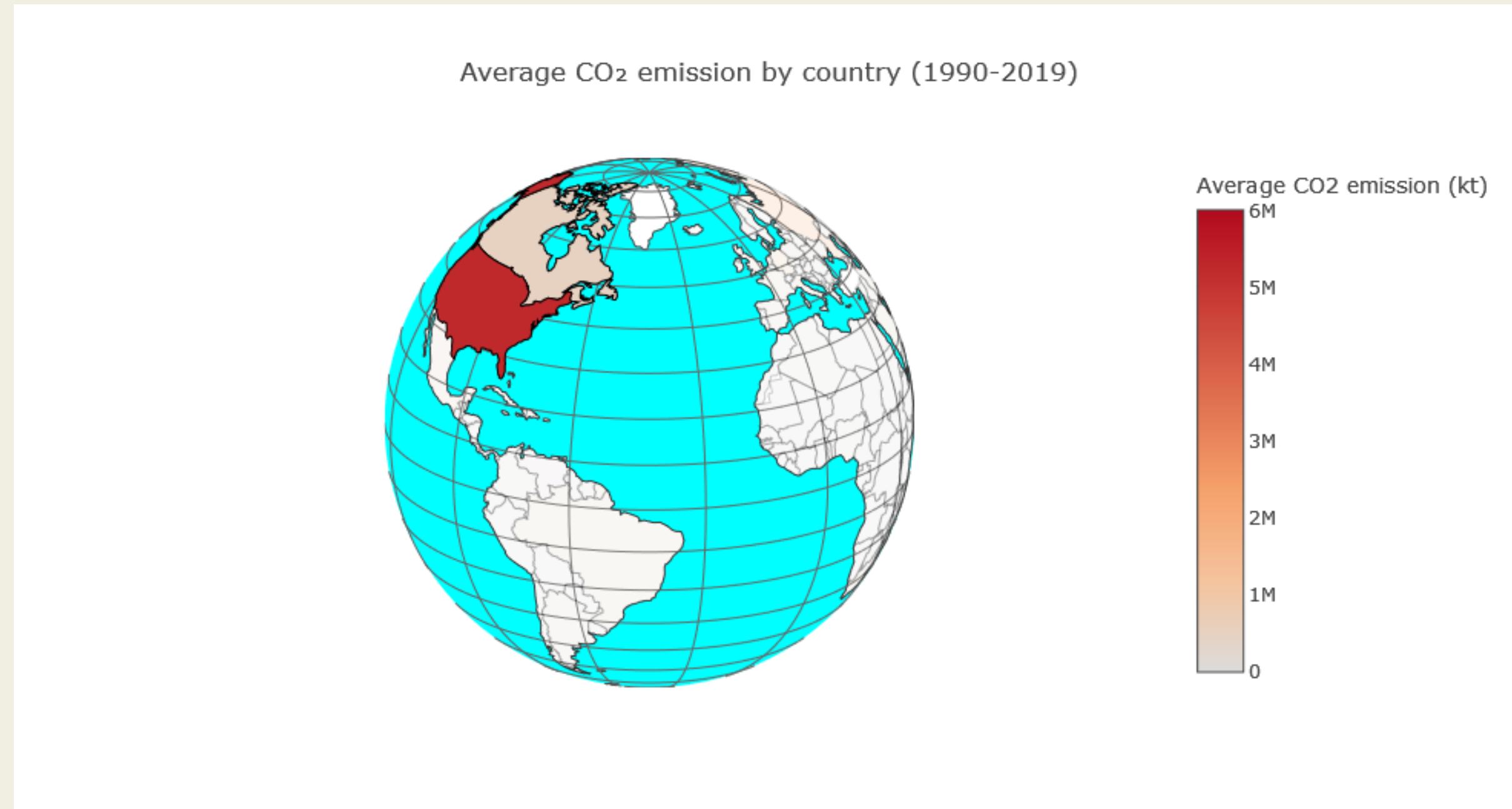
Oil and coal are our most used natural resources



Part 2: Greenhouse gas emissions

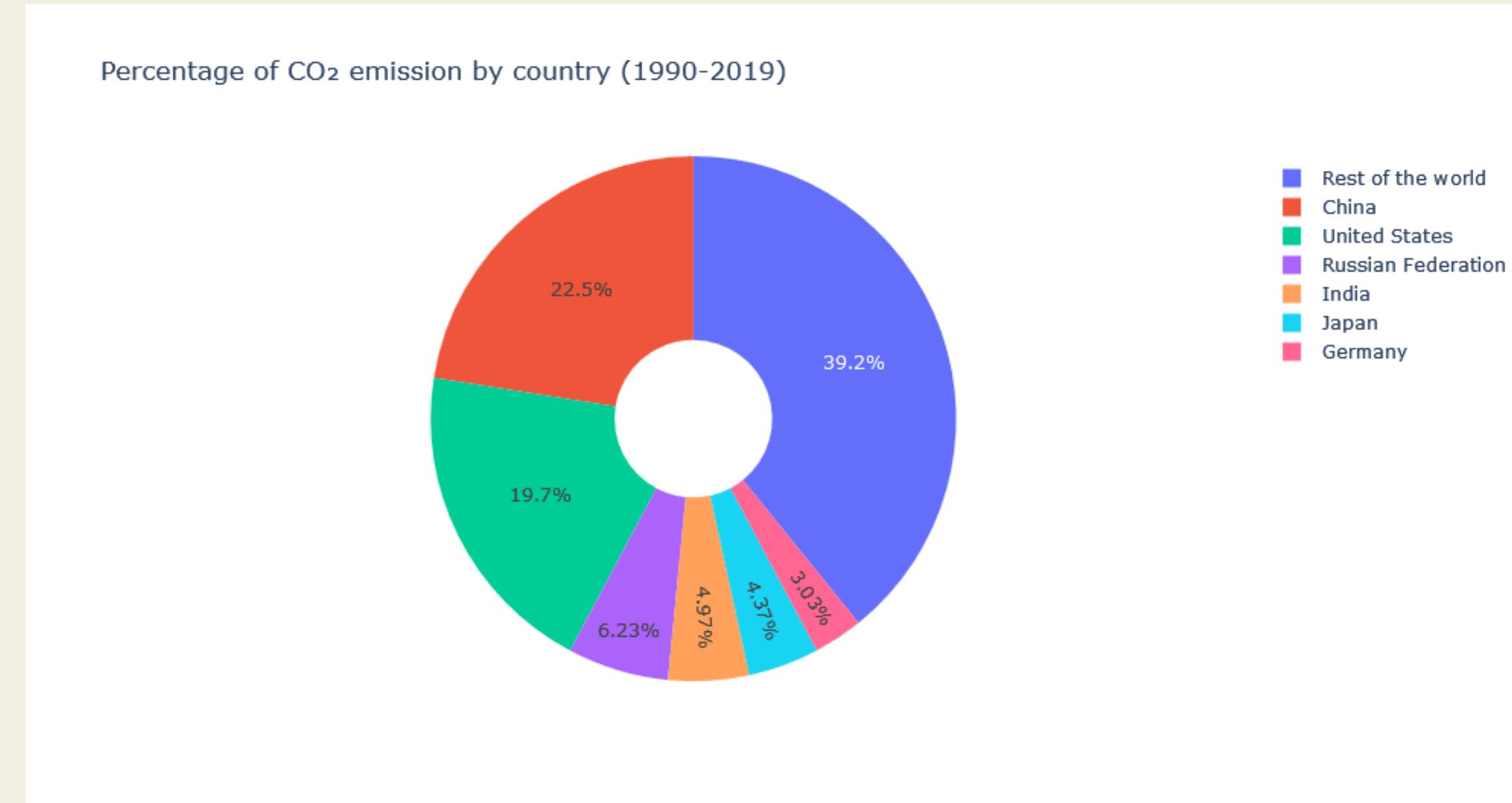
Understanding the evolution of greenhouse gas emissions globally and by country, especially CO₂.

Do all countries emit the same amount of CO₂?



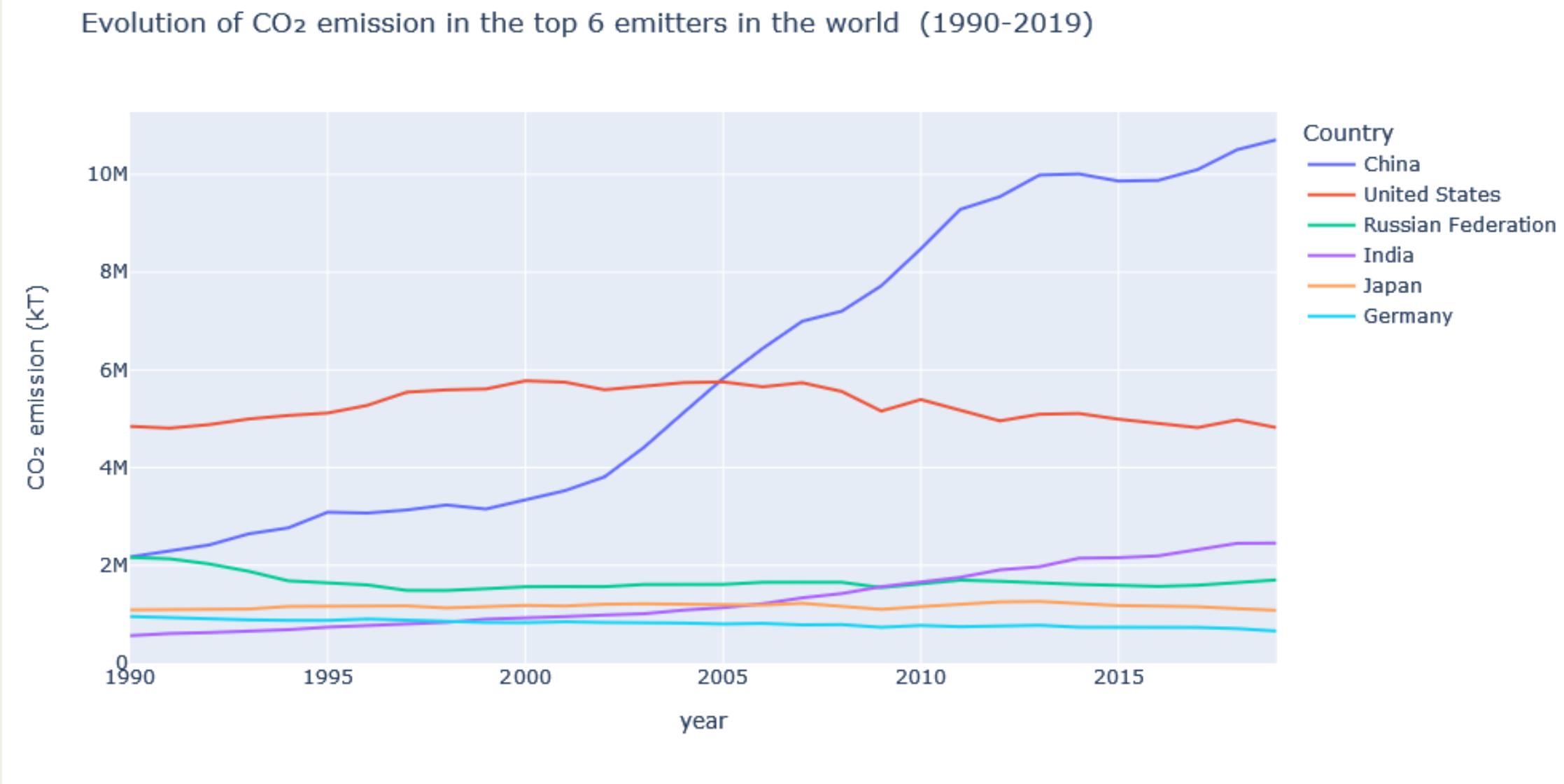
Do all countries emit the same amount of CO₂?

China and the US alone accounted for nearly 43 percent of the world's CO₂ emissions between 1990 and 2019.



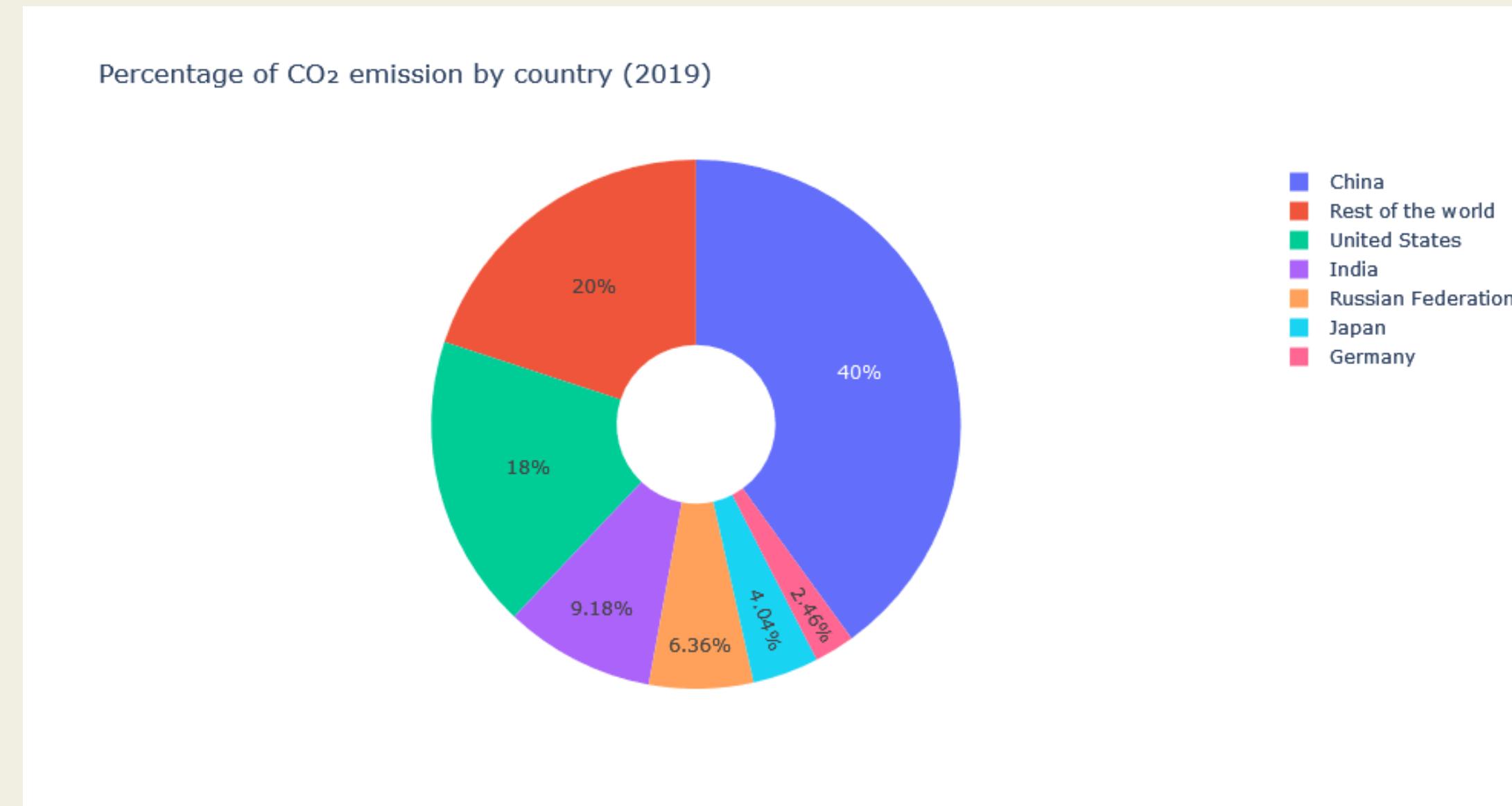
How did the emission change in the top emitters?

The emission in China skyrocketed since 2002 (it kept increasing even after the Paris agreement in 2016).



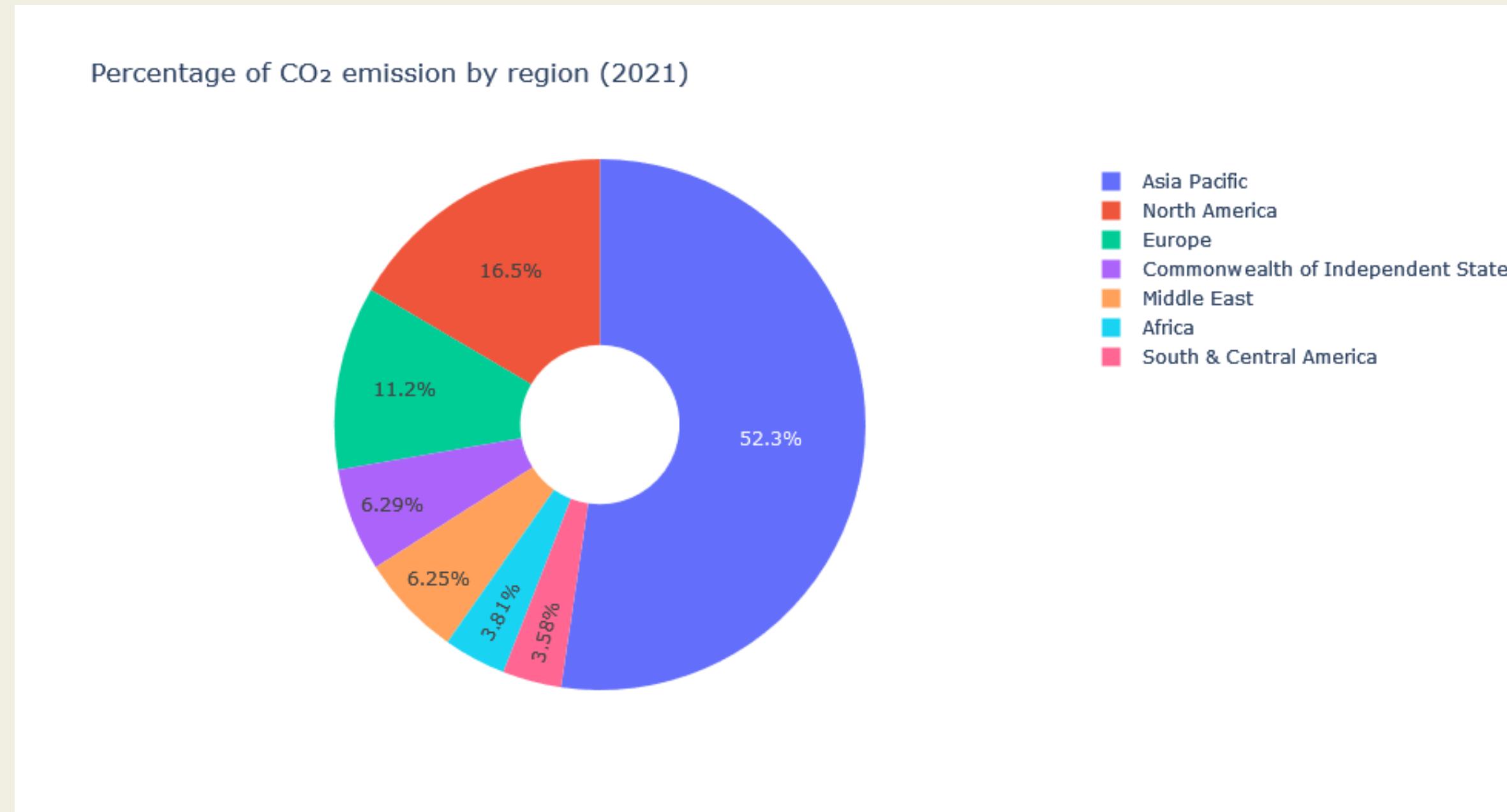
How much did the emission increase in China?

China was responsible for 40% of the world's CO₂ emission in 2019!



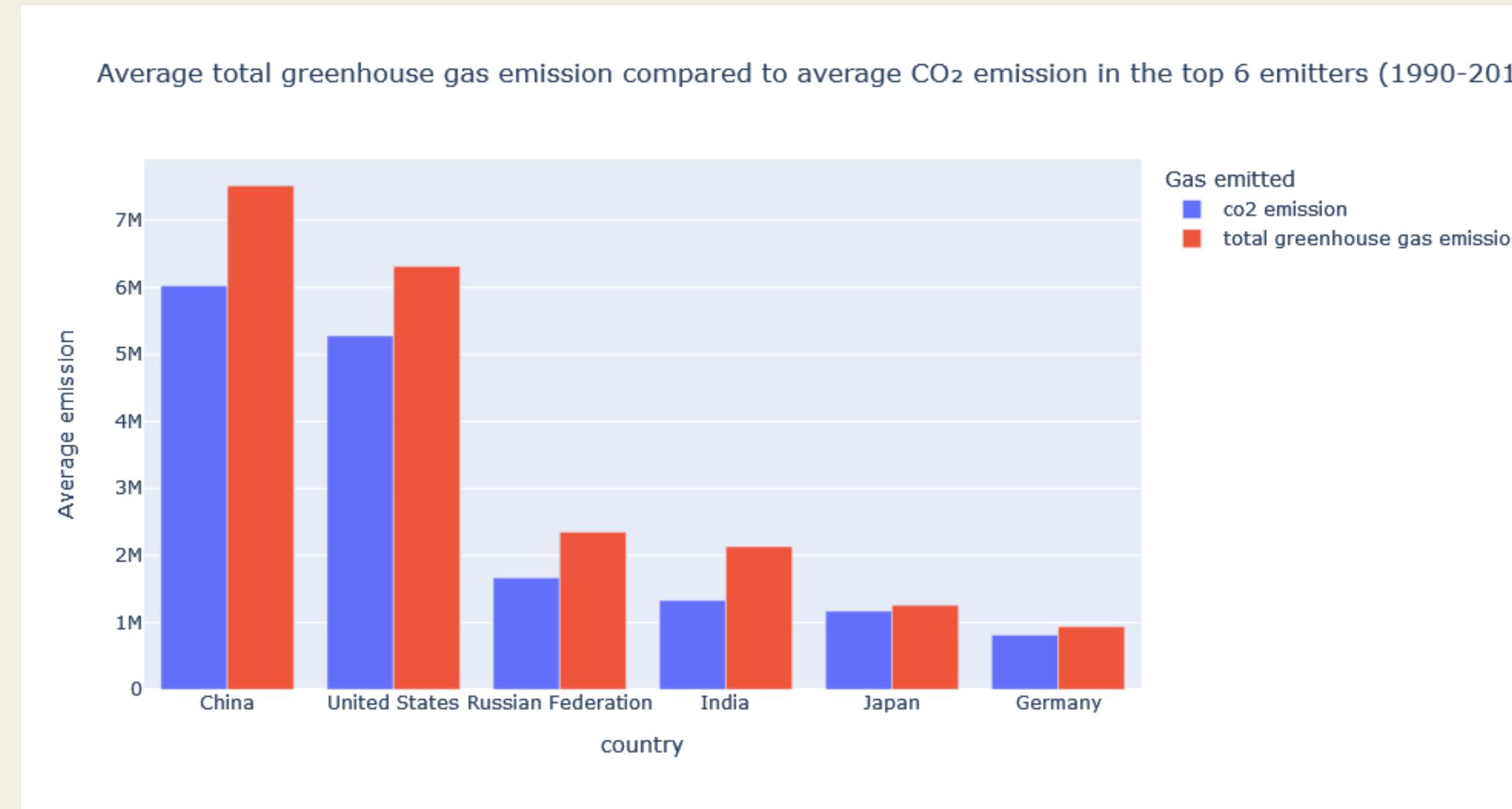
How about regions?

The Asia-Pacific region produced 17.74 billion metric tons of CO₂ emissions in 2021. This was more than the combined total emissions of all other regions that year.



Total greenhouse gas vs CO₂

CO₂ accounts for about 76% of total greenhouse gas emissions.

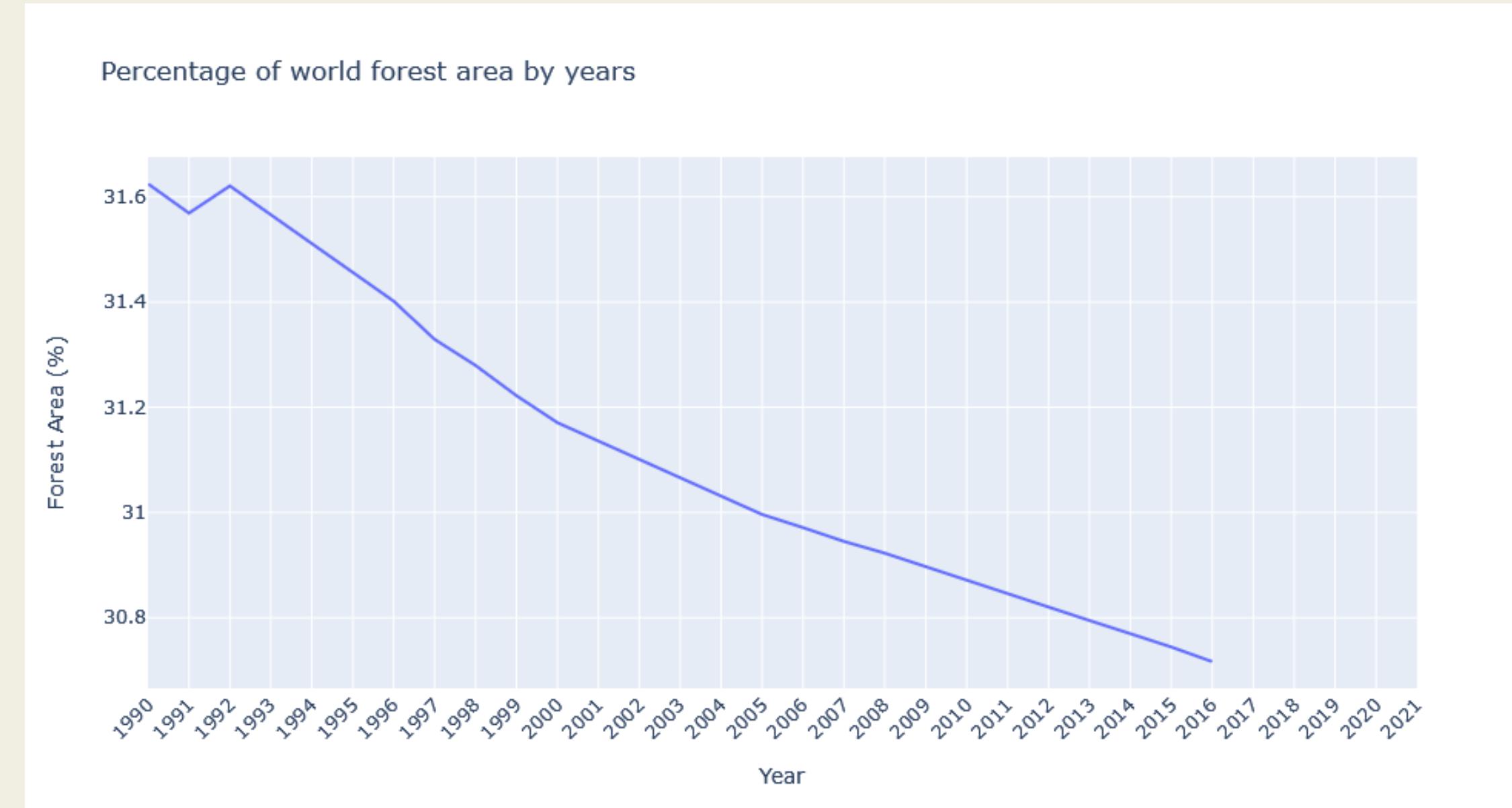


Part 3: Forest area

Understanding the evolution of forest area globally over the years.

Forest area global evolution

The percentage of forest area in the world is decreasing through years.

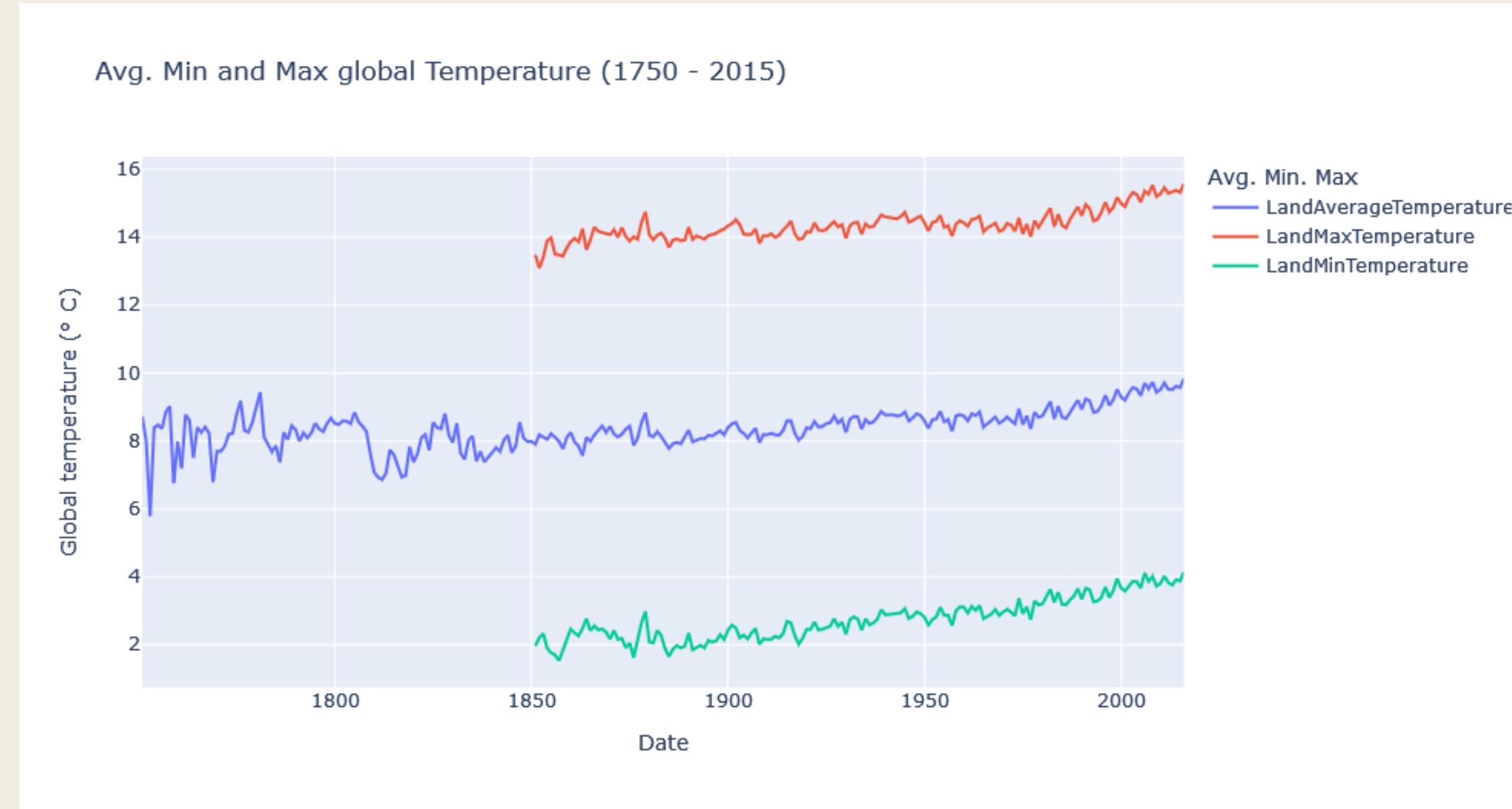


Part 4: Temperature

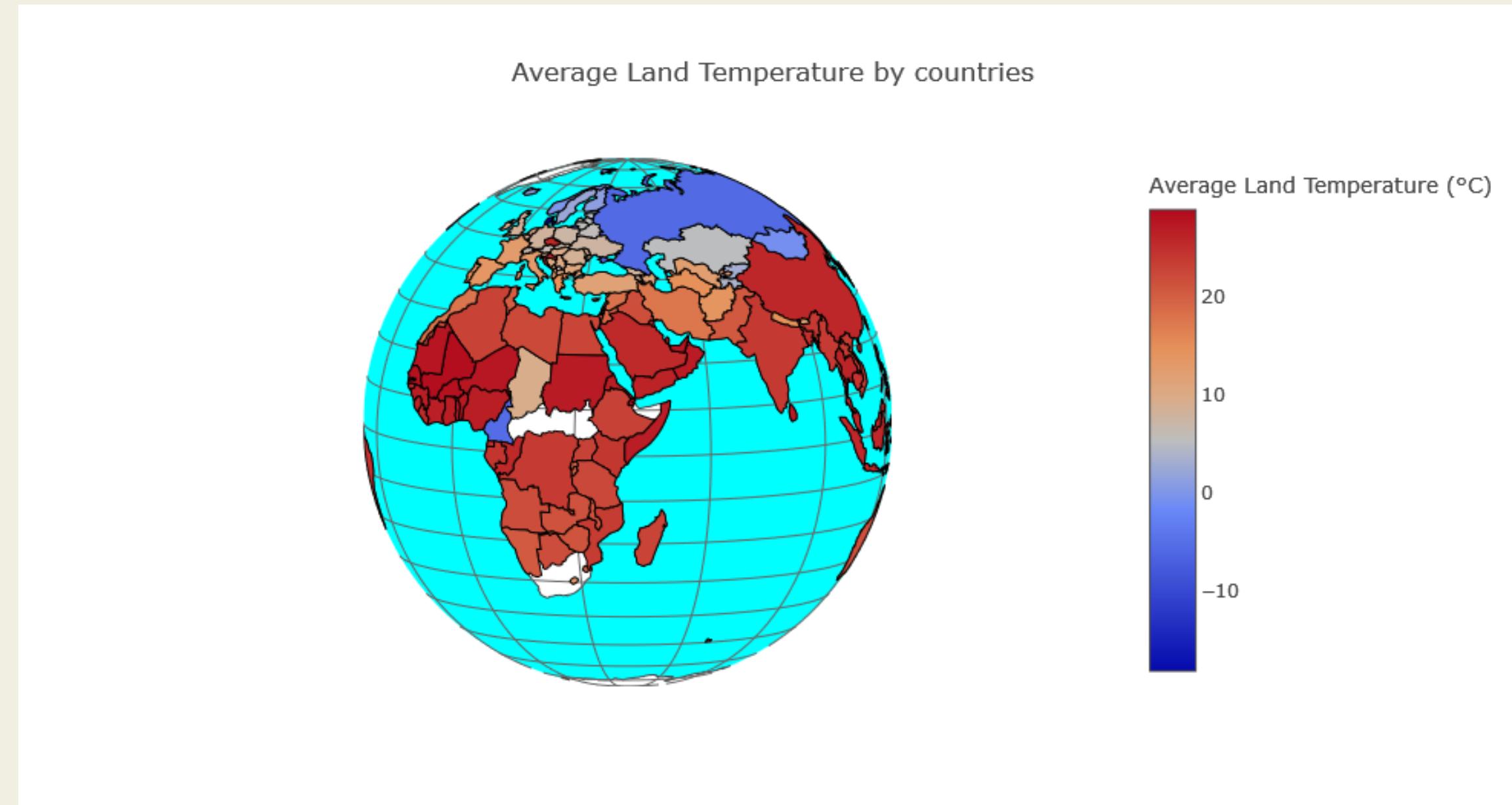
Understanding how much the rise of greenhouse gas emissions and decrease in forest area has affected the earth's temperature.

Land surface temperature

The average land temperature in the world is increasing through years.

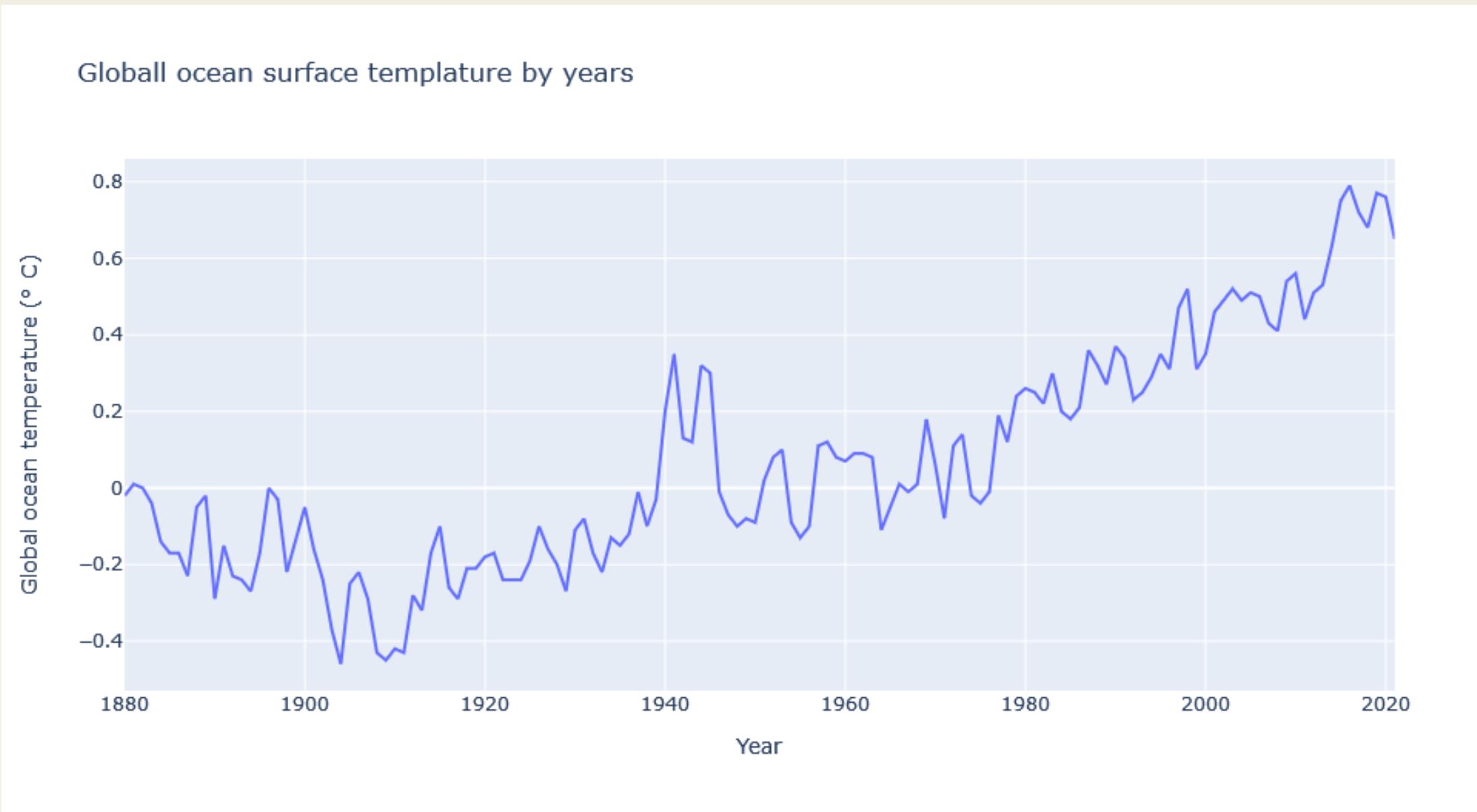


How does it variate by country?



Ocean surface temperature

The anomaly in ocean temperature in the world is also increasing through years.

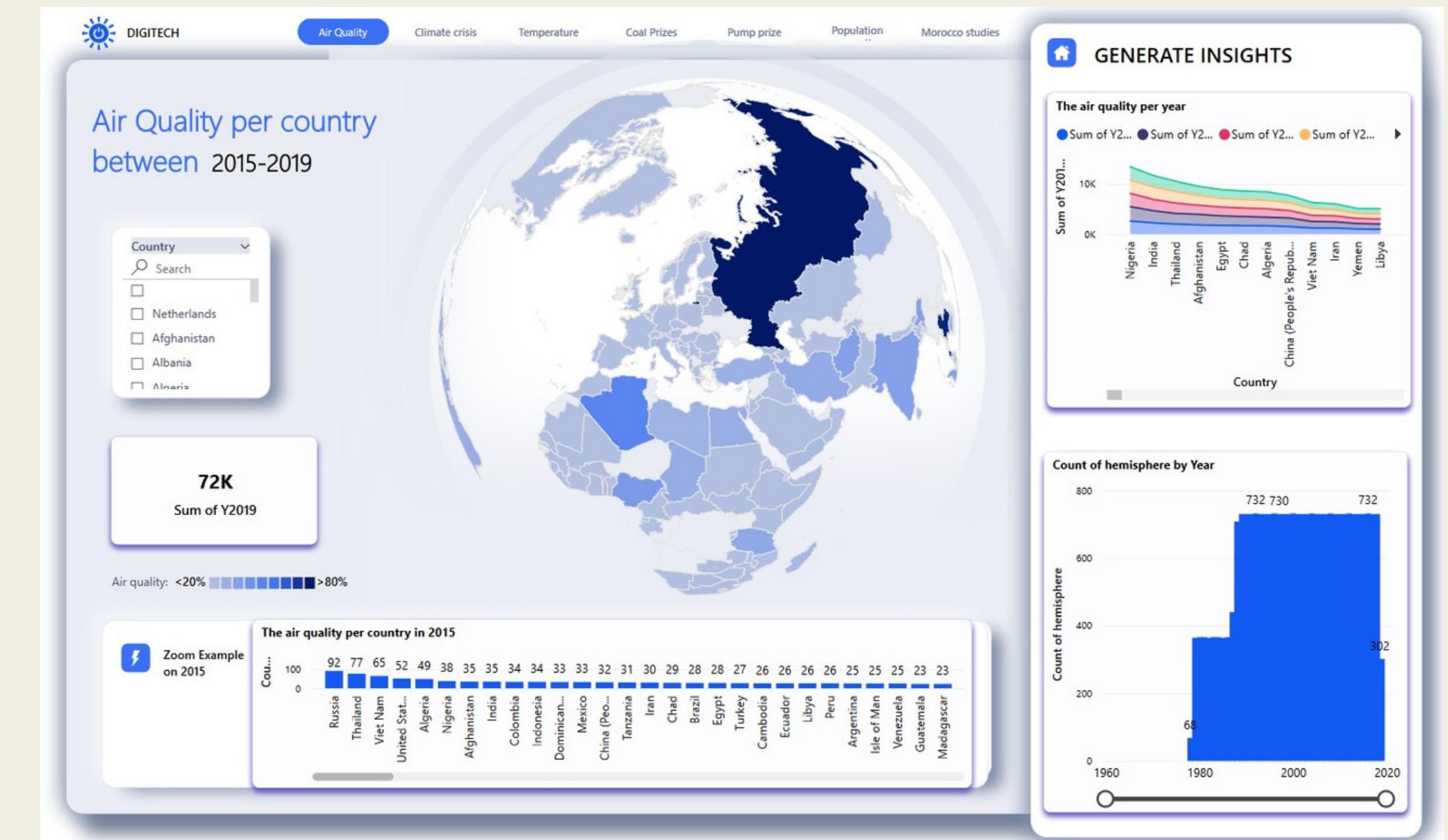


Data Visualization

Data visualization is the graphical representation of information and data.
By using visual elements like charts, graphs, and maps.

Dashboard example

This is just an example of the dashboards created.
A full compilation of dashboards is provided with the project to fully visualize the data.

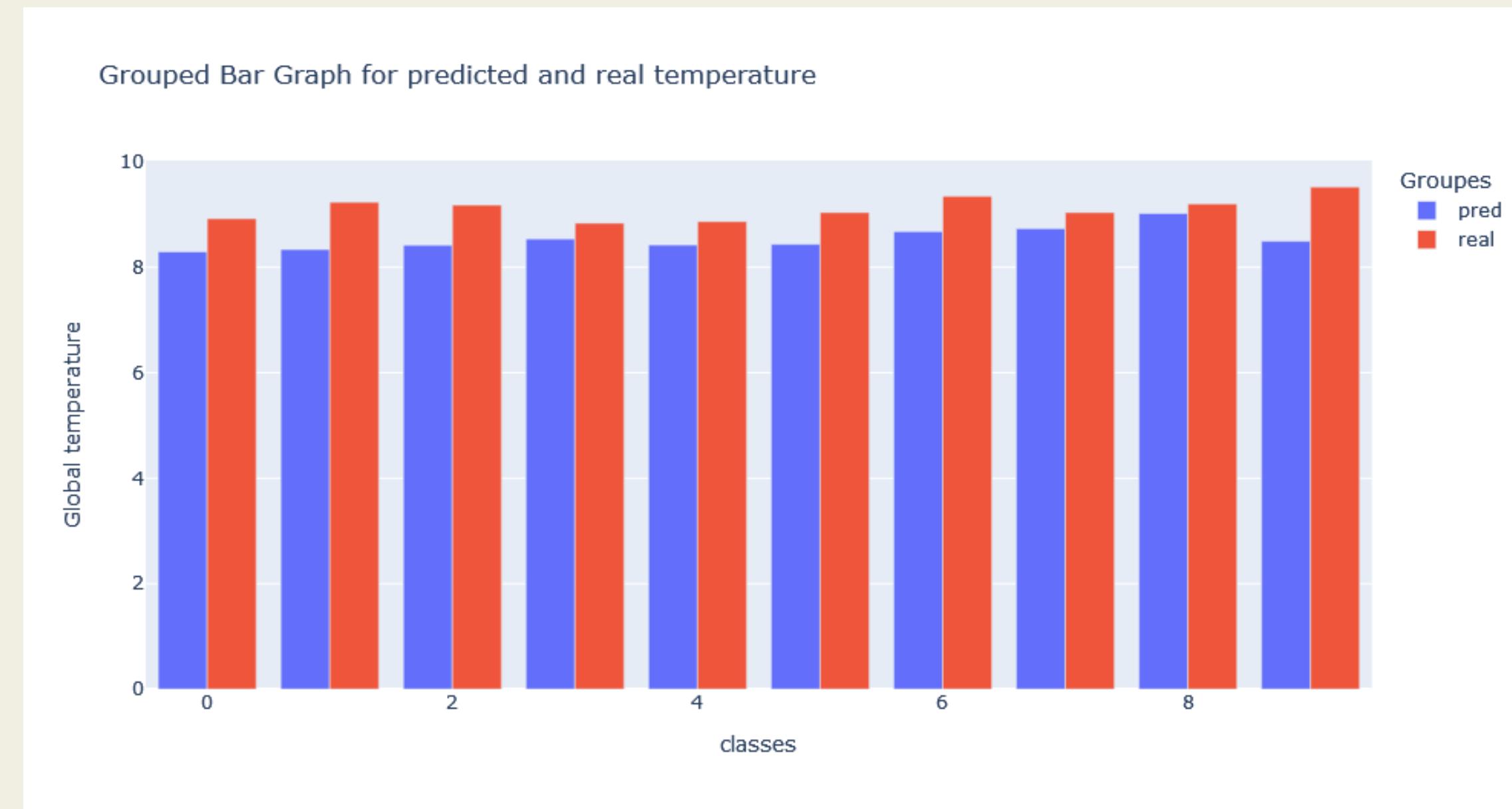


Machine Learning

Using a machine learning model to predict the global temperature for the next 10 years.

Predicting the global temperature

We predicted the temperature for the next 10 years from the previous 116 years' data using an LSTM (Long Short-Term Memory) model with 3 Layers.

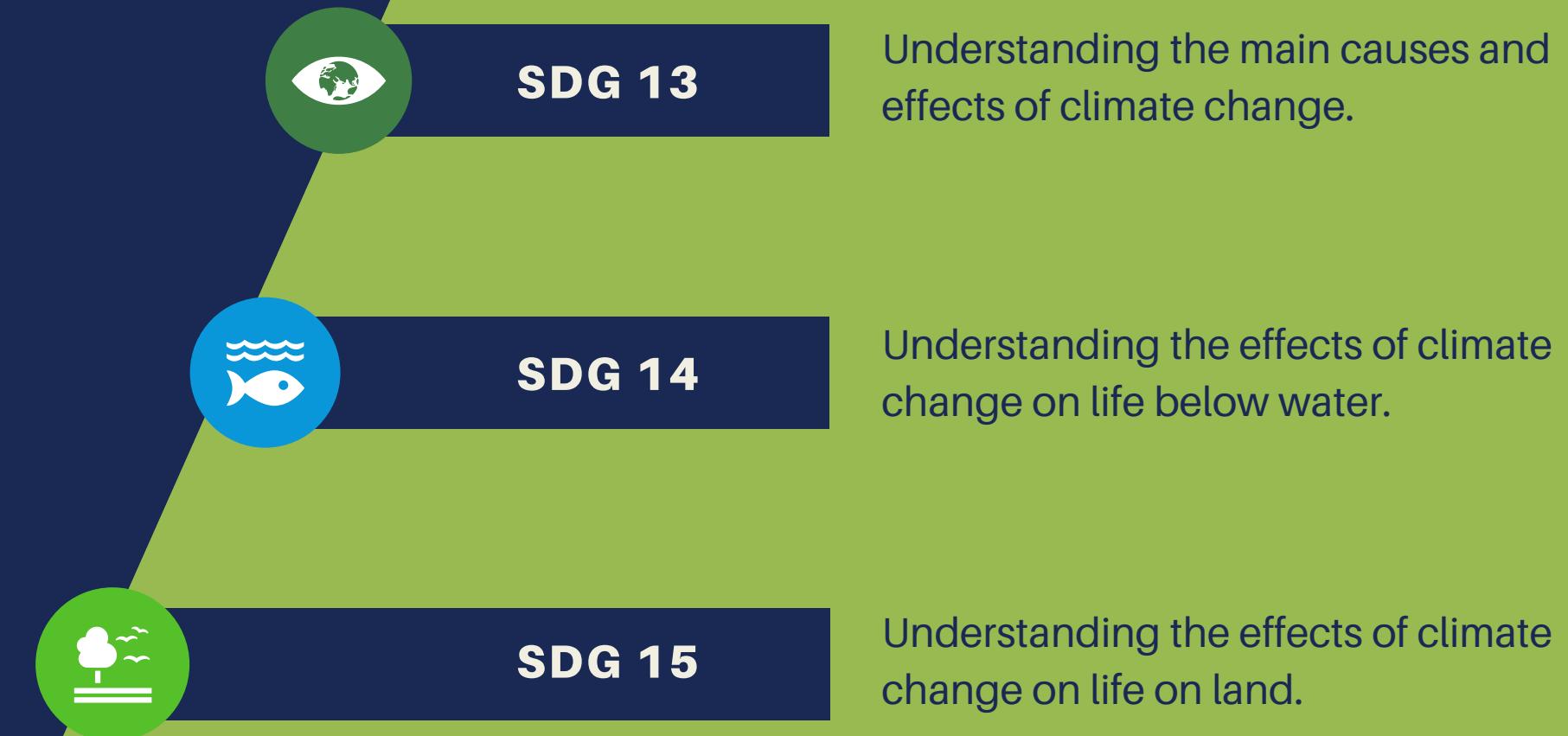


Conclusion

As part of the UN Big Data Hackathon 2022, we have worked on the climate change theme.

The project consisted of cleaning the world bank data related to climate change, getting insights from the data, visualizing the data and using machine learning to predict future data.

We have met our goals of understanding the causes and effects of climate change, and relating it to the main chosen SDGs.





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**We thank you for your continued support and
for giving us the opportunity to contribute to
the SDGs.**