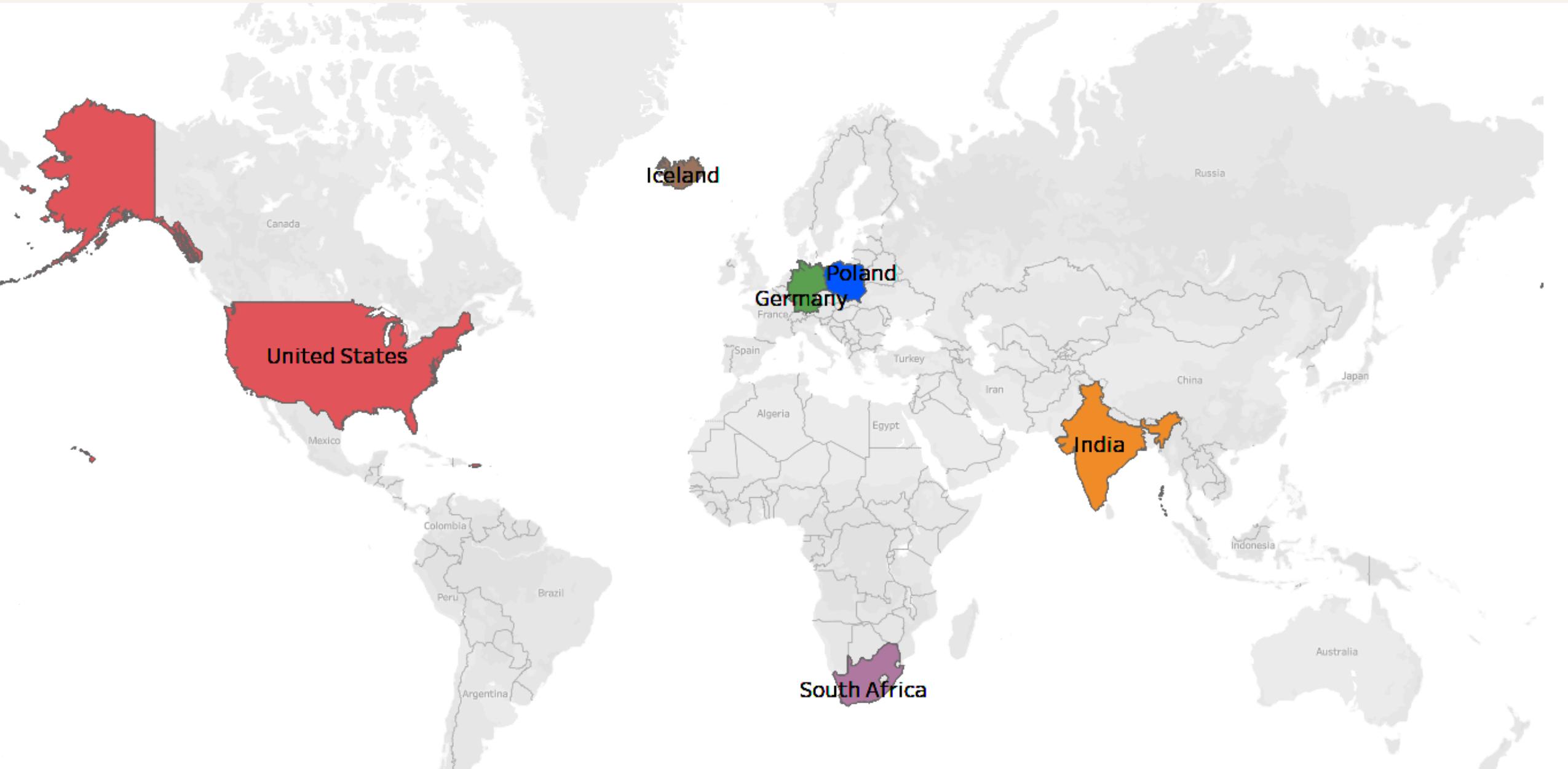


Some data in world & selected countries

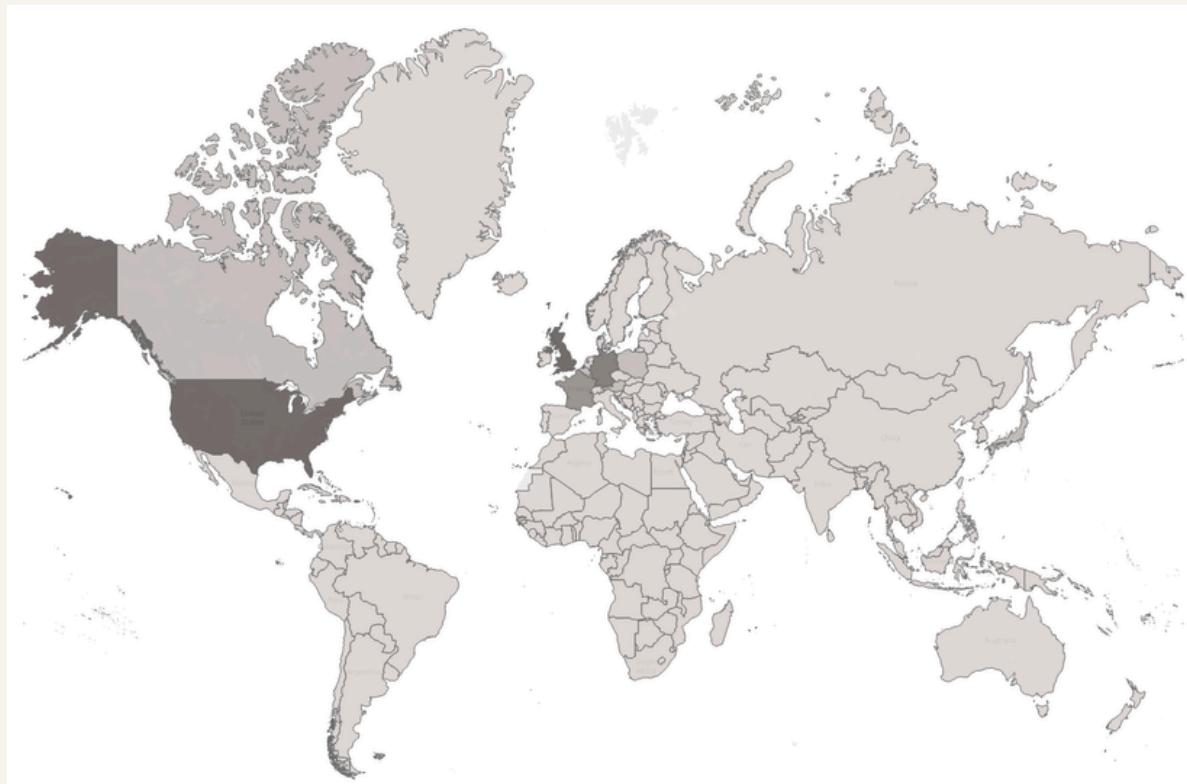


*Prepared as part of the Tech Leaders mentorship project
Magdalena Marszalek-Wasilewska*

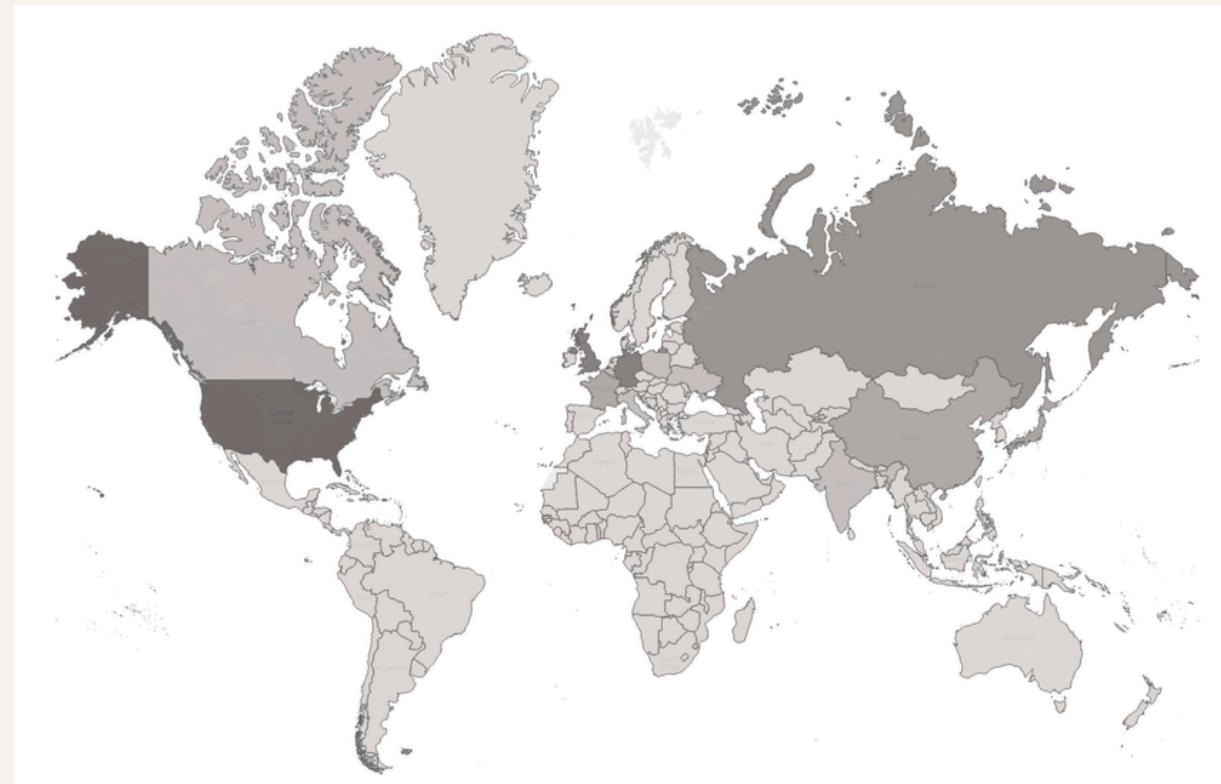
CO₂ emissions in 1920, 1980, and 2017

Emission level
Very Low (< 1 [MtCO ₂ e])
Low (>= 1 [MtCO ₂ e])
Medium (>= 3 [MtCO ₂ e])
Medium-High (>= 5 [MtCO ₂ e])
High (>= 9 [MtCO ₂ e])
Very High (>= 15 [MtCO ₂ e])

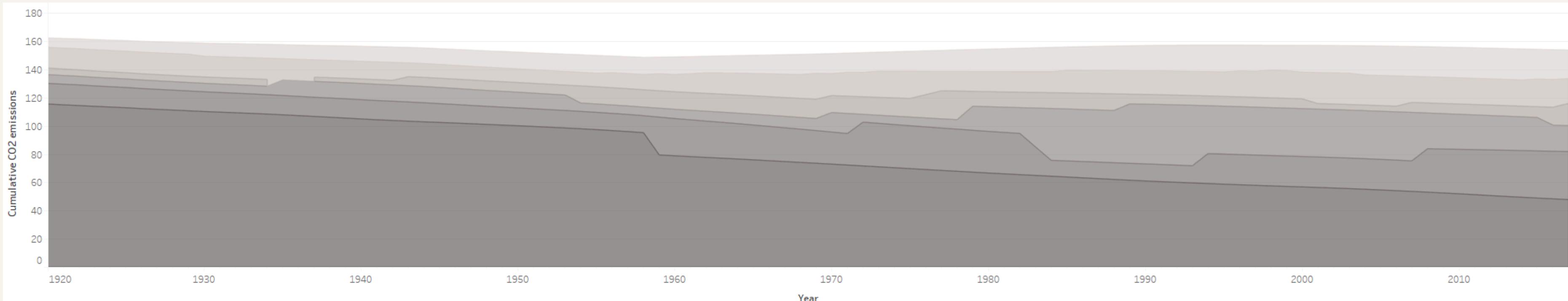
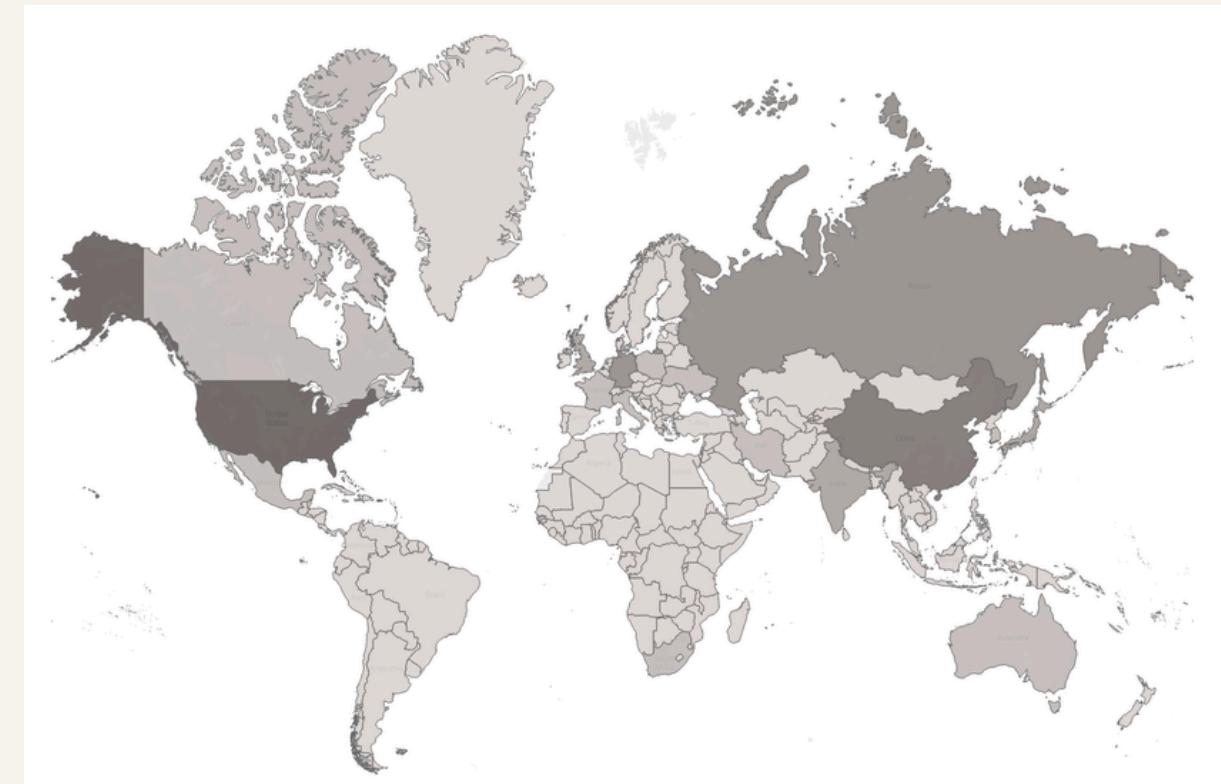
1920



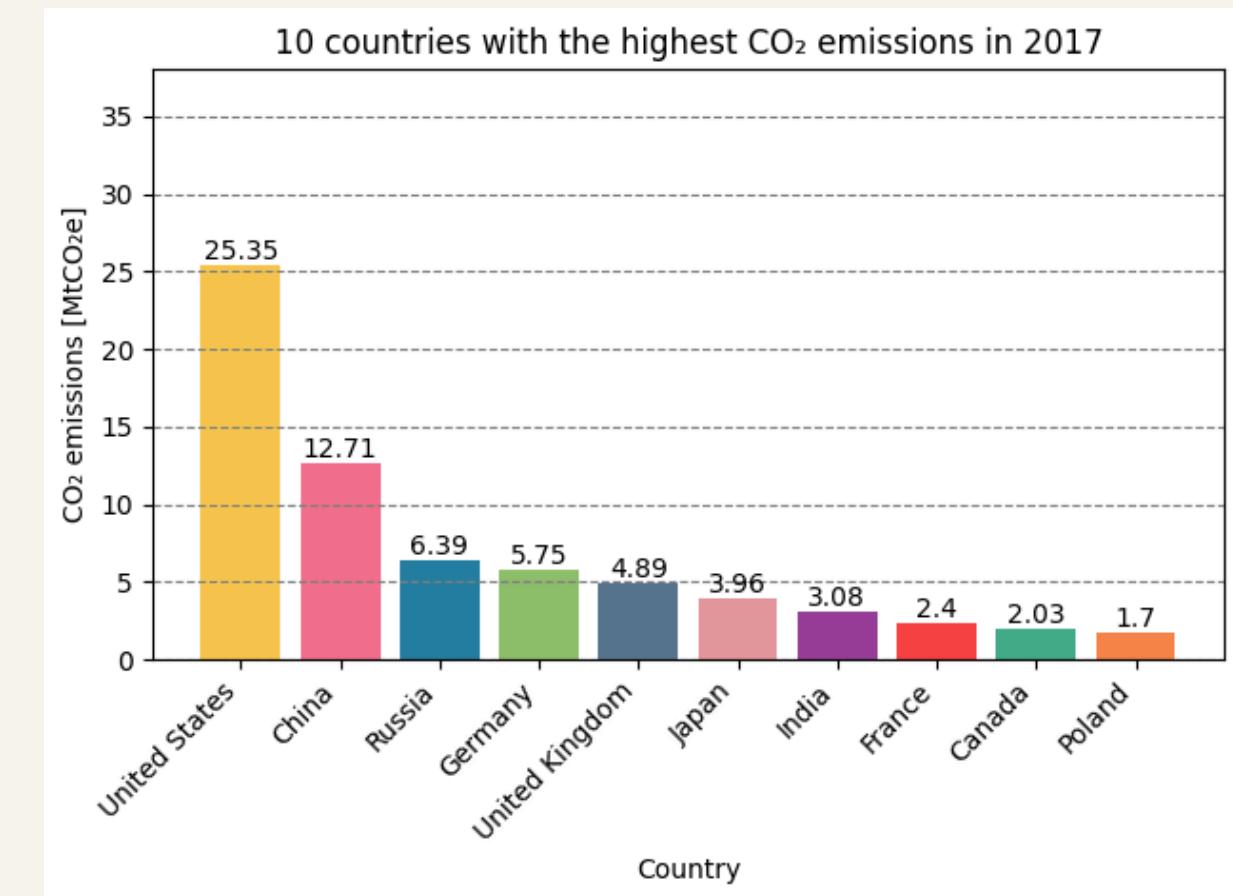
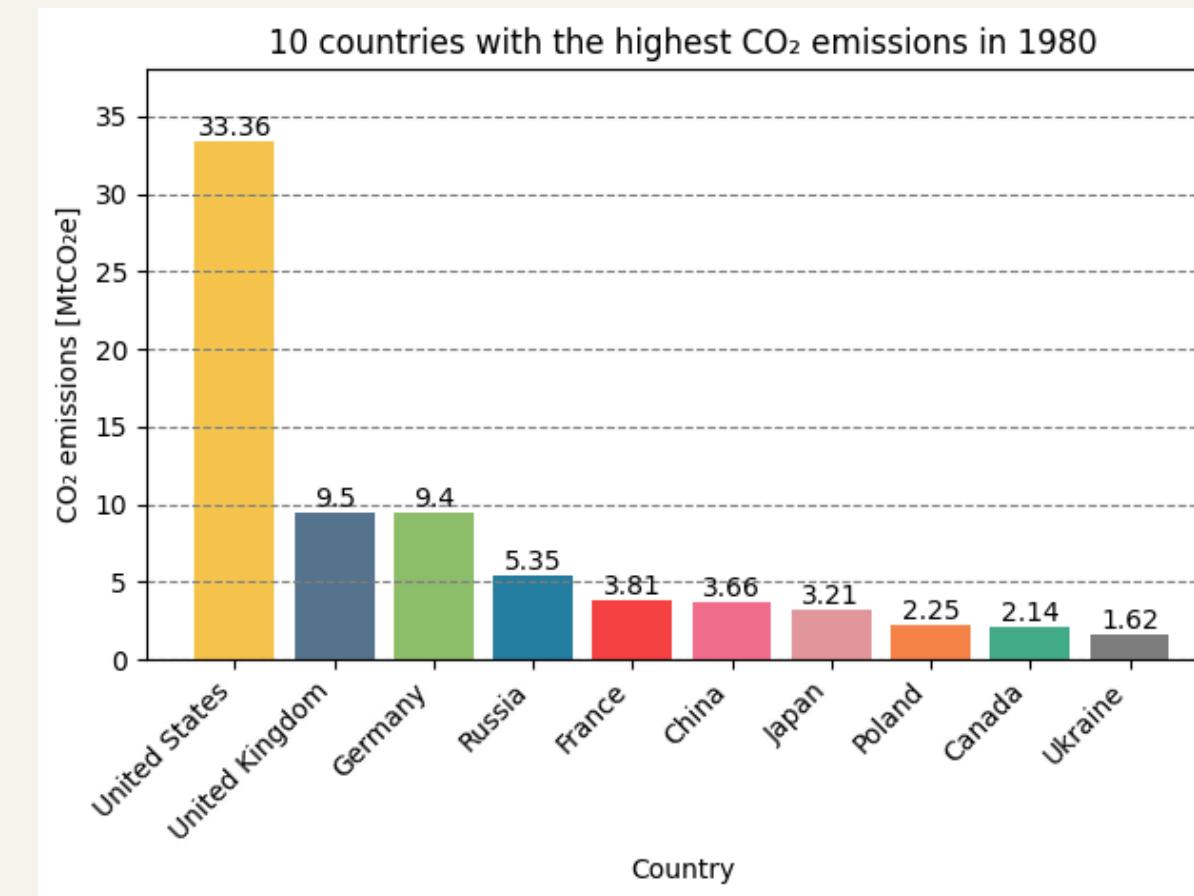
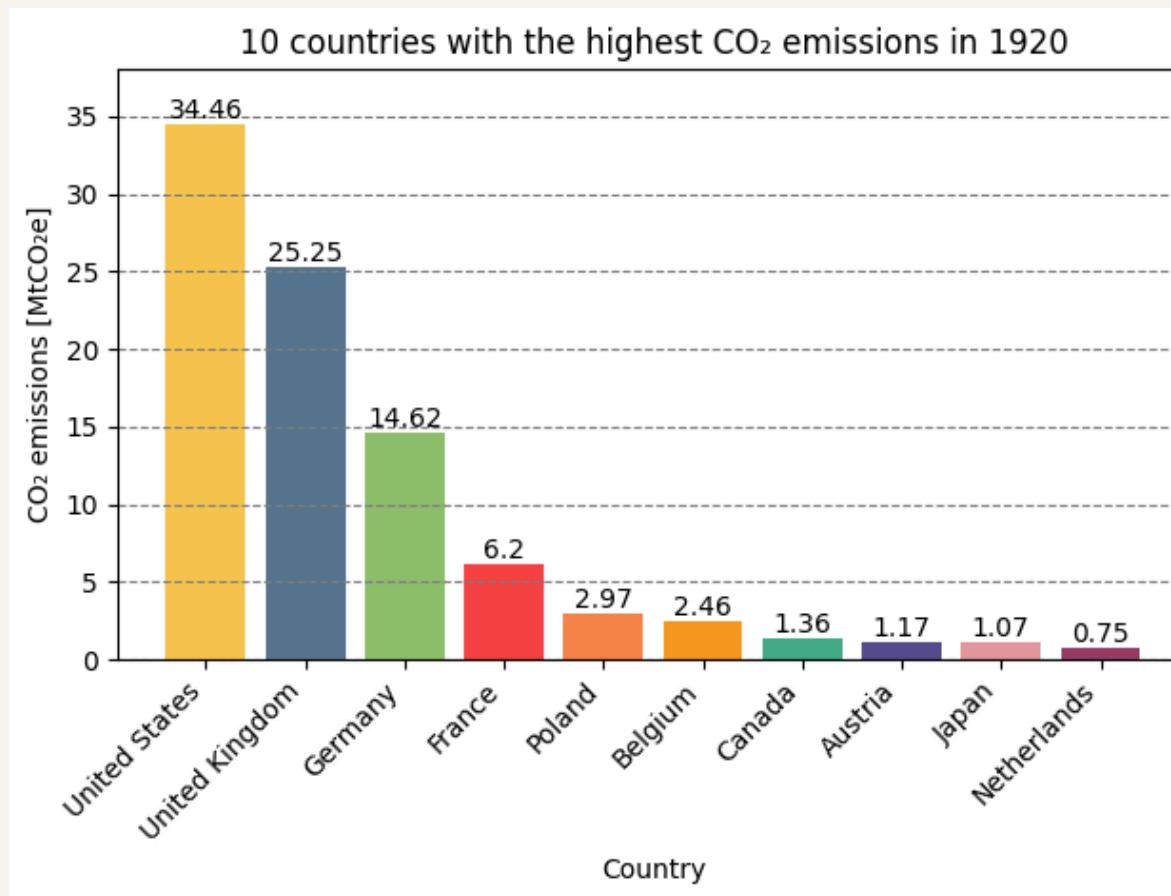
1980



2017



10 countries with the highest CO₂ emissions in 1920, 1980, and 2017



Human Development Index (HDI)

Human Development Index (HDI) is a composite statistic developed by the United Nations to measure a country's overall social and economic development. It combines three key dimensions:

1. Life expectancy – average expected lifespan at birth
2. Education – measured by average years of schooling and expected years of schooling
3. Income per capita – adjusted for purchasing power (GDP per capita, PPP)

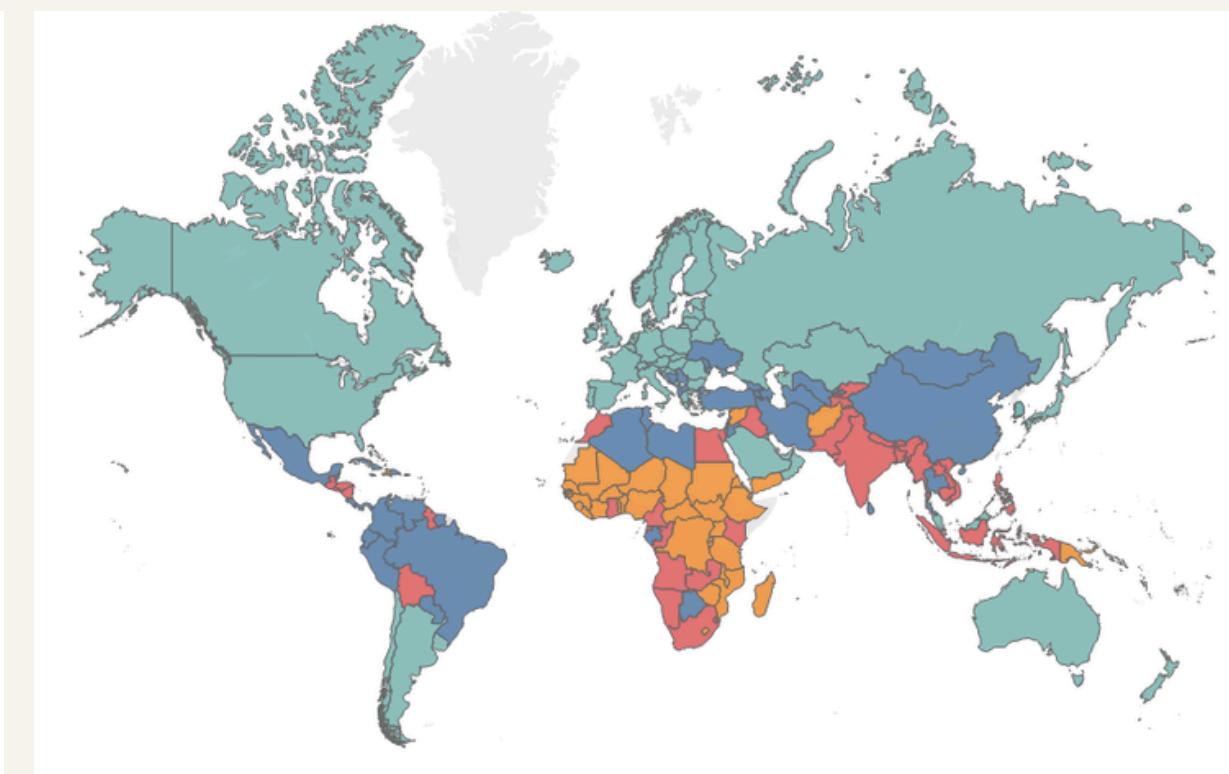
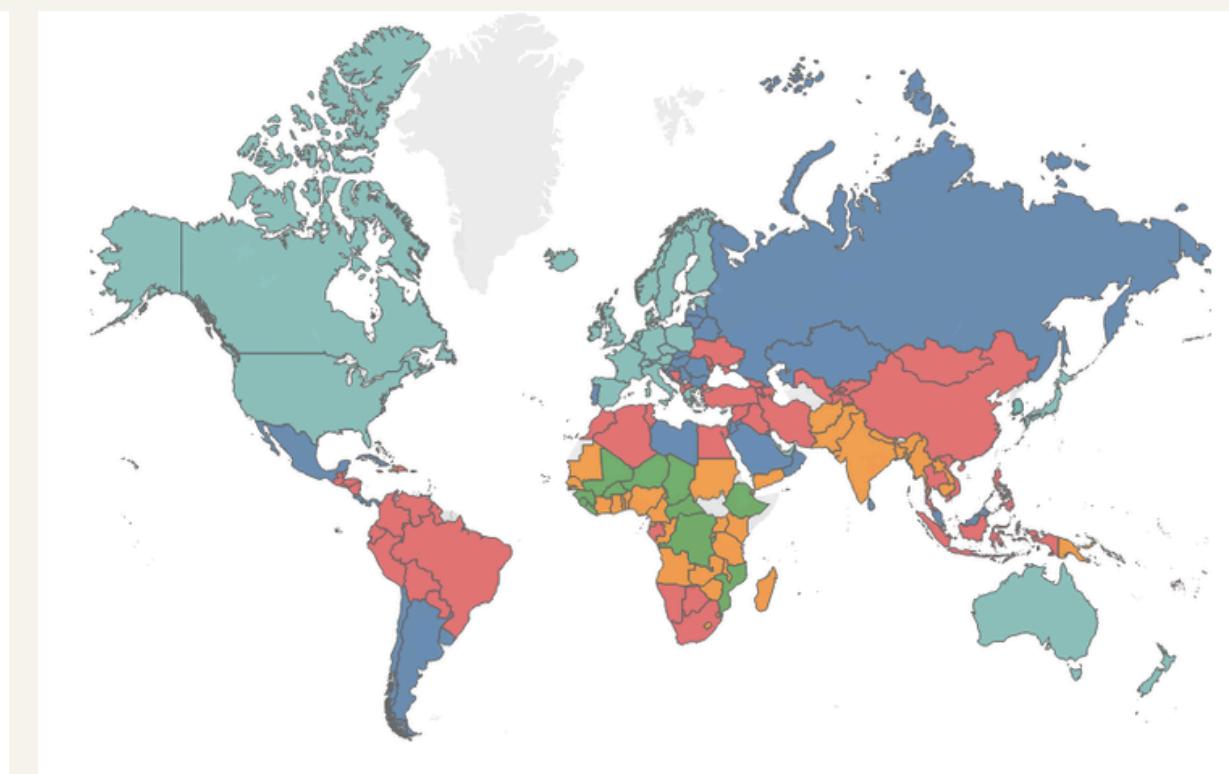
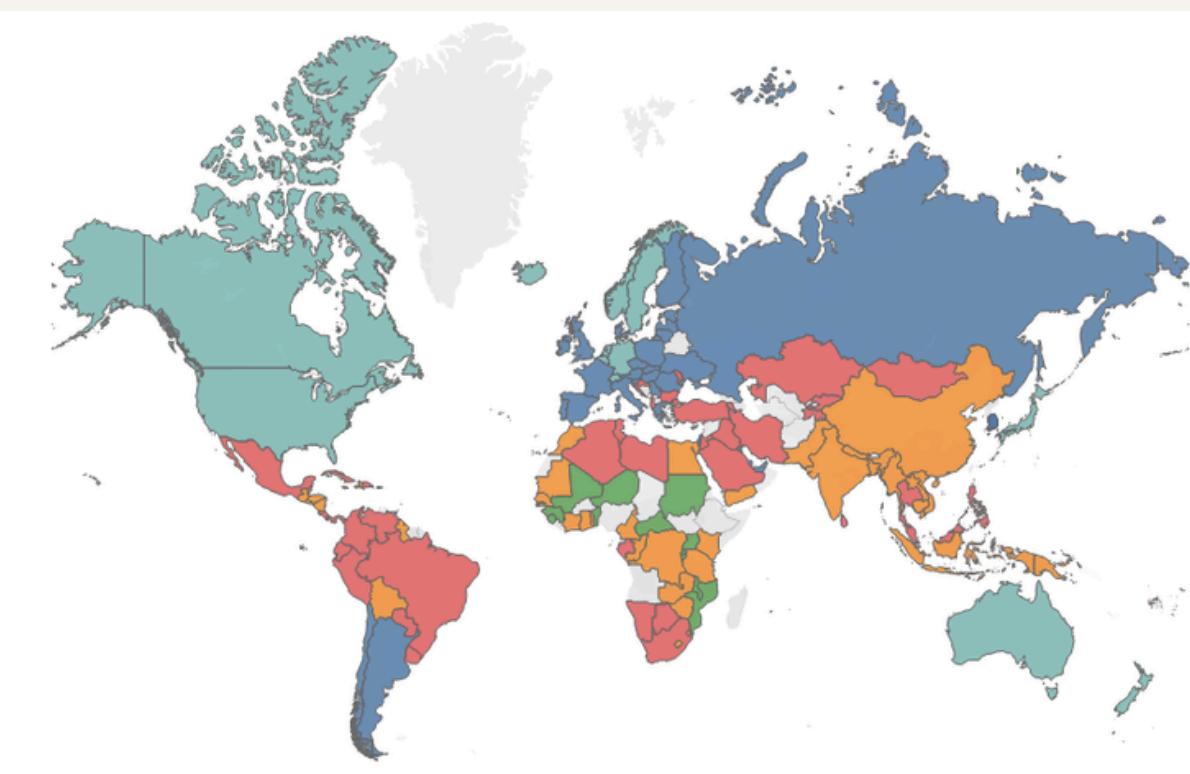
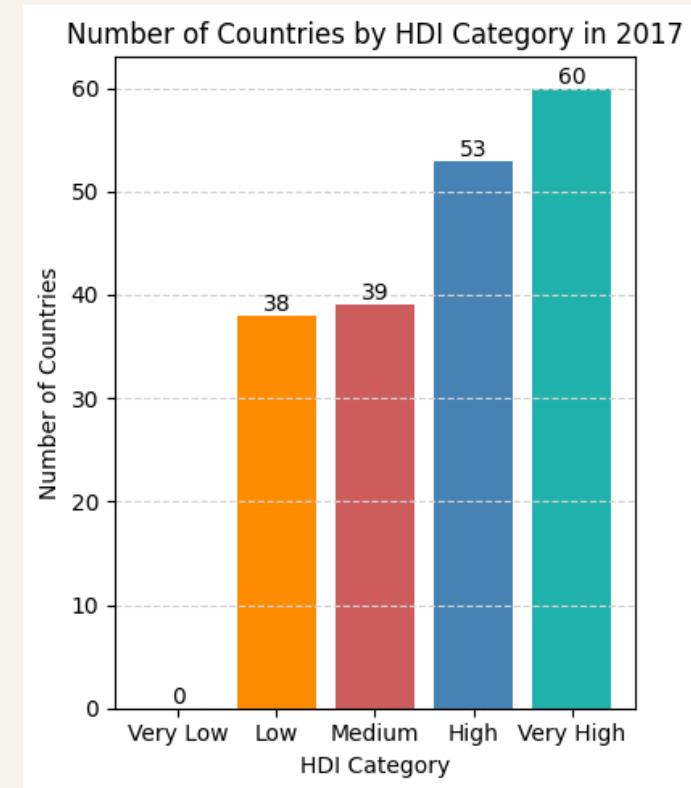
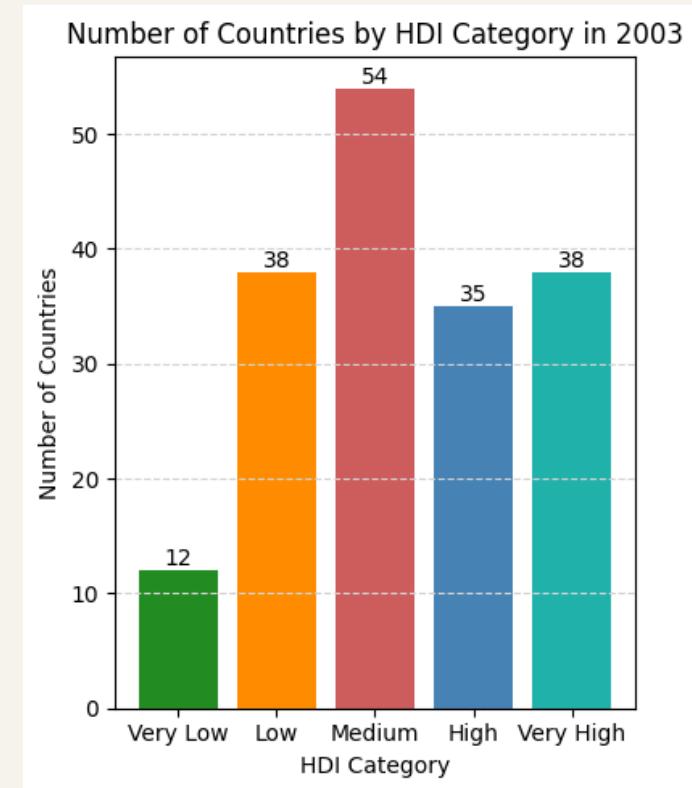
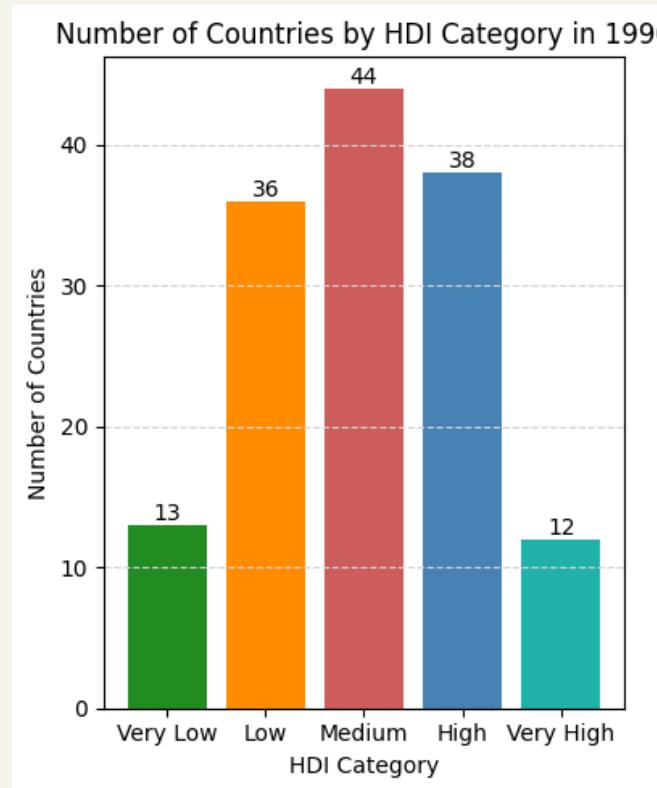
HDI values range from 0 to 1, where a higher value indicates a higher level of human development. It helps compare countries' development beyond just income, including health and education aspects.

HDI in the world

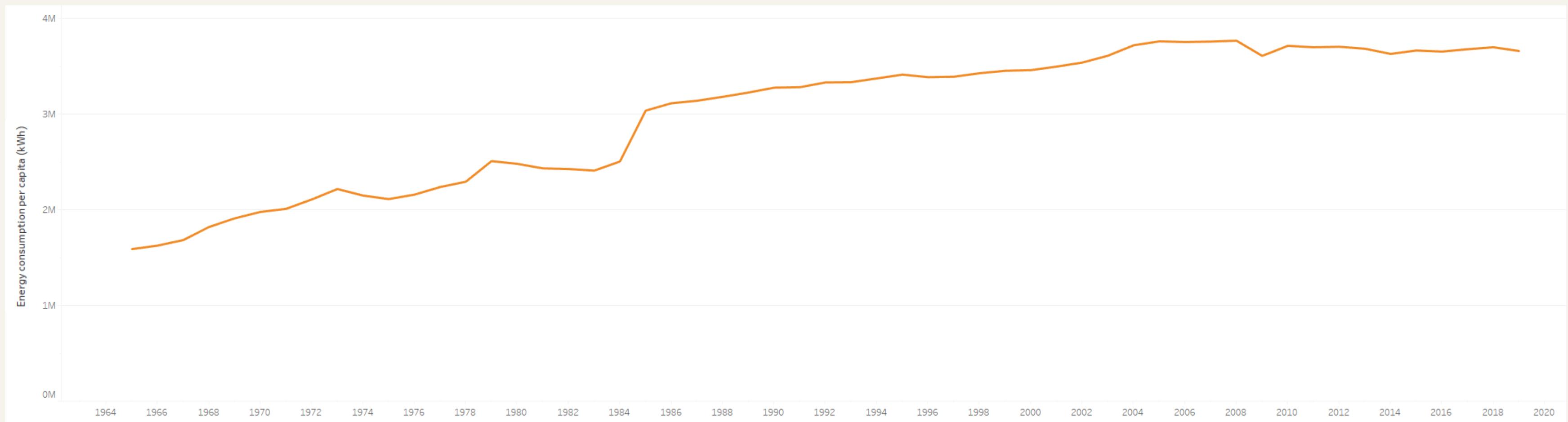
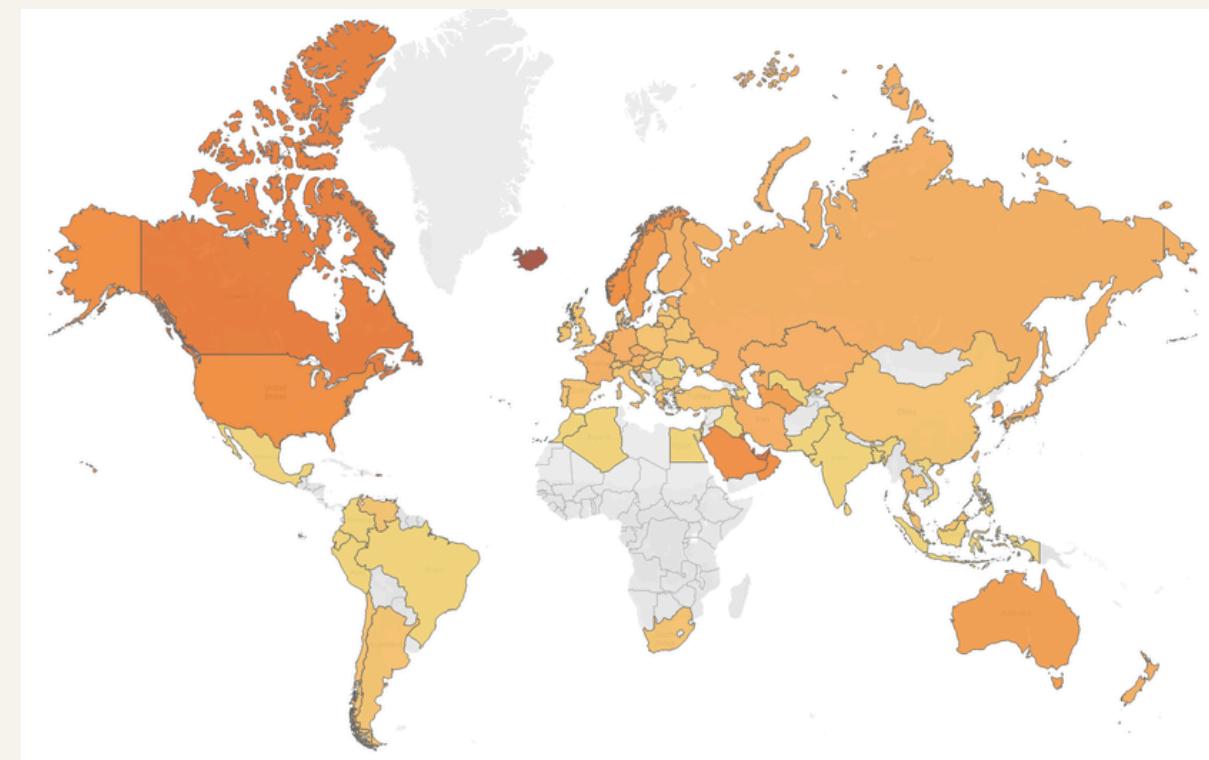
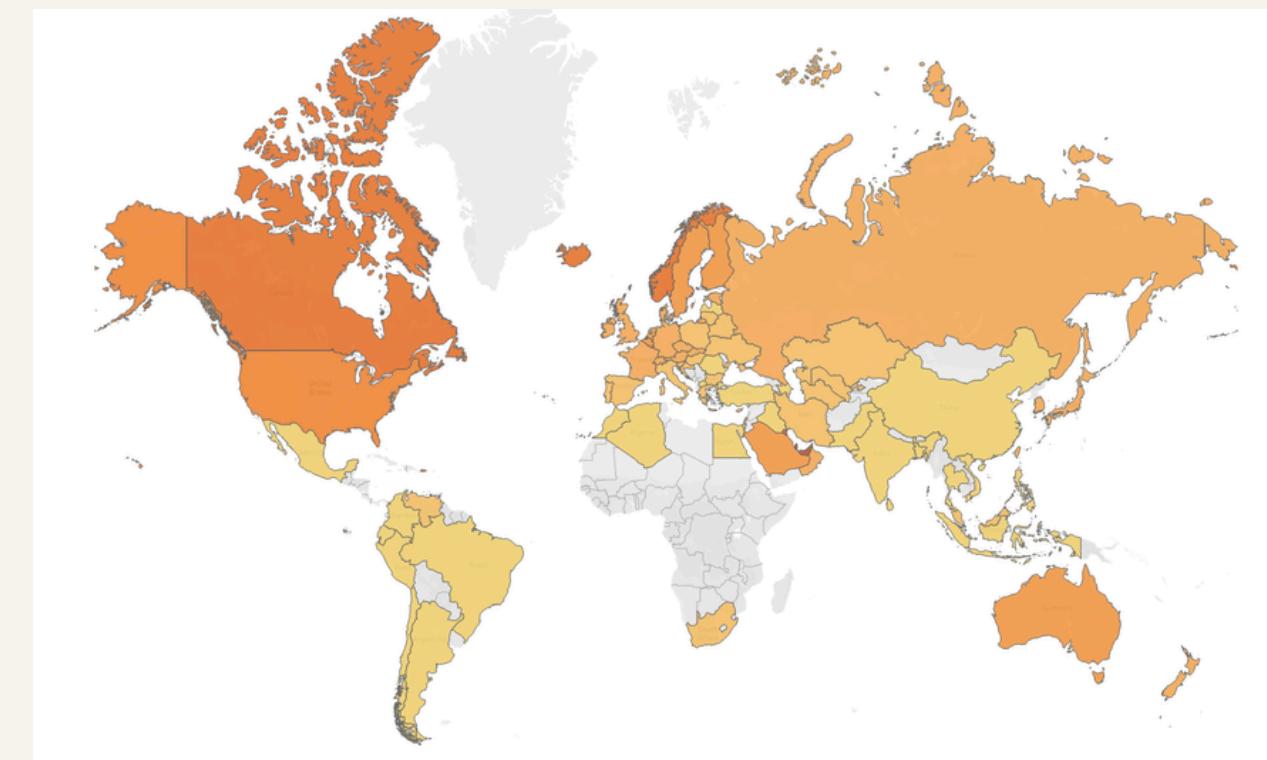
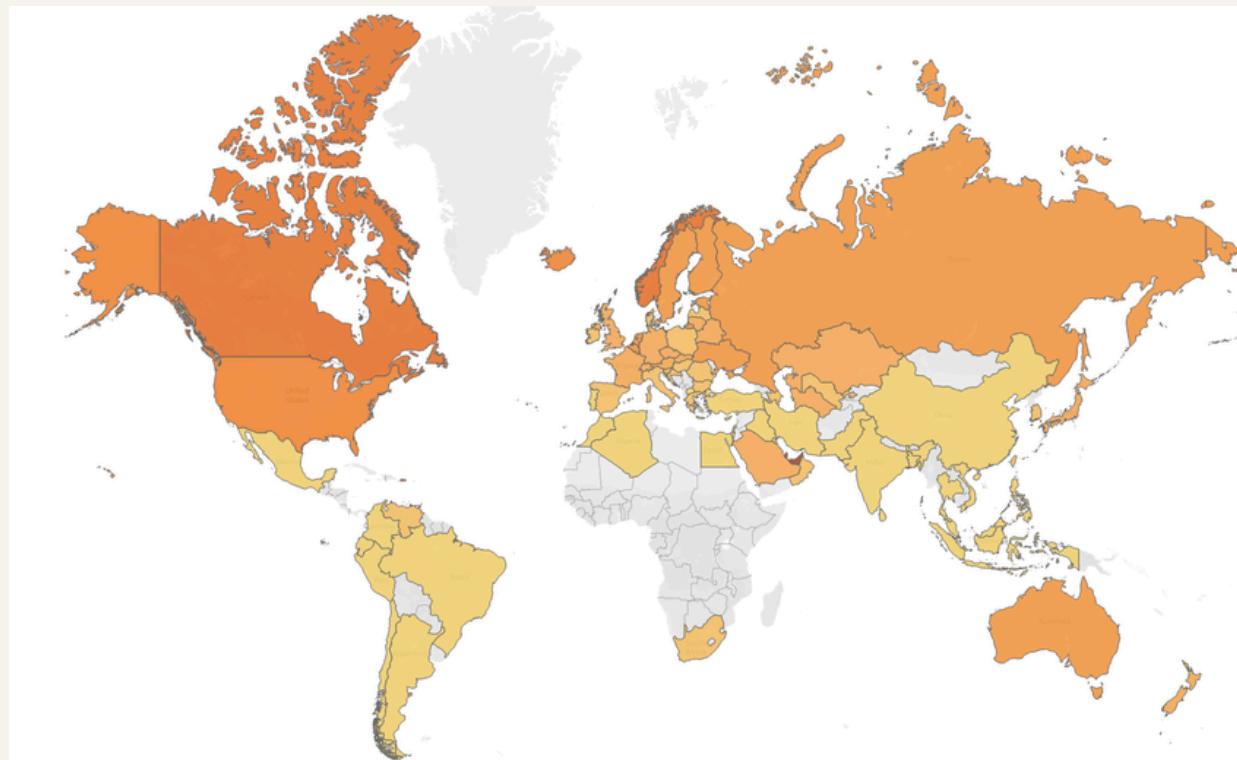
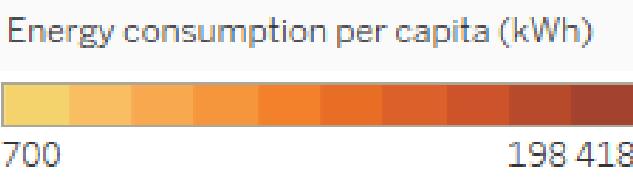
Classification: UNDP

(United Nations Development Programme)

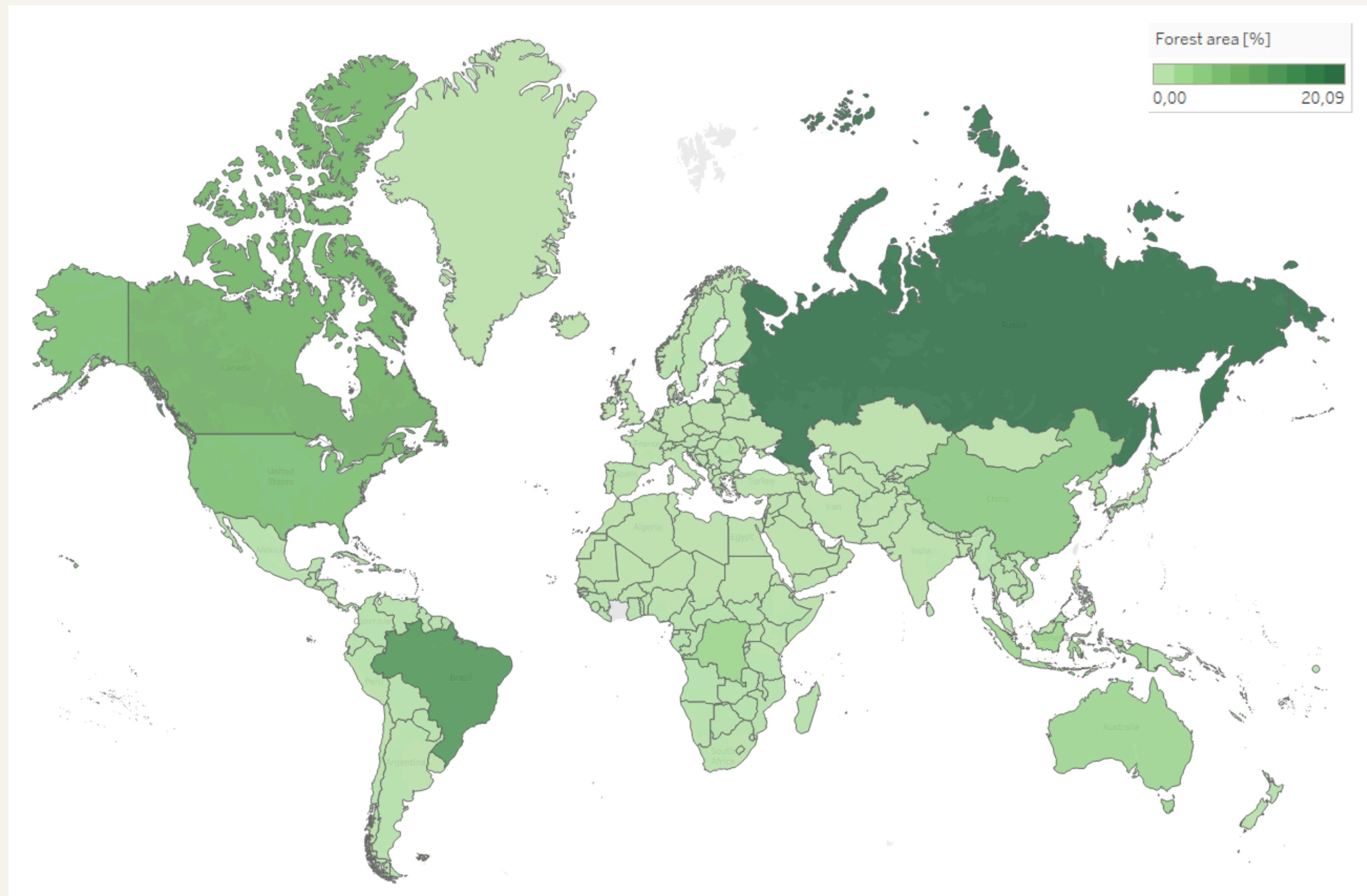
Very High: 0.80 - 1.0
High: 0.70 - 0.799
Medium: 0.55 - 0.699
Low: 0.35 - 0.549
Very Low: 0.0 - 0.349



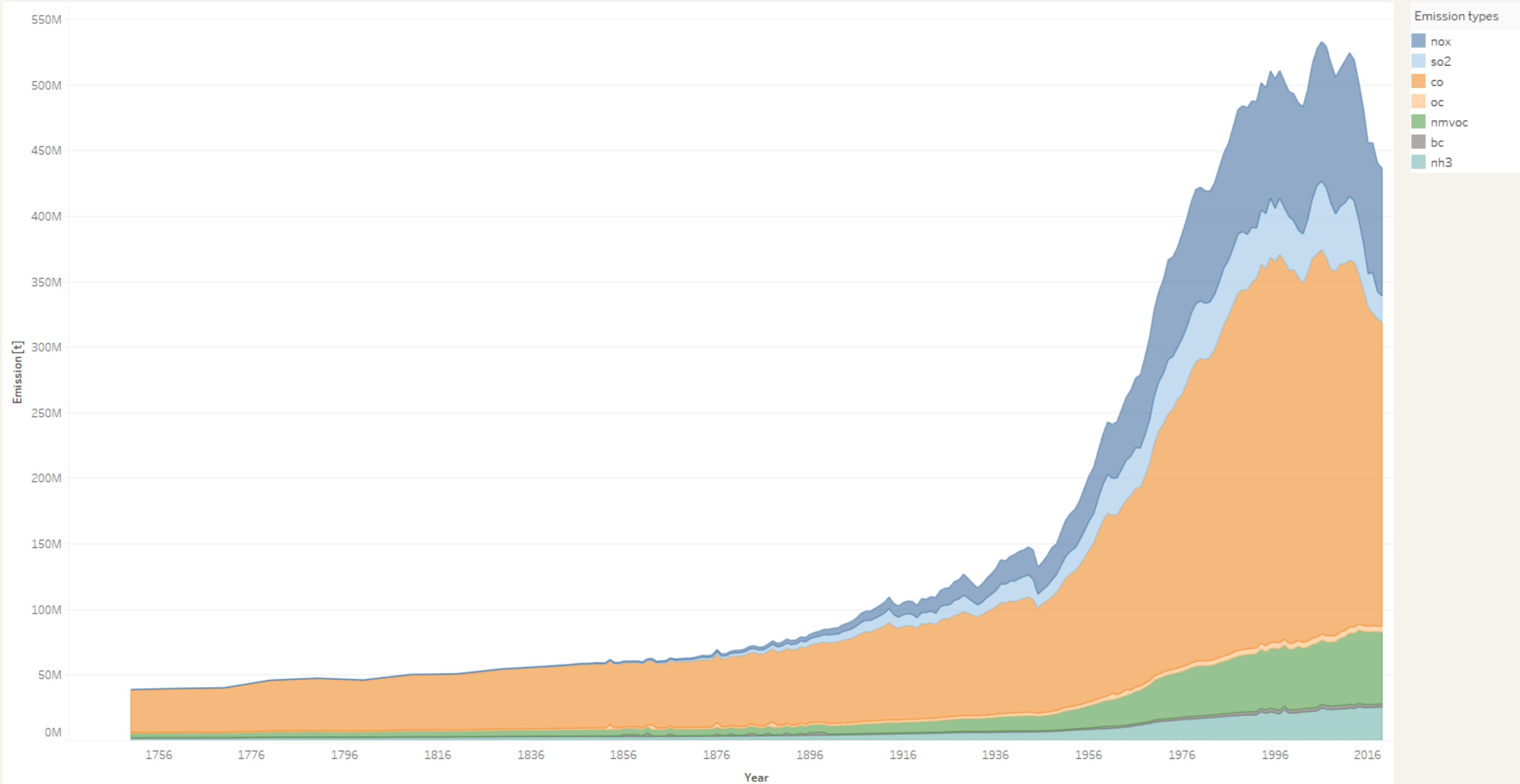
Energy consumption per capita in 1990, 2003, and 2017



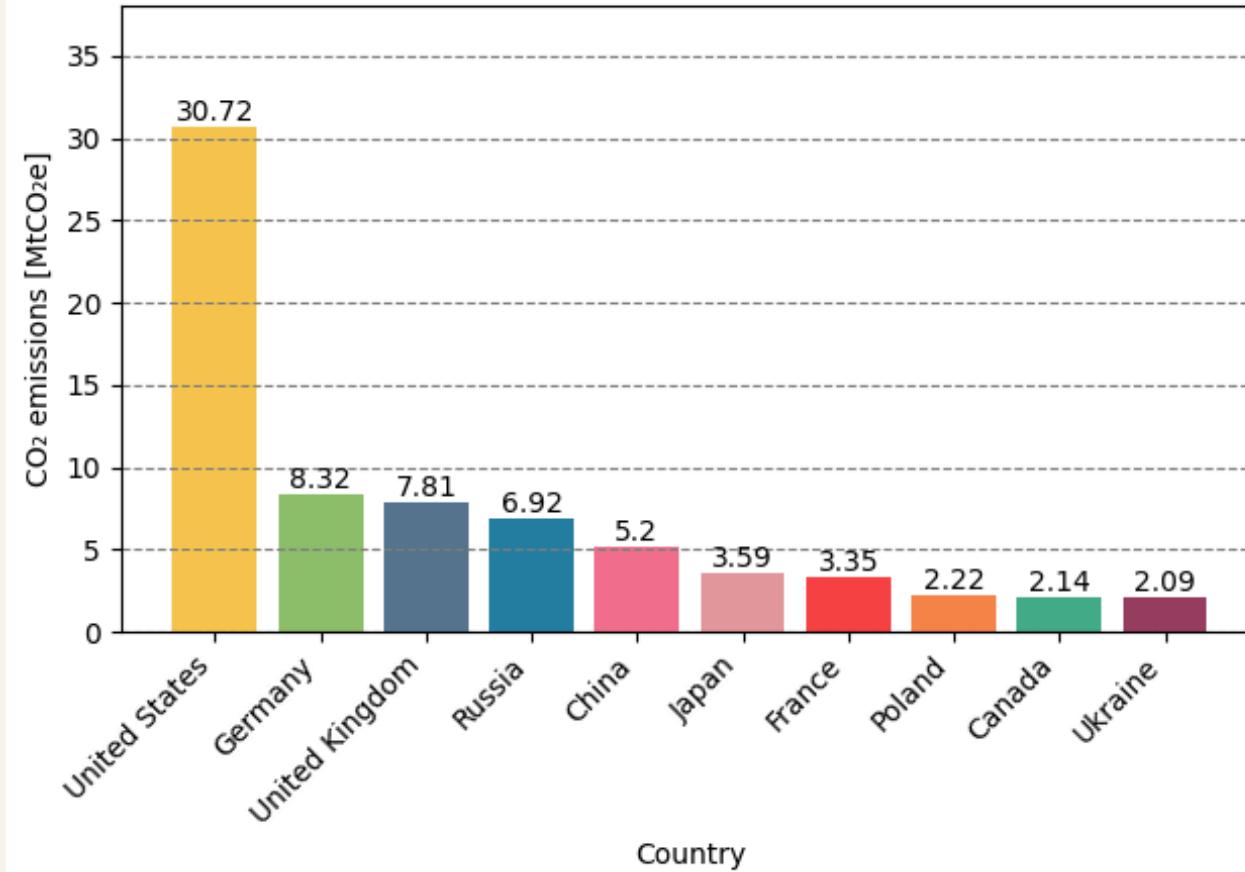
Forest cover in countries in 2017



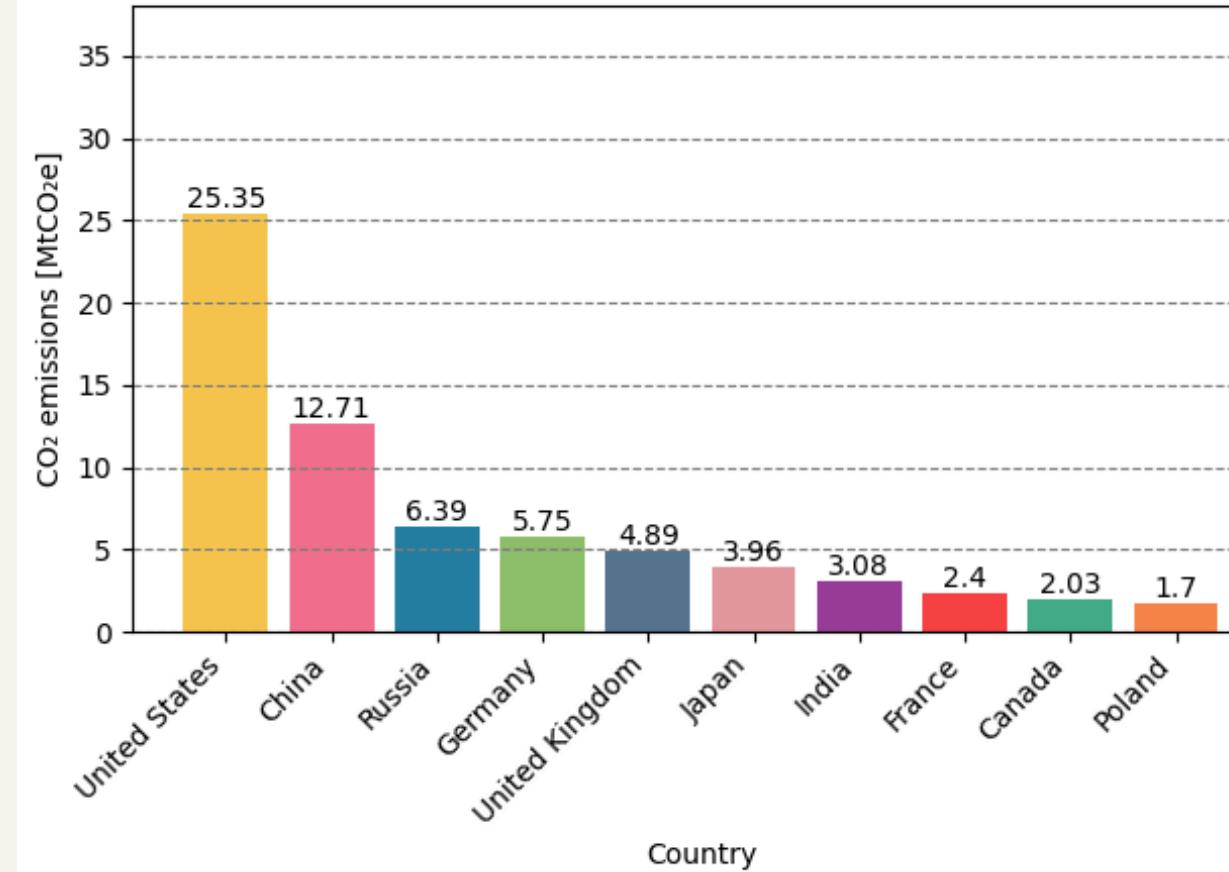
Air pollution emissions of different types



10 countries with the highest CO₂ emissions in 1990



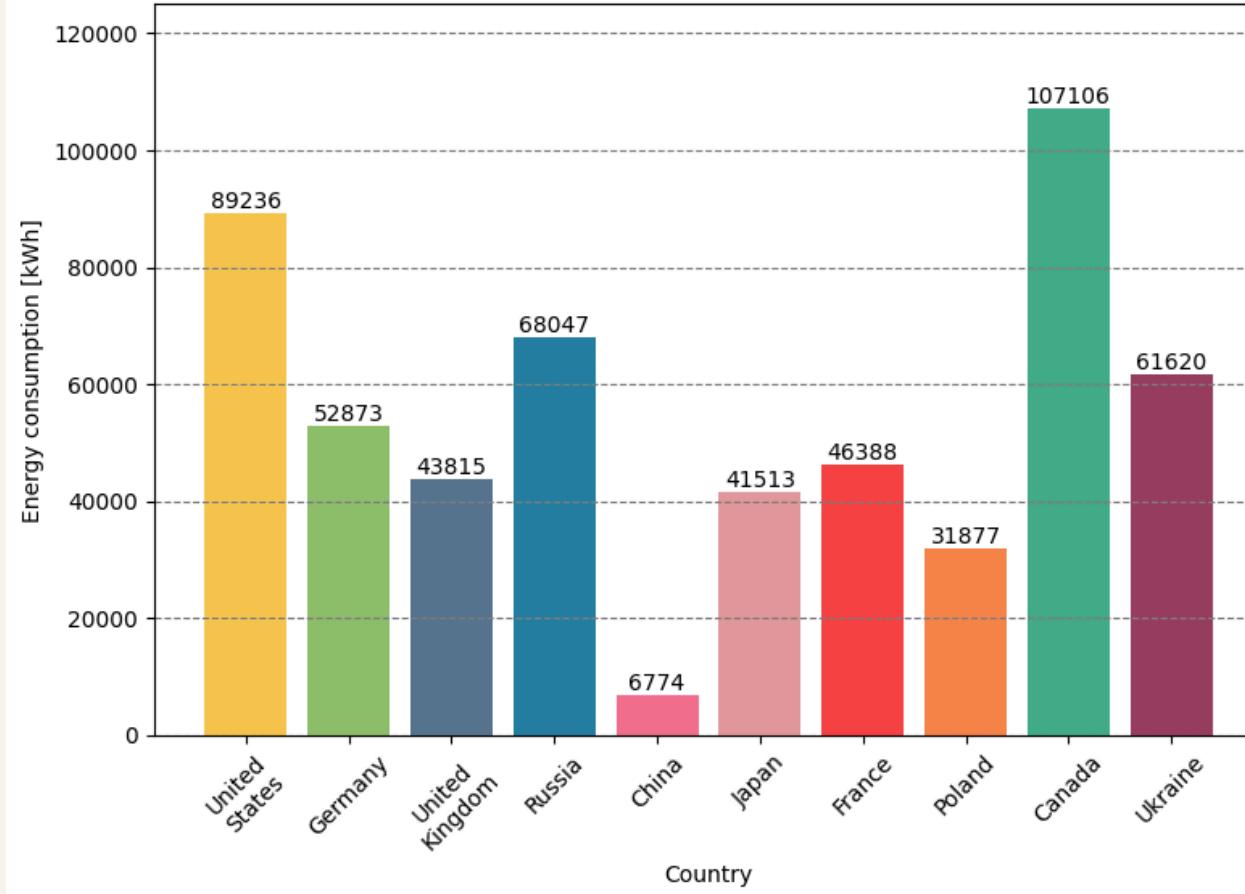
10 countries with the highest CO₂ emissions in 2017



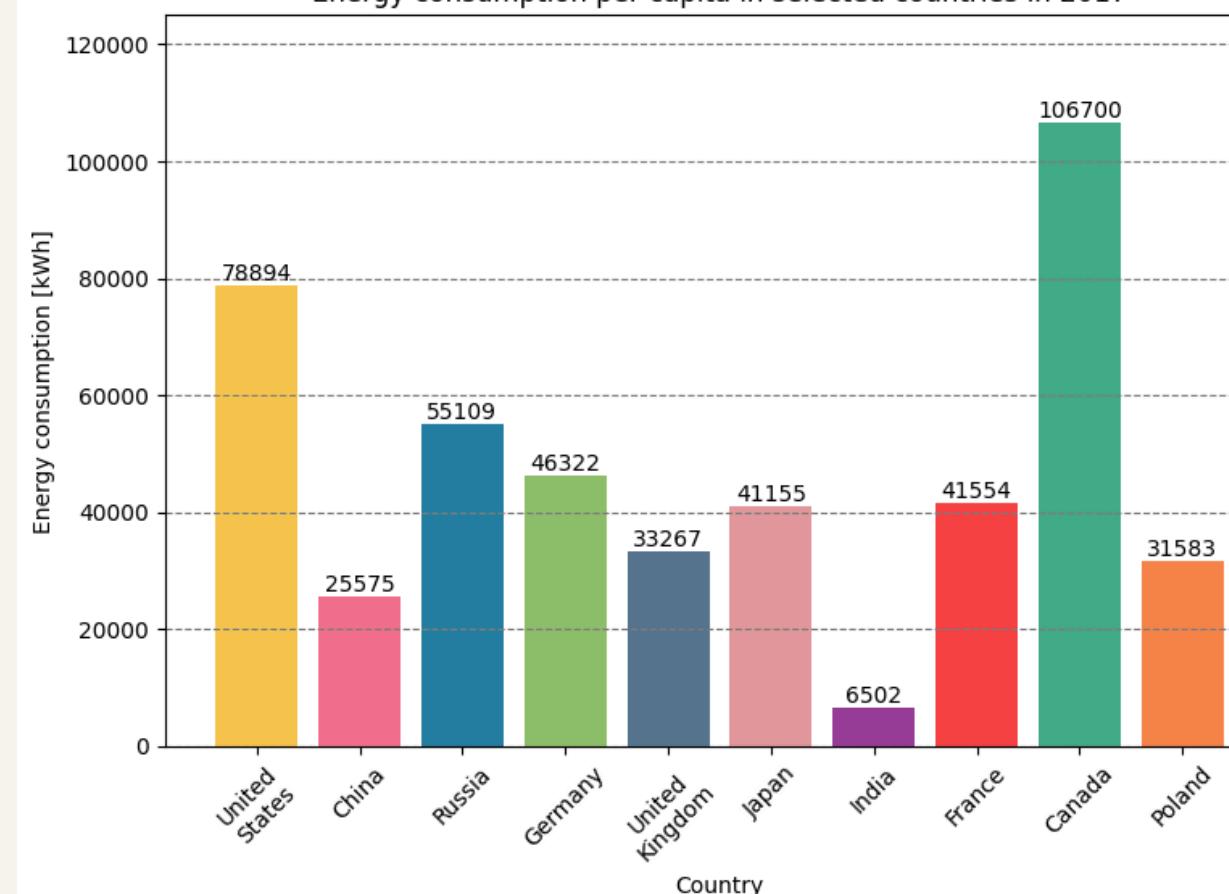
Conclusions (2017):

Canada: high energy, low CO₂ emissions.
Very high energy consumption per capita.
This is due to the cold climate, the vast size of the country and the long distances, as well as the need for heating.
- Relatively low CO₂ emissions per capita relative to energy consumption
This is because much of the energy comes from low-carbon sources, especially:
Hydropower (hydro) – a huge part of the energy mix.
Nuclear power and other renewables also play a role.
Conclusion: Canada consumes a lot of energy, but emits relatively little CO₂ because it uses 'clean' sources.

Energy consumption per capita in selected countries in 1990



Energy consumption per capita in selected countries in 2017



China is the opposite: relatively low energy consumption and high CO₂ emissions.

Energy consumption per capita is not as high as in Canada or the USA.

However, CO₂ emissions per capita are clearly high.

The main reasons are:

- Dominance of coal in electricity generation (the dirtiest fuel).
- heavy industry (steel, cement and electronics), which is energy-intensive and emits a lot of CO₂.

Energy efficiency is weaker than in developed countries.

Conclusion: Although China uses less energy per capita than Canada, its energy is much more emission-intensive.

Conclusions:

1. CO₂ and greenhouse gas (GHG) emissions (1990–2017):

CO₂ emissions:

Developed and rapidly developing countries (e.g. the USA, China, India, Russia and Germany) have the highest emissions.

There have been increases in CO₂ emissions per capita in Asian countries and decreases or stabilisation in Europe and the USA.

GHG emissions:

An apparent global increase in GHG emissions.

Still large emissions in the agriculture and energy sectors in developing countries.

Conclusion: Increased prosperity is associated with increased emissions. Without effective climate strategies, development could exacerbate the environmental crisis.

2. Changes in the HDI (Human Development Index): 1990–2017

Human development growth:

The number of countries with a 'Very High HDI' increased from 12 in 1990 to 60 in 2017.

The 'Very Low HDI' category had disappeared completely by 2017.

The number of countries in the 'Low' and 'Medium' categories decreased in favour of 'High' and 'Very High'.

In 1990, sub-Saharan Africa and South Asia dominated the lowest HDI.

By 2017, however, the HDI had increased significantly in Asia (China and India) and Latin America.

Conclusion: Socio-economic development is progressing globally, with more and more countries gaining access to education, healthcare, and higher incomes.

3. Energy consumption per capita (1990–2017):

A noticeable increase in global energy consumption per capita, particularly in China, India and the Middle East.

The highest consumption rates are still recorded in developed countries such as the USA, Canada, Norway, Australia and Iceland.

Since 2005, energy consumption per capita has stabilised, despite the increase in the HDI. This may suggest the adoption of more efficient technologies or a shift towards renewable energy sources (RES).

Conclusion: energy consumption increases with development, but efficiency and technologies are beginning to stabilise this trend.

Overall conclusion:

▲ HDI

Significant increase – fewer poor countries, more development

▲ Energy

More energy per capita, especially in developing countries.

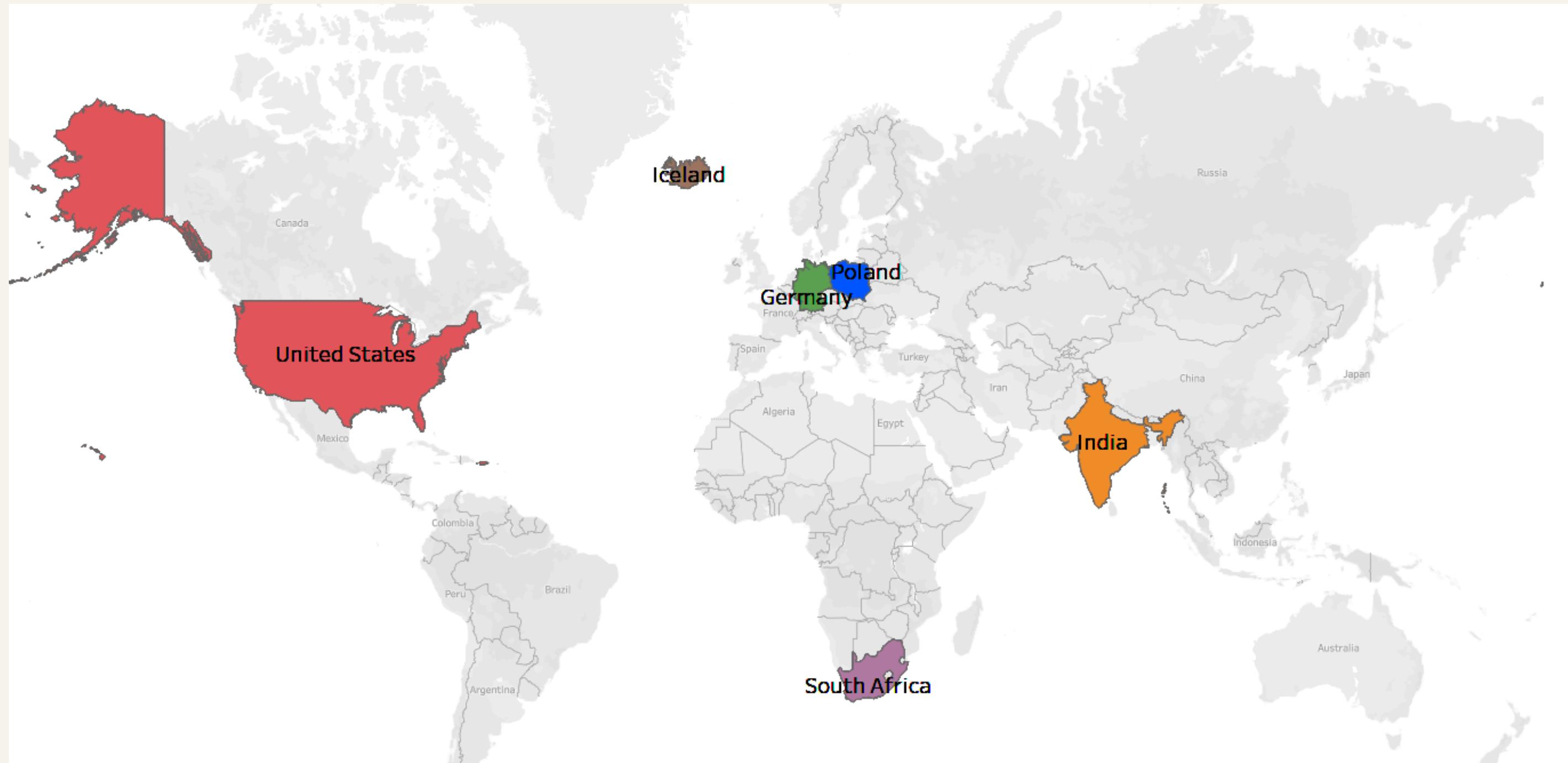
▲ Emissions:

Increasing in tandem with HDI, especially CO₂ and GHG.

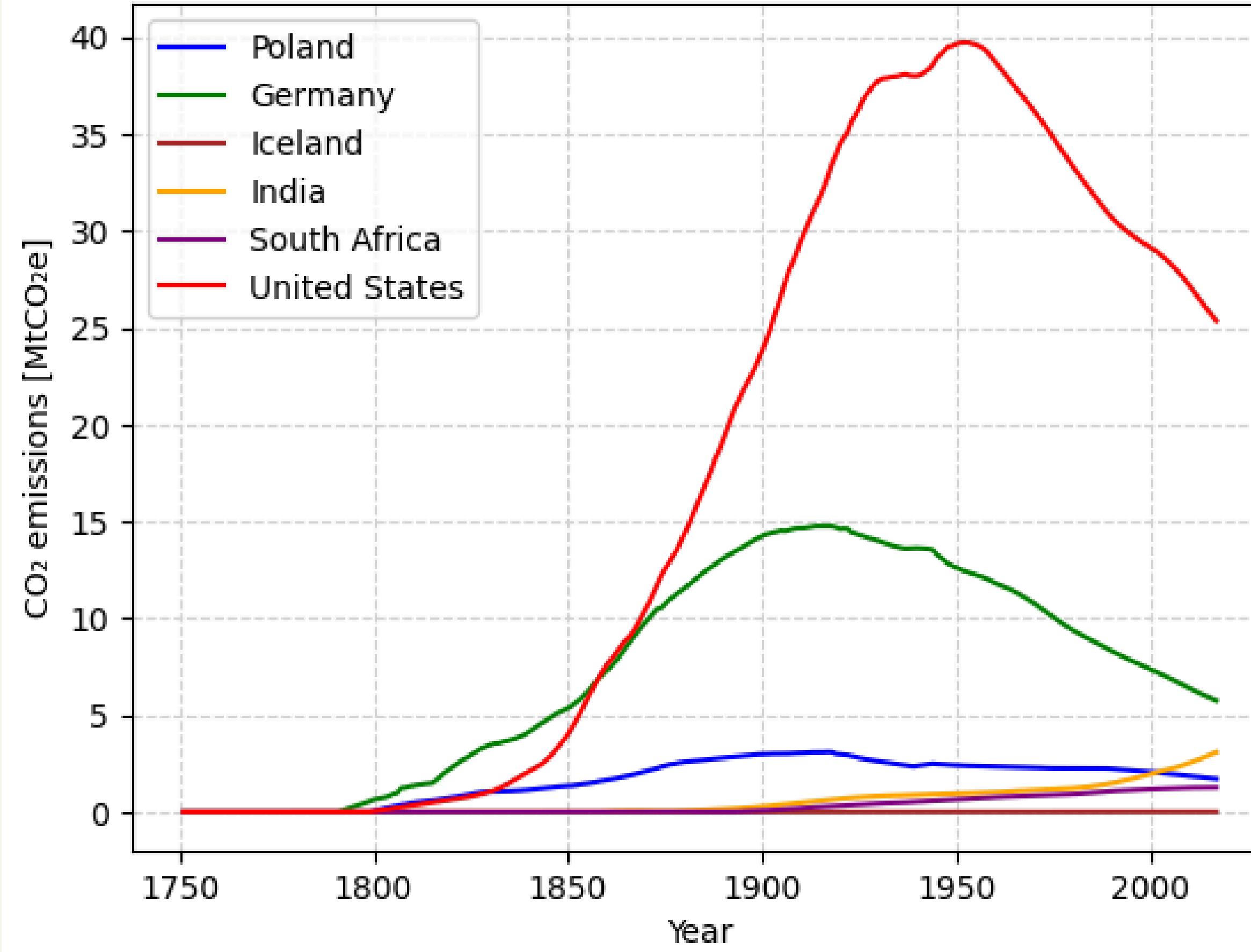
⟳ Inequalities:

Although the average HDI is increasing, inequalities in energy consumption and emissions are very apparent.

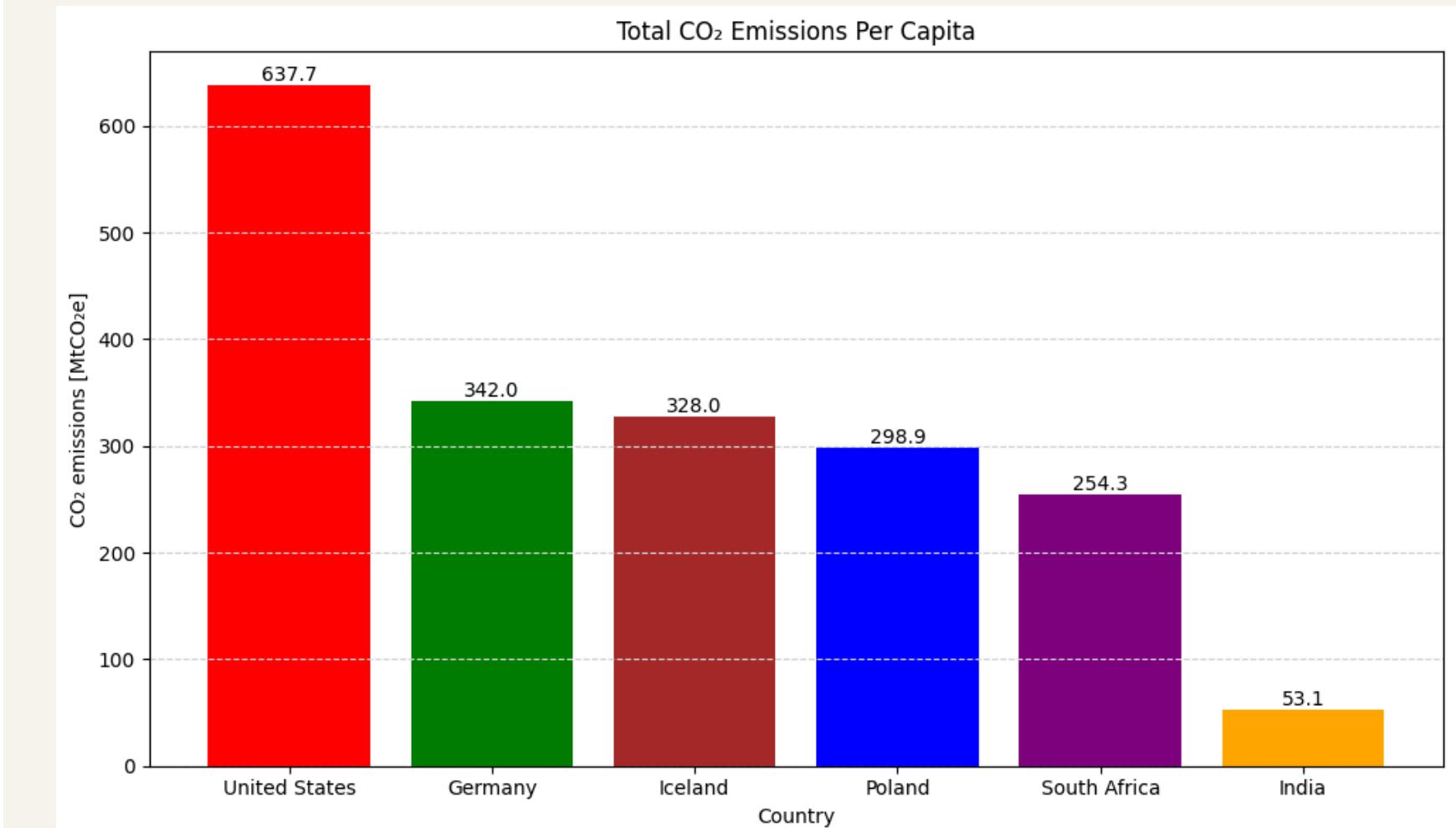
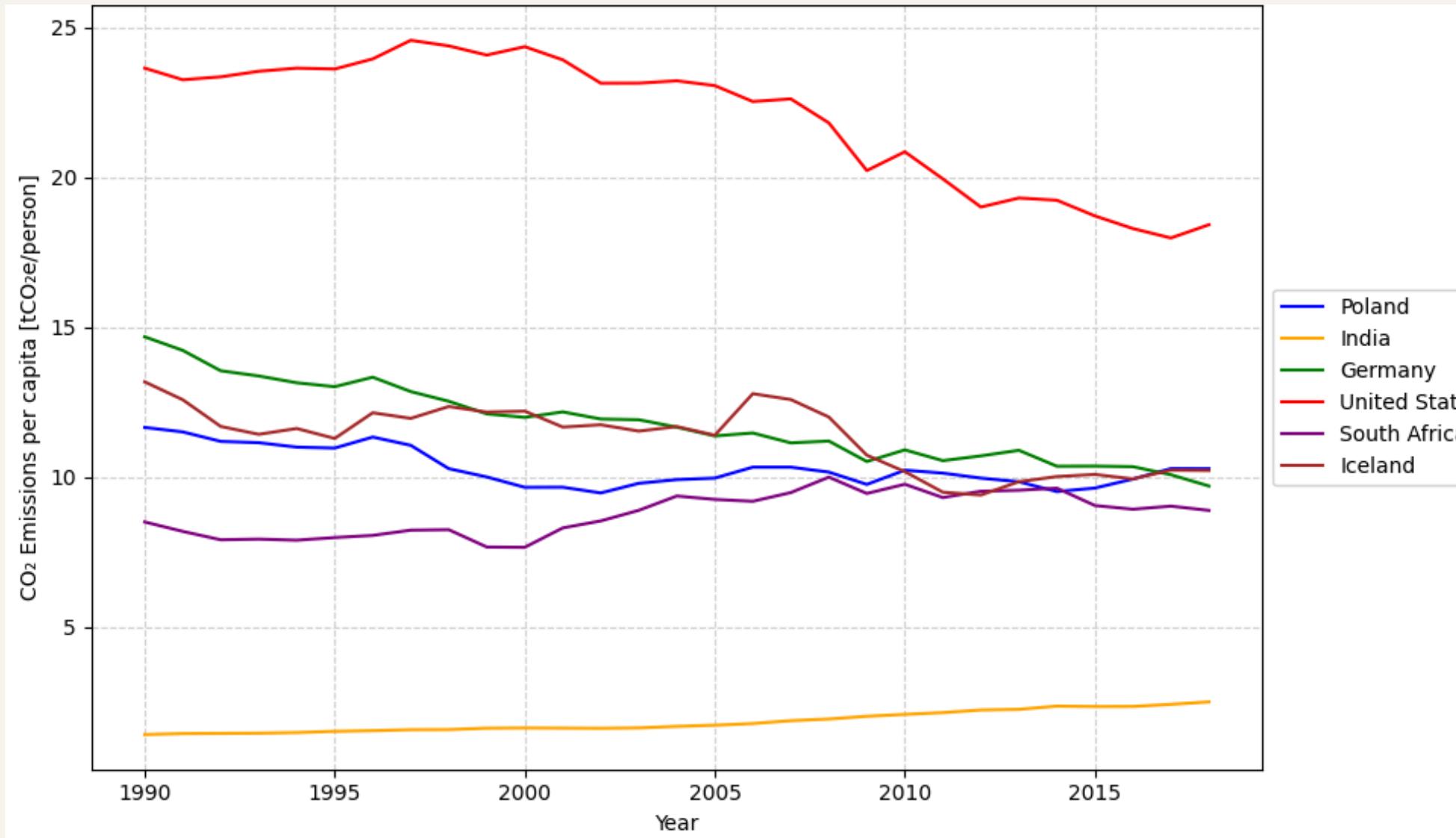
Some data in six selected countries



CO₂ emissions in selected countries



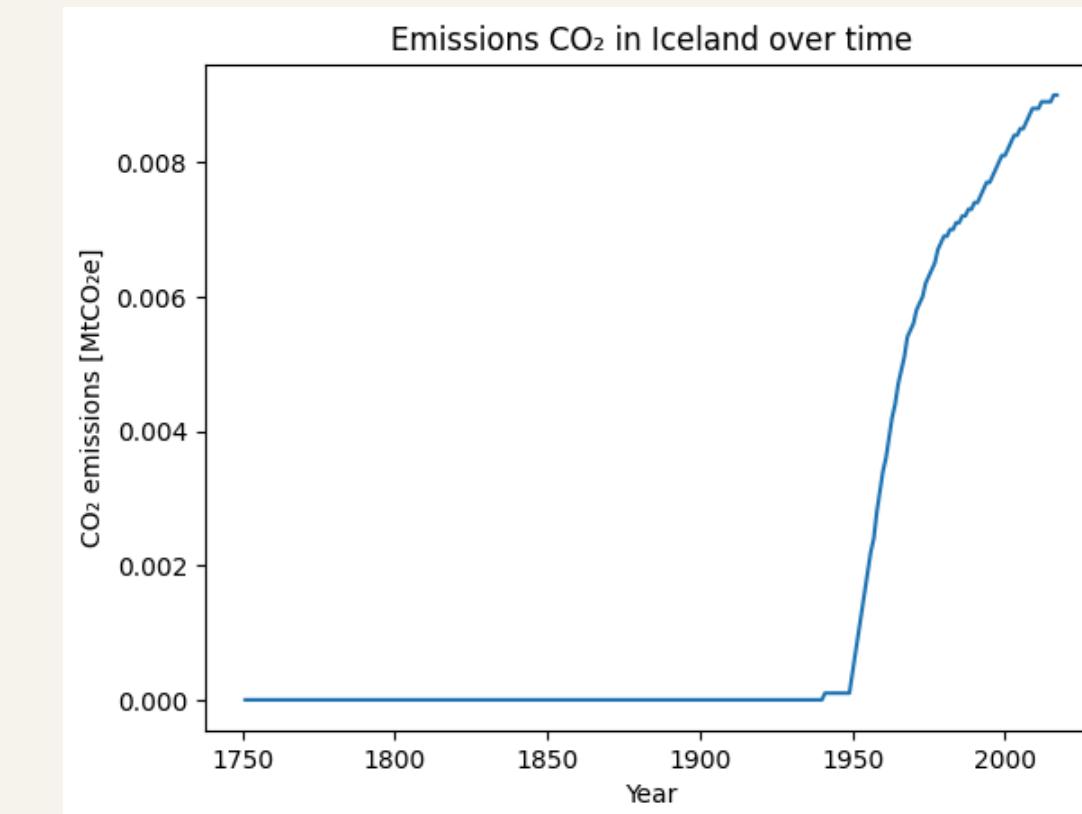
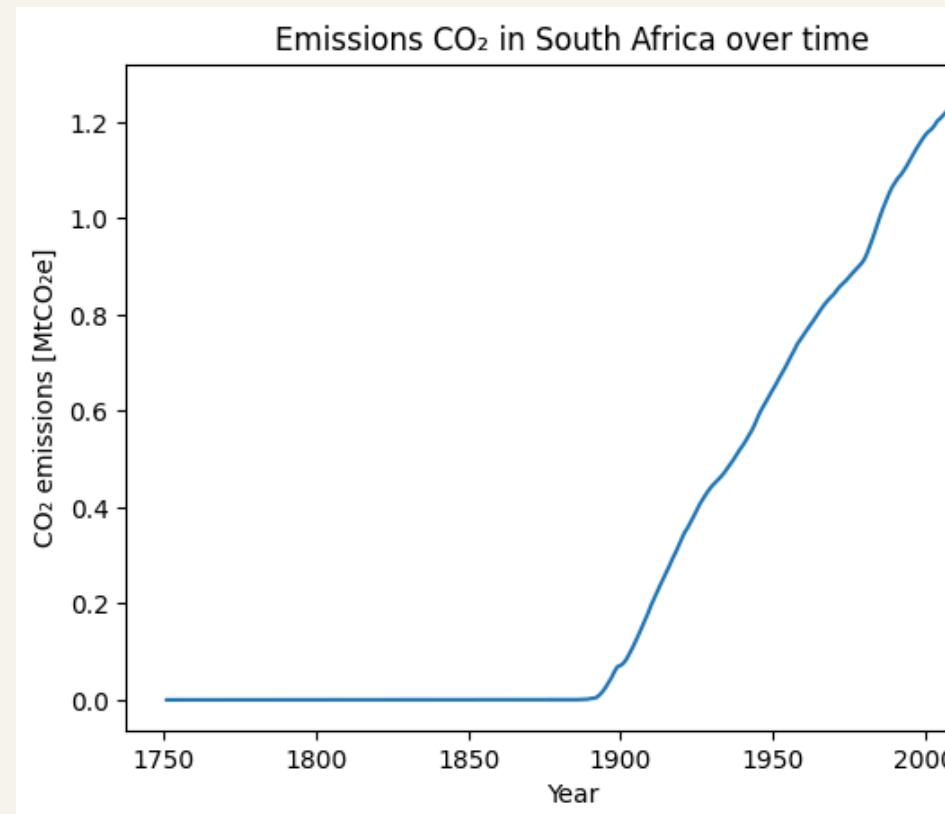
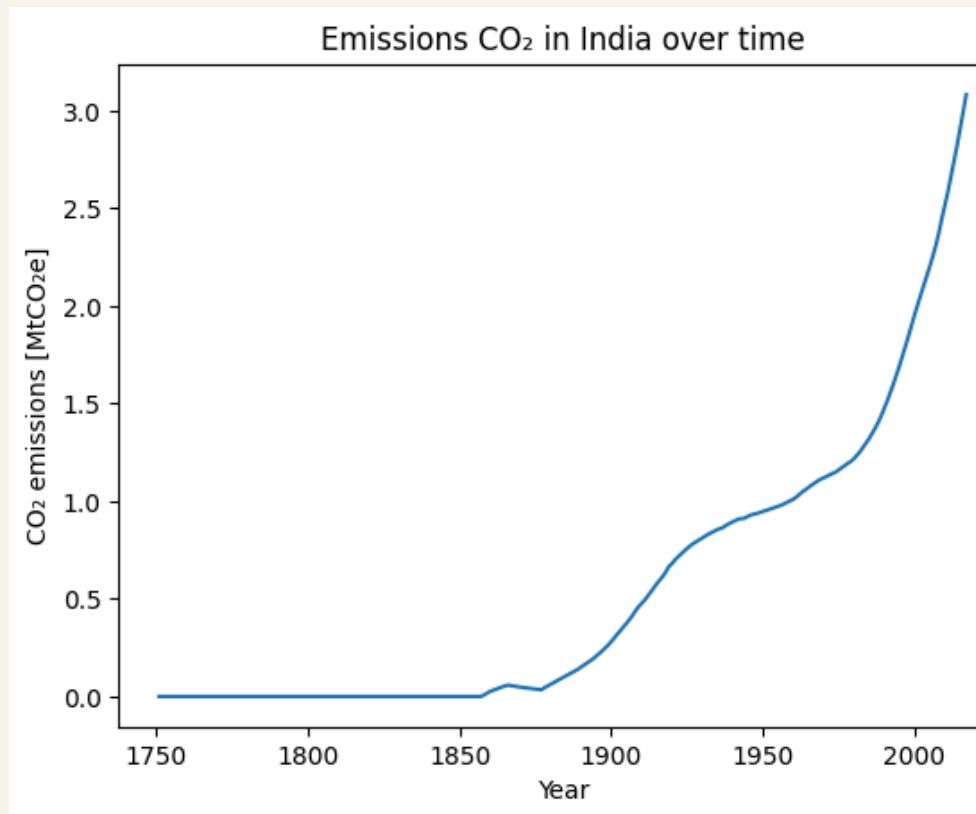
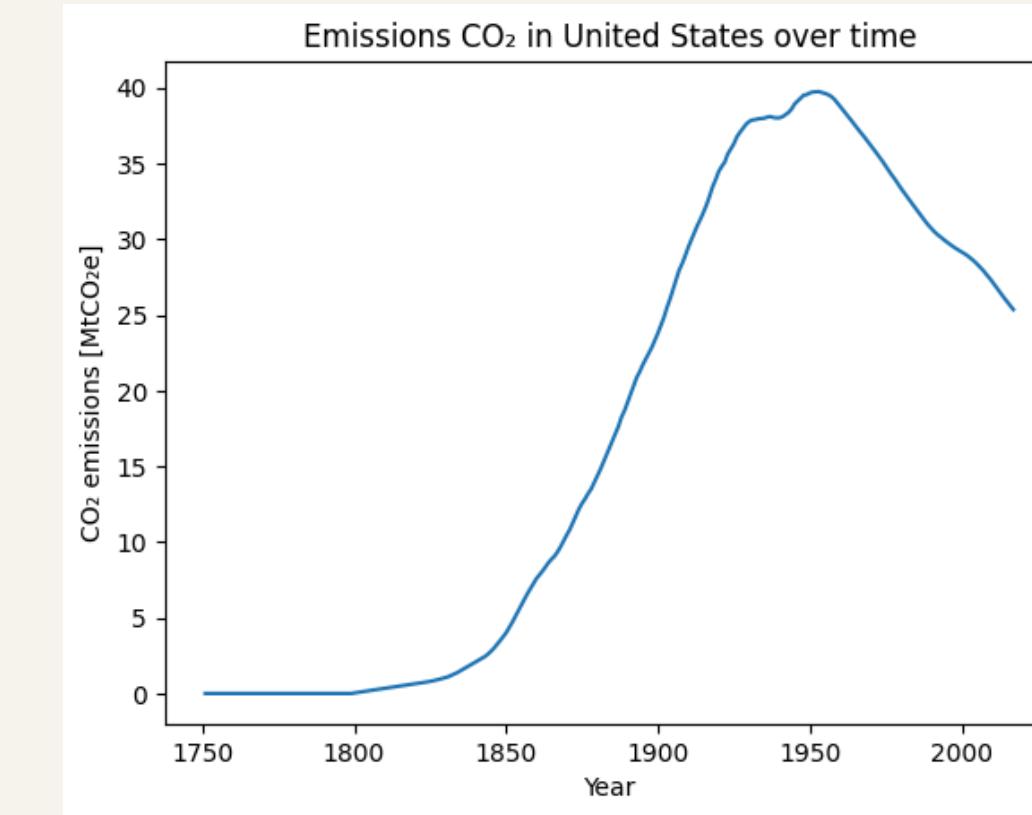
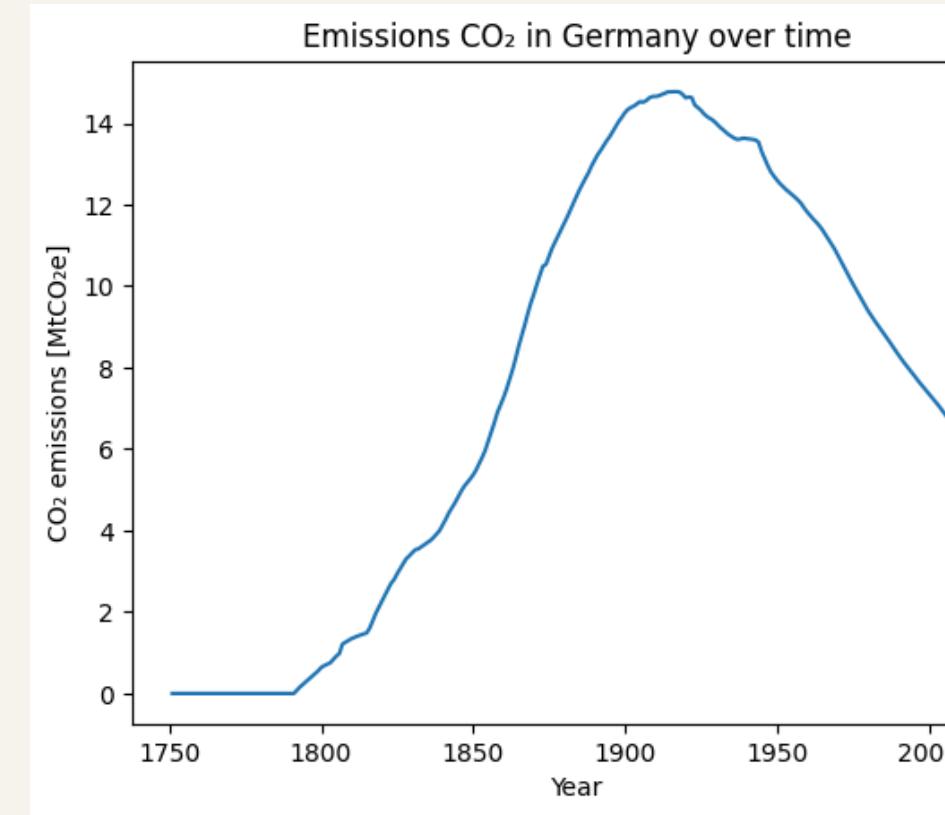
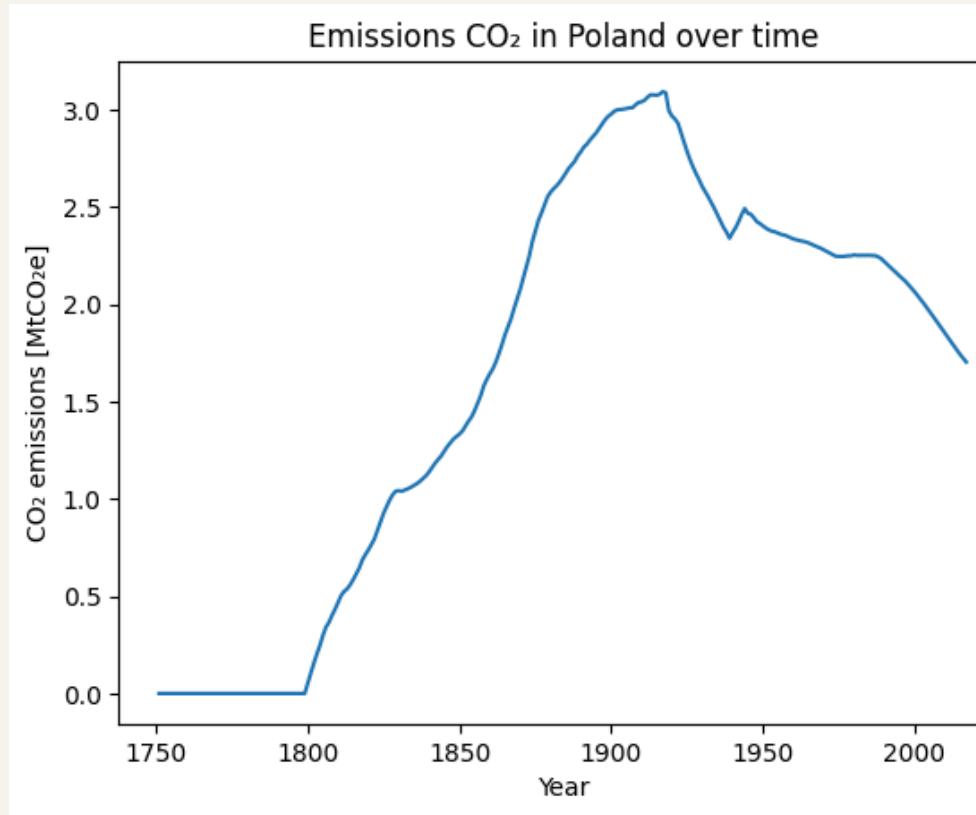
CO₂ emissions per capita in selected countries



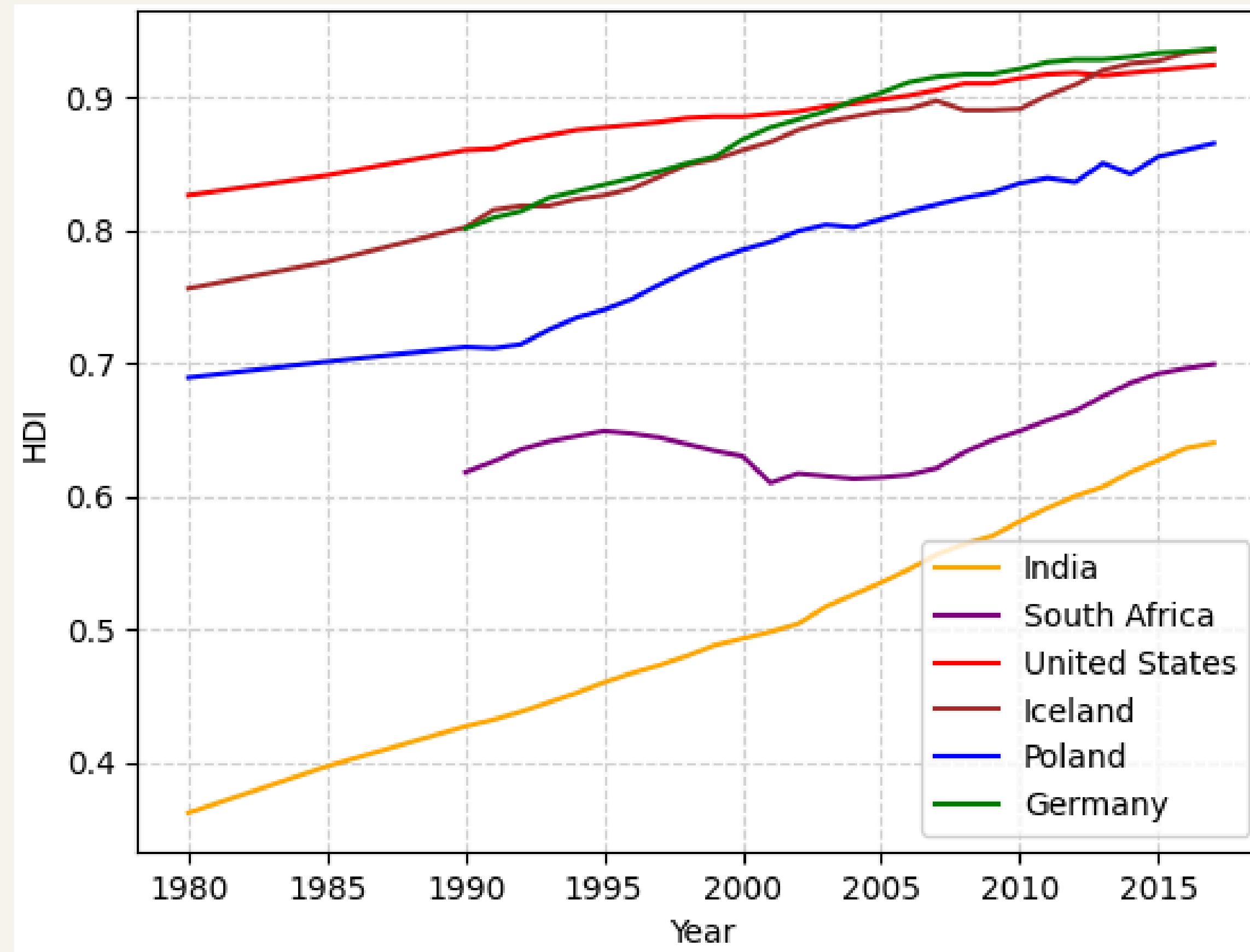
- The United States has the highest per capita CO₂ emissions, indicating a very high level of energy consumption related to transportation, industry, and lifestyle.
- India has the lowest per capita emissions. Despite its large population and level of economic development, its per capita emissions are very low, which may indicate lower energy consumption and industrialisation levels per capita.
- Germany and Iceland have comparable values, although Iceland is known for its use of renewable energy sources, such as geothermal energy. This may suggest high energy consumption per capita, for example for heating.
- Poland and South Africa have similar values. This may be related to their dependence on coal as the main energy source.

CO₂ emissions in selected countries

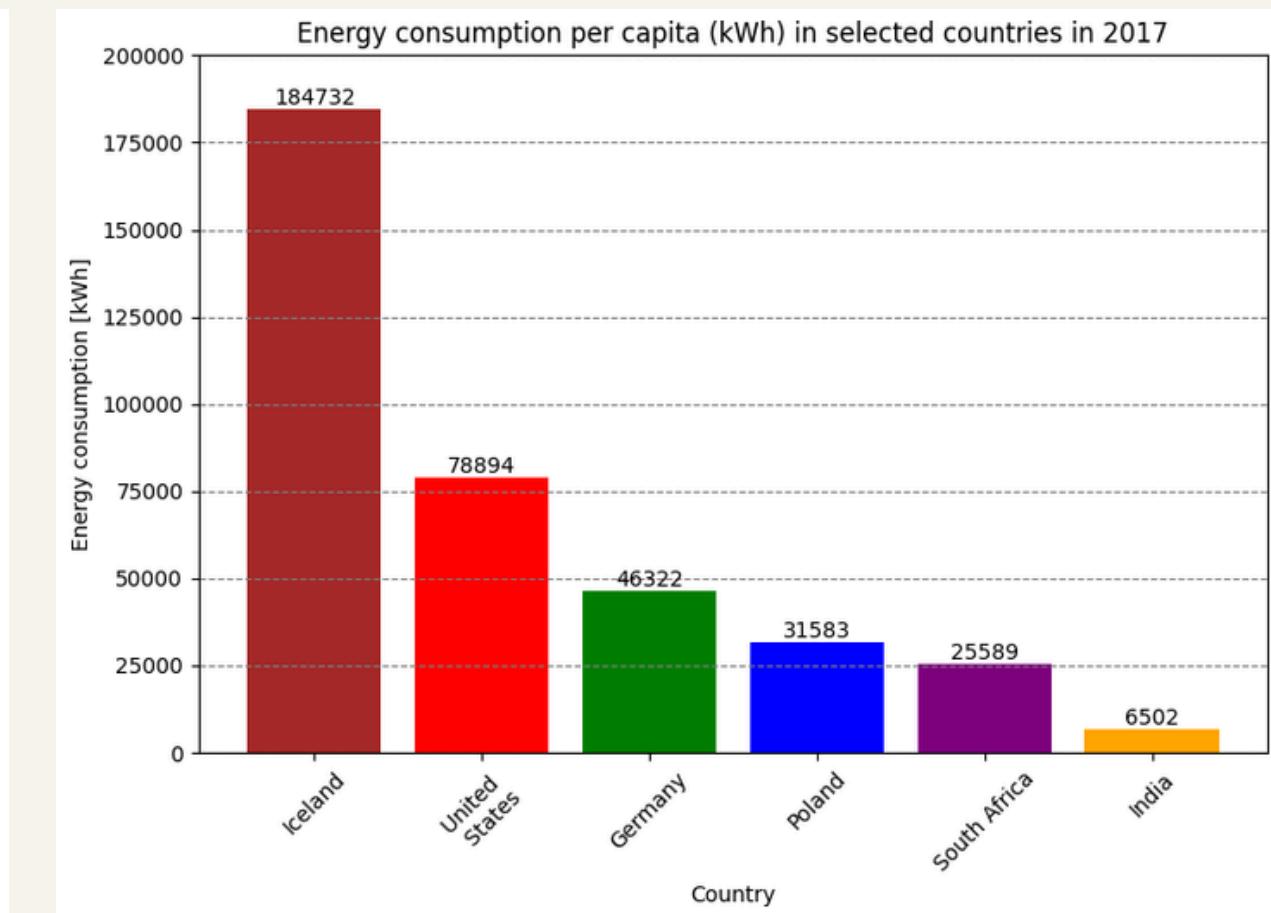
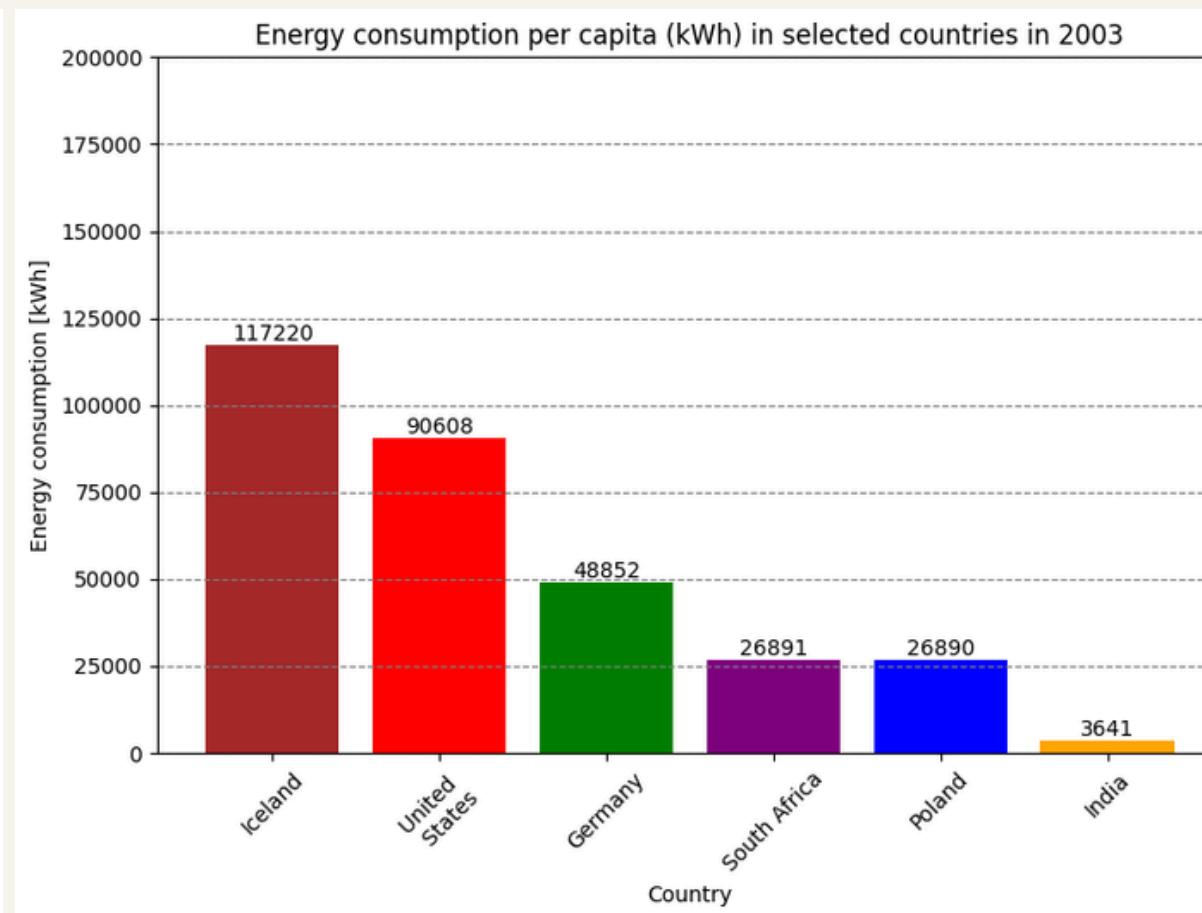
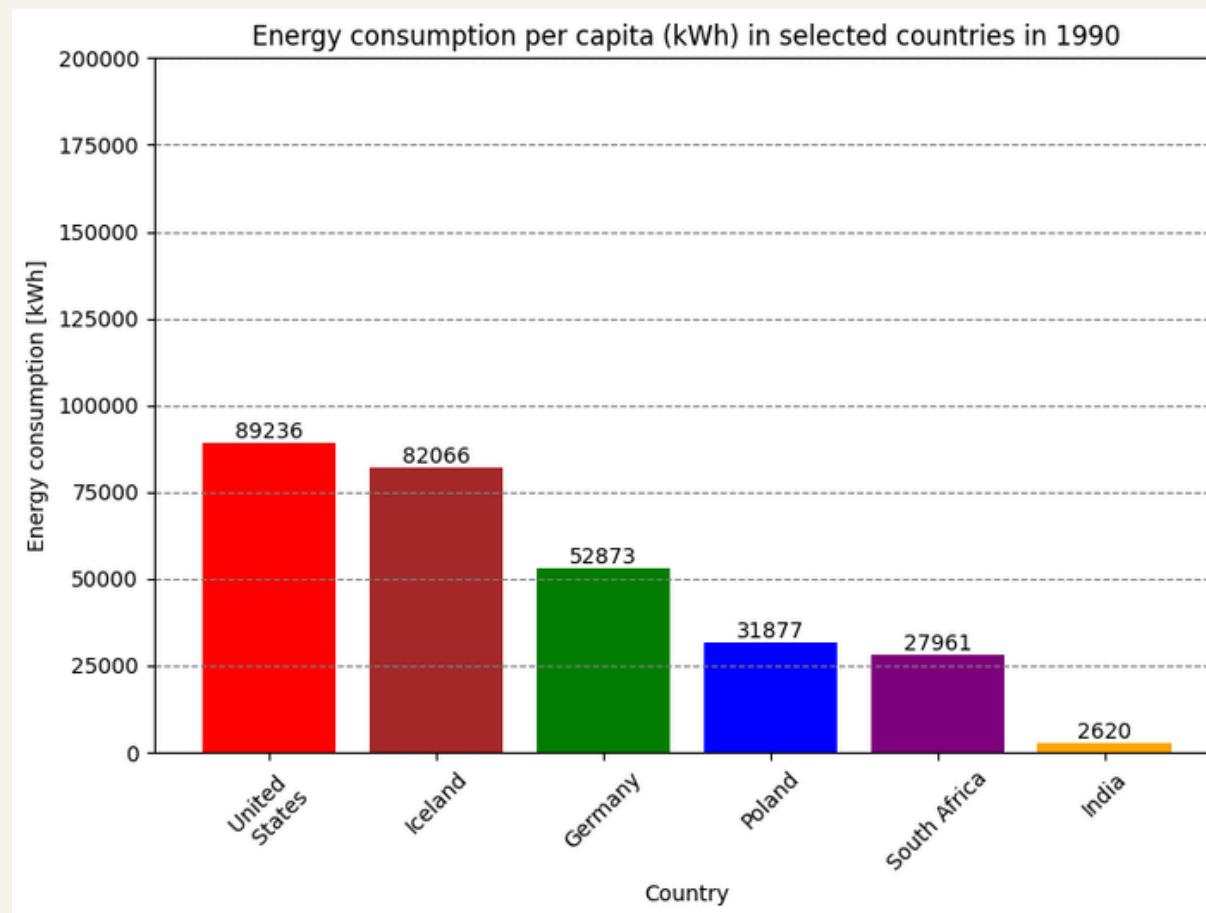
Pay attention to CO₂ emissions scale



HDI in selected countries

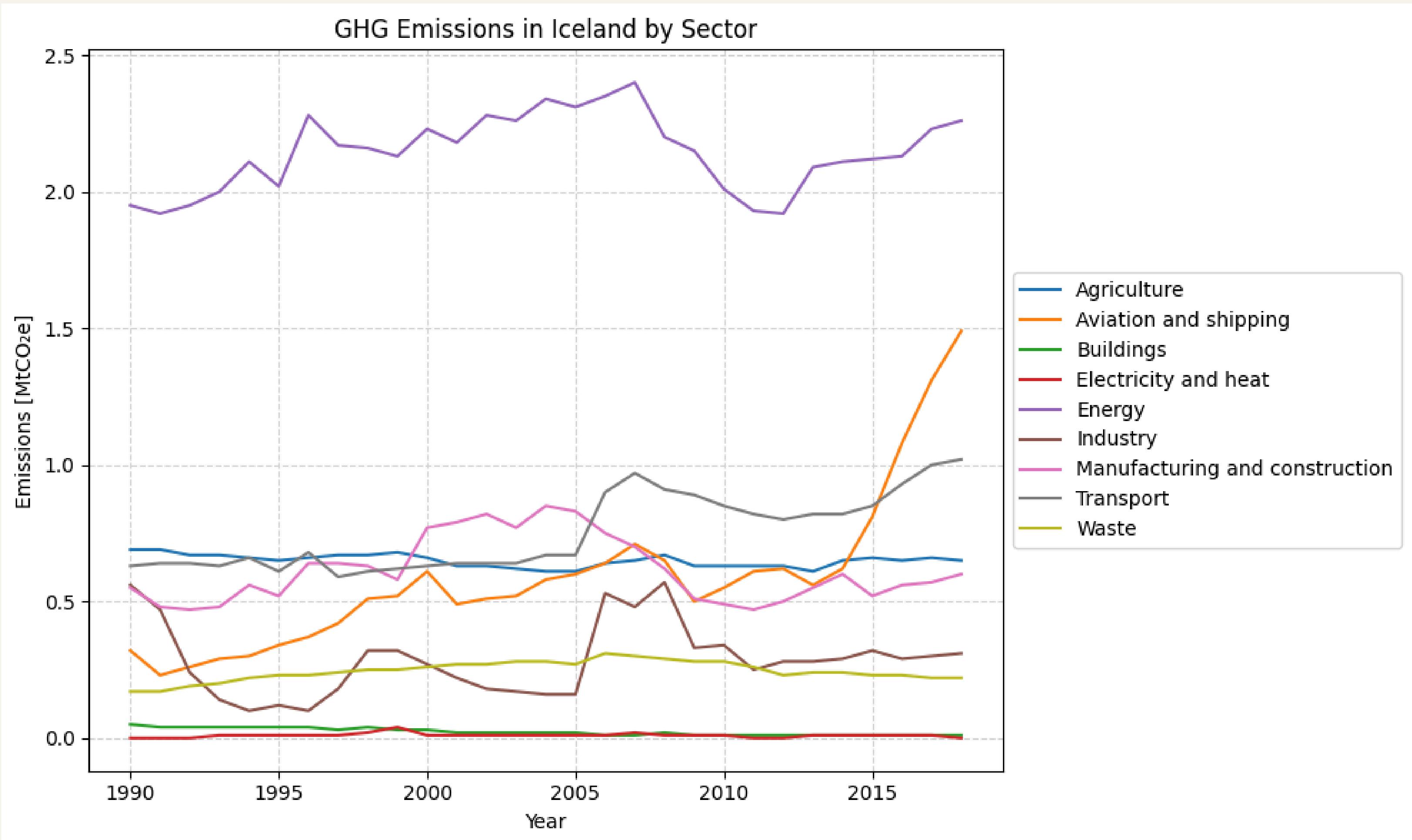


Energy consumption per capita in selected countries in 1990, 2003, and 2017

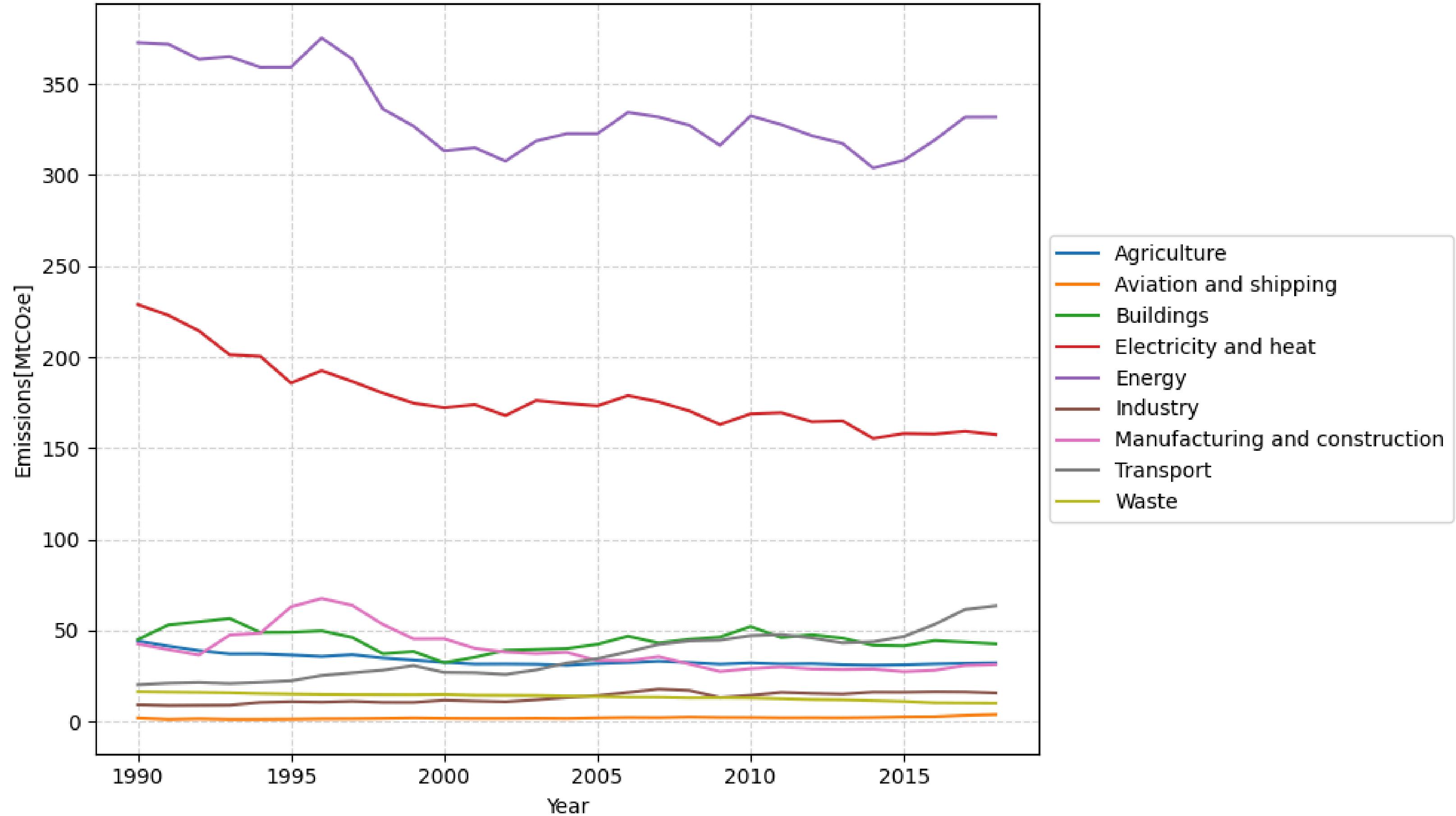


Greenhouse Gas (GHG)

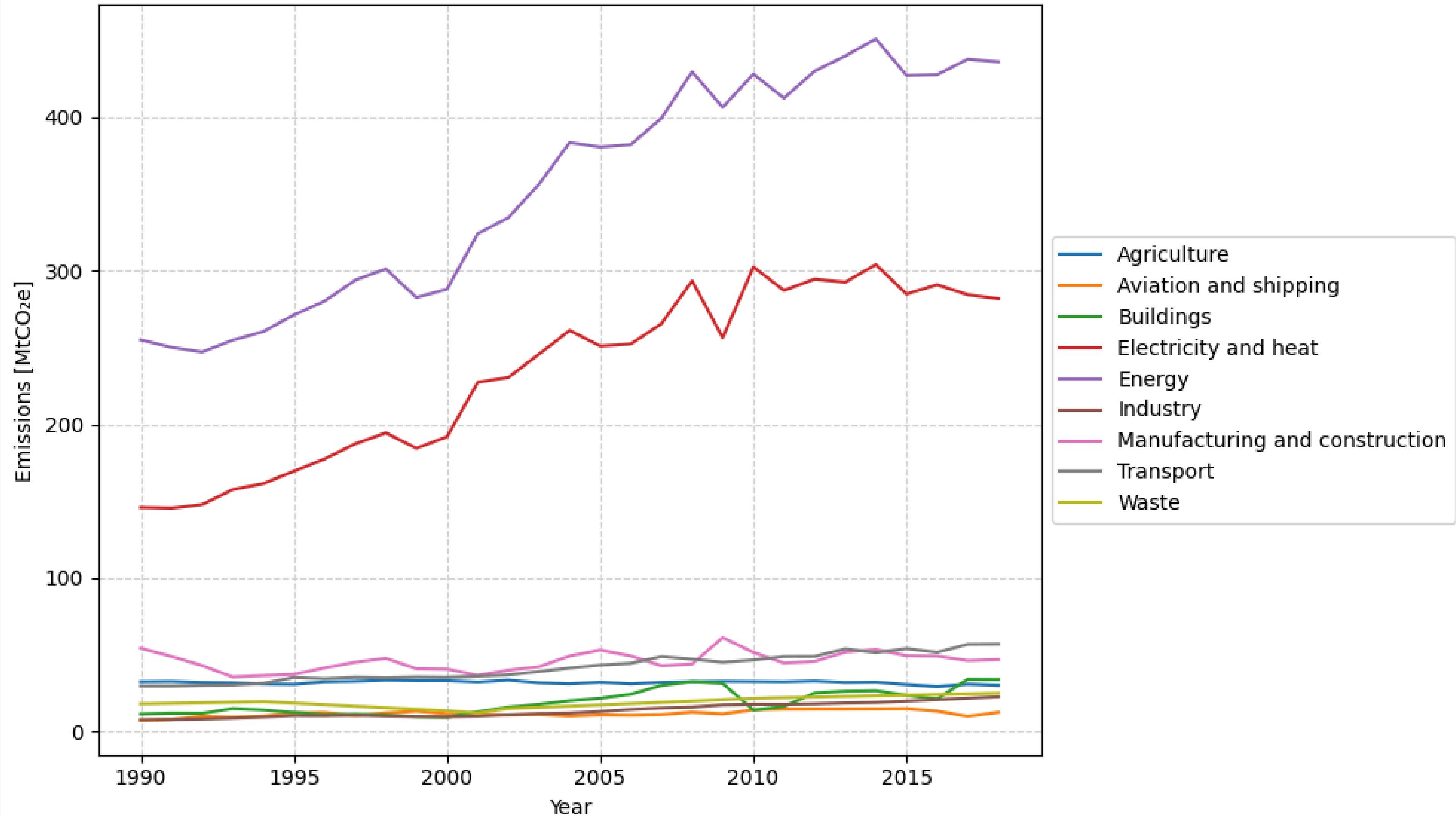
Emissions in selected countries



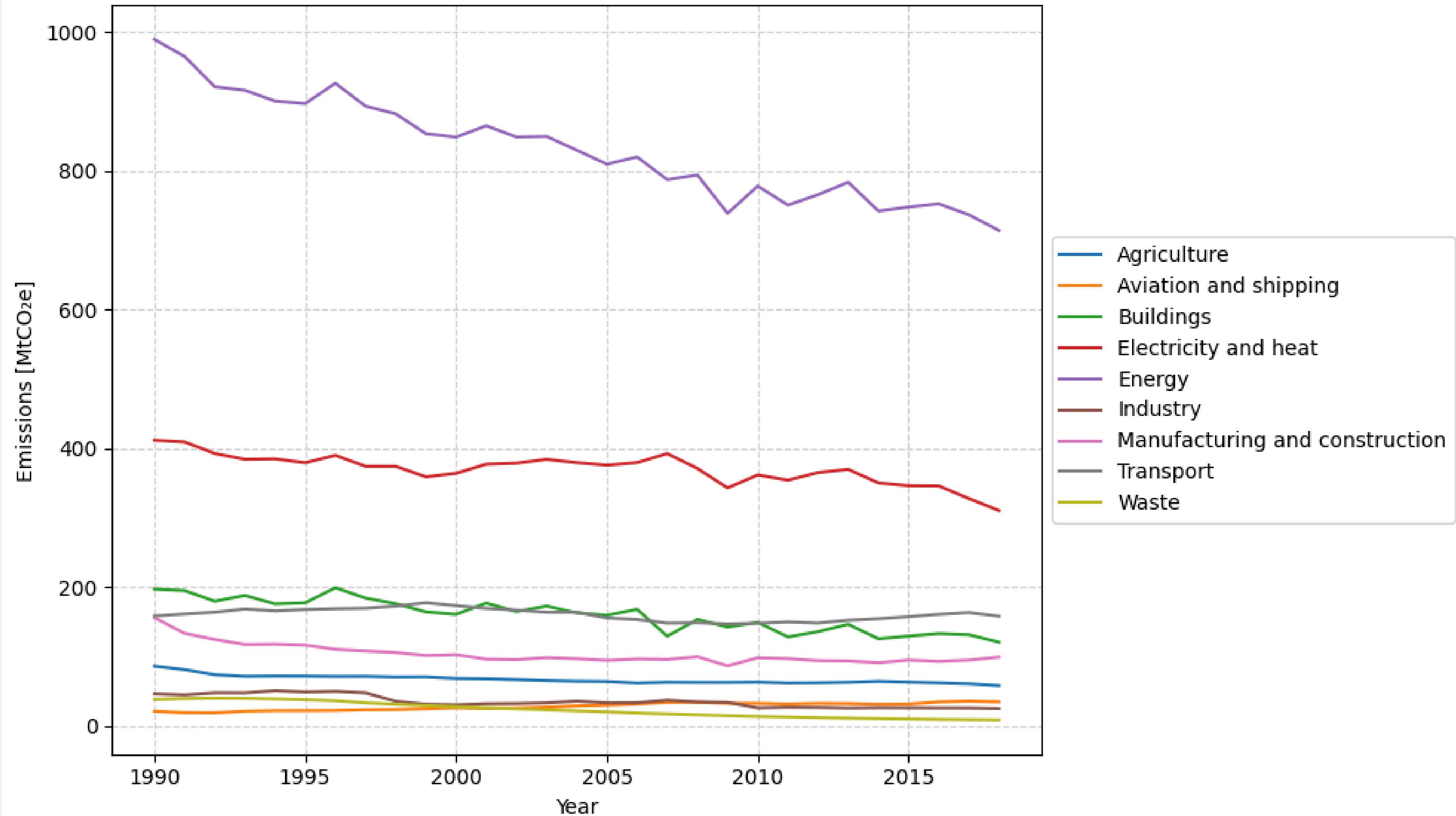
GHG Emissions in Poland by Sector



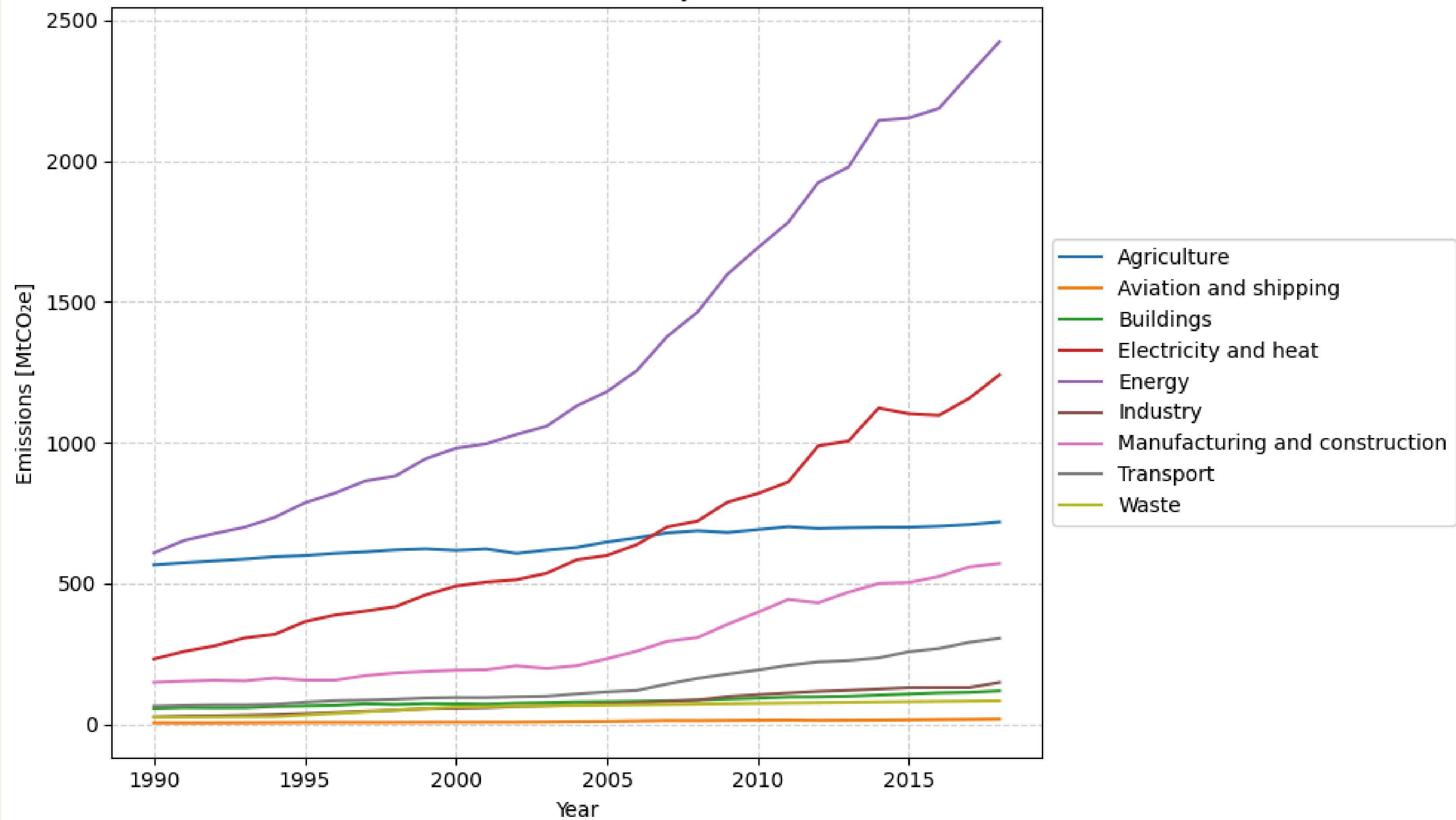
GHG Emissions in South Africa by Sector



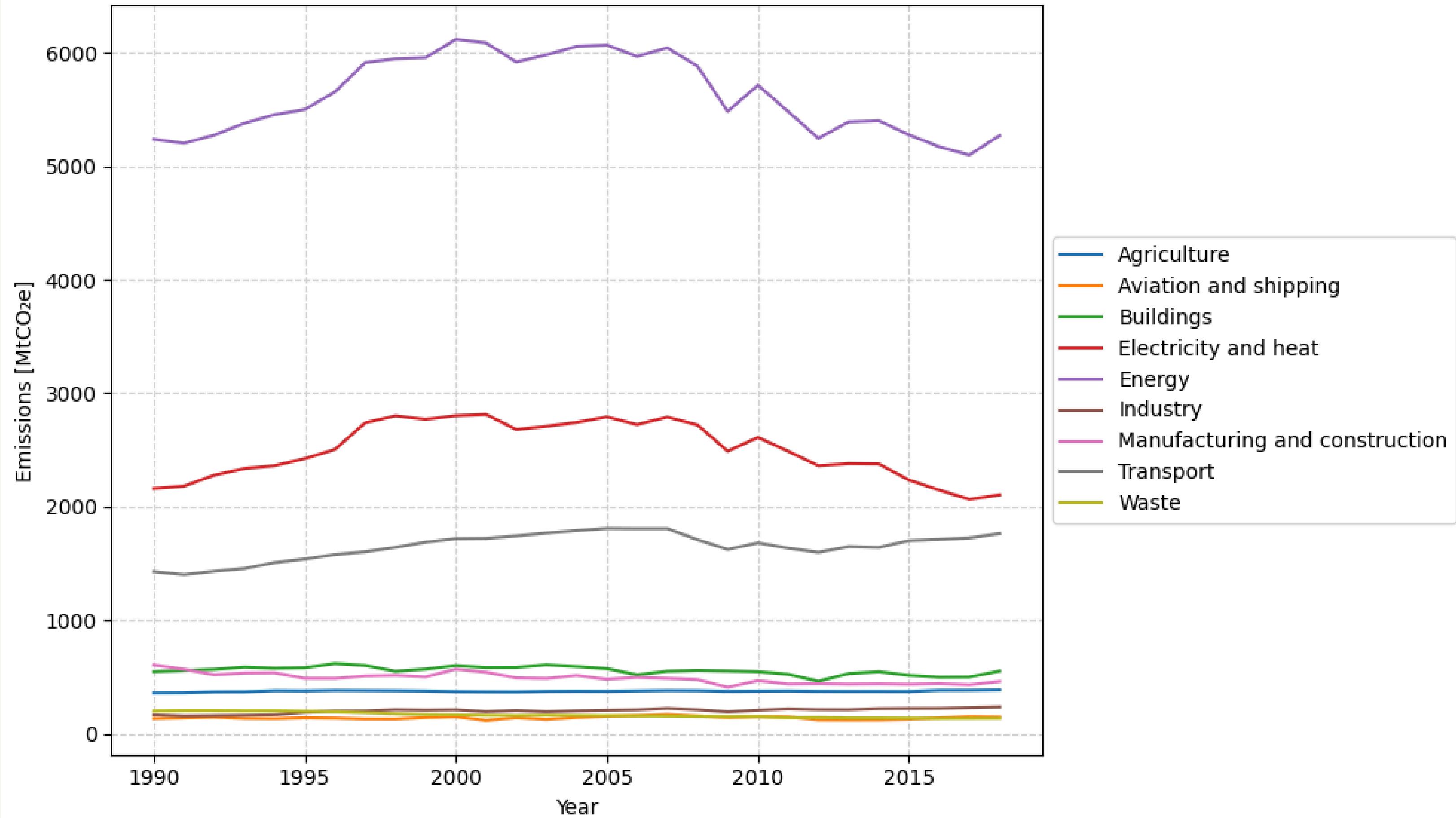
GHG Emissions in Germany by Sector



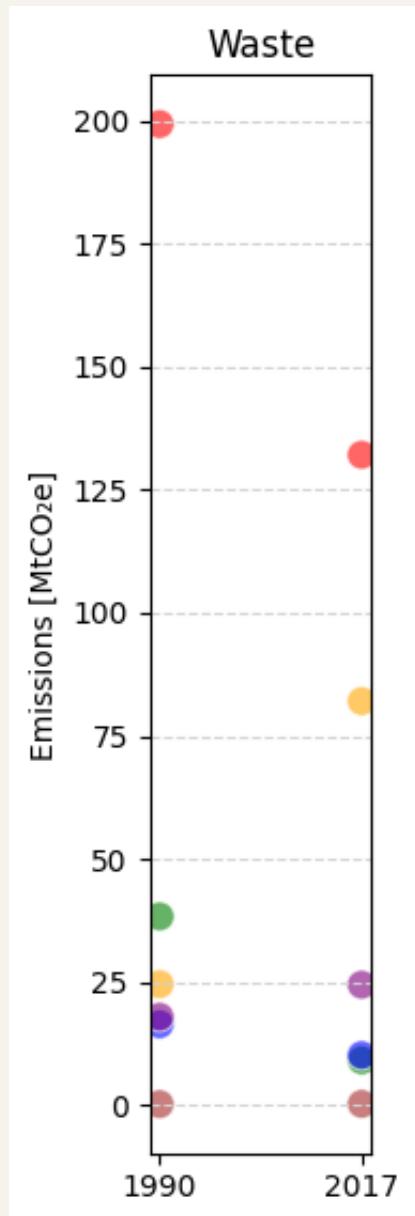
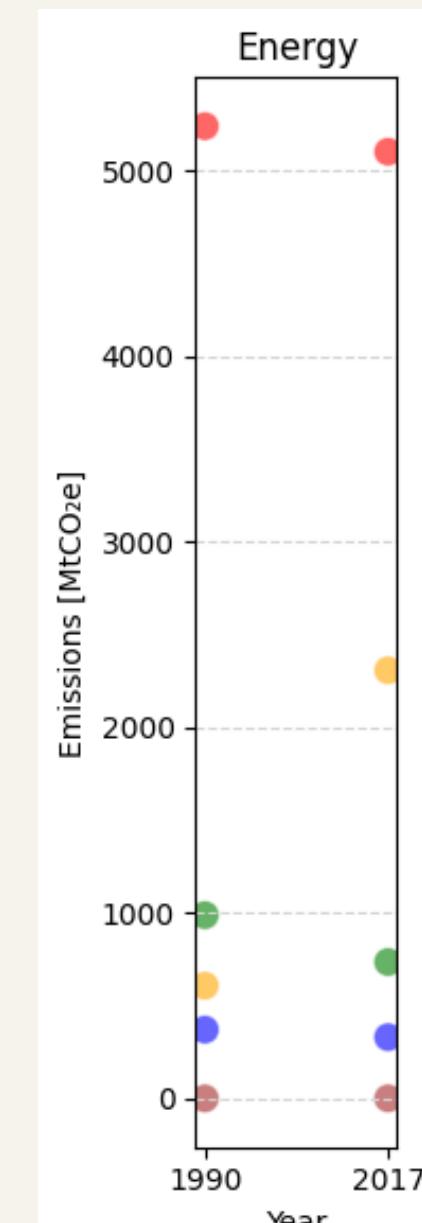
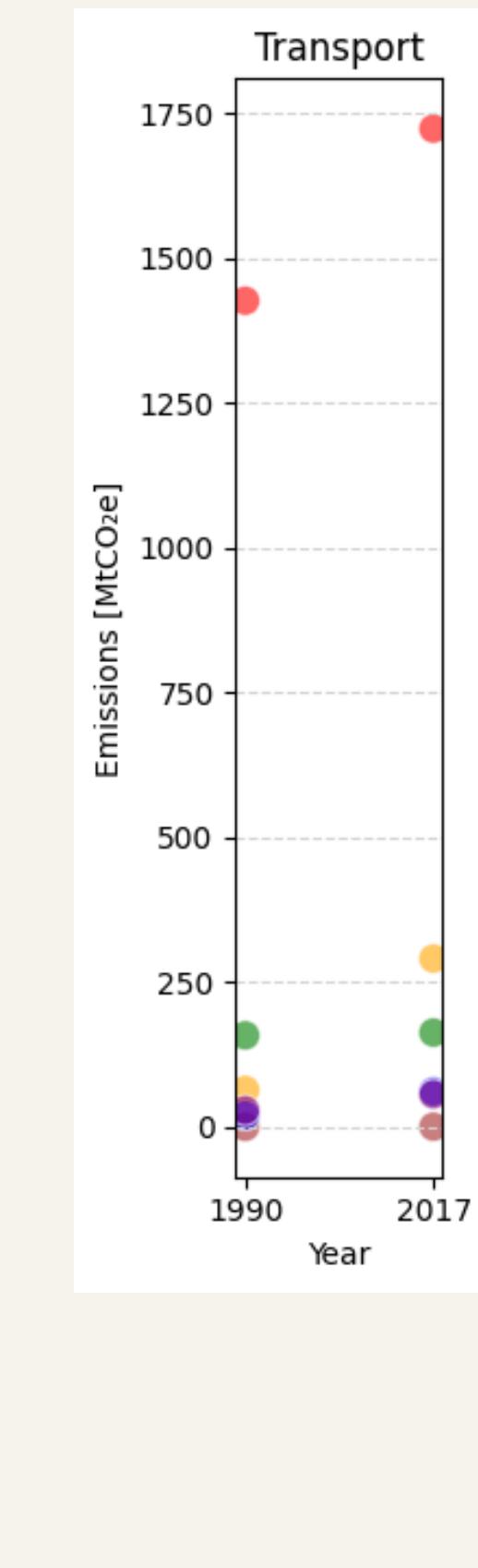
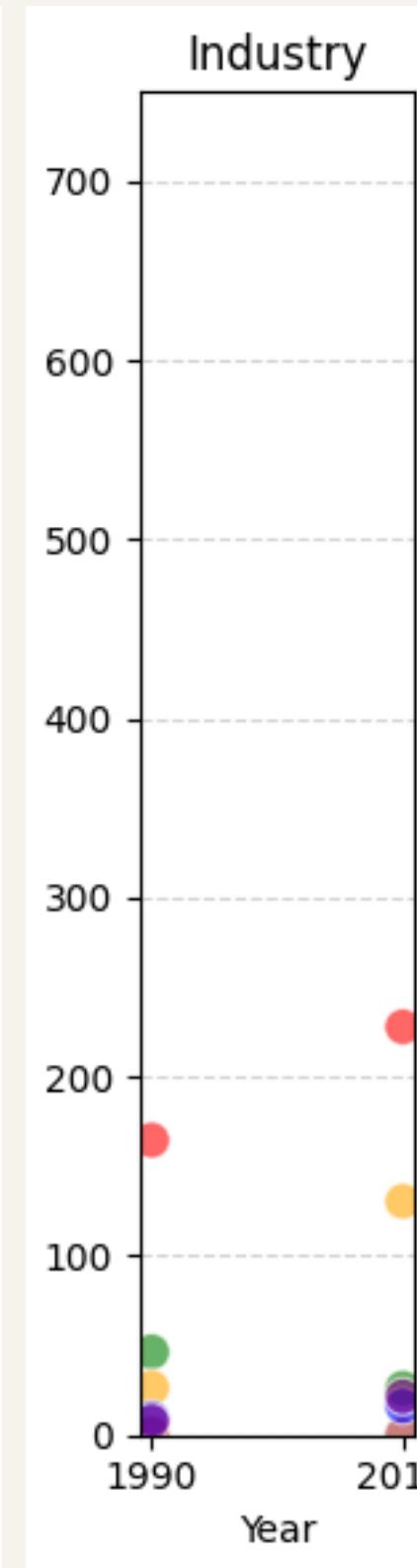
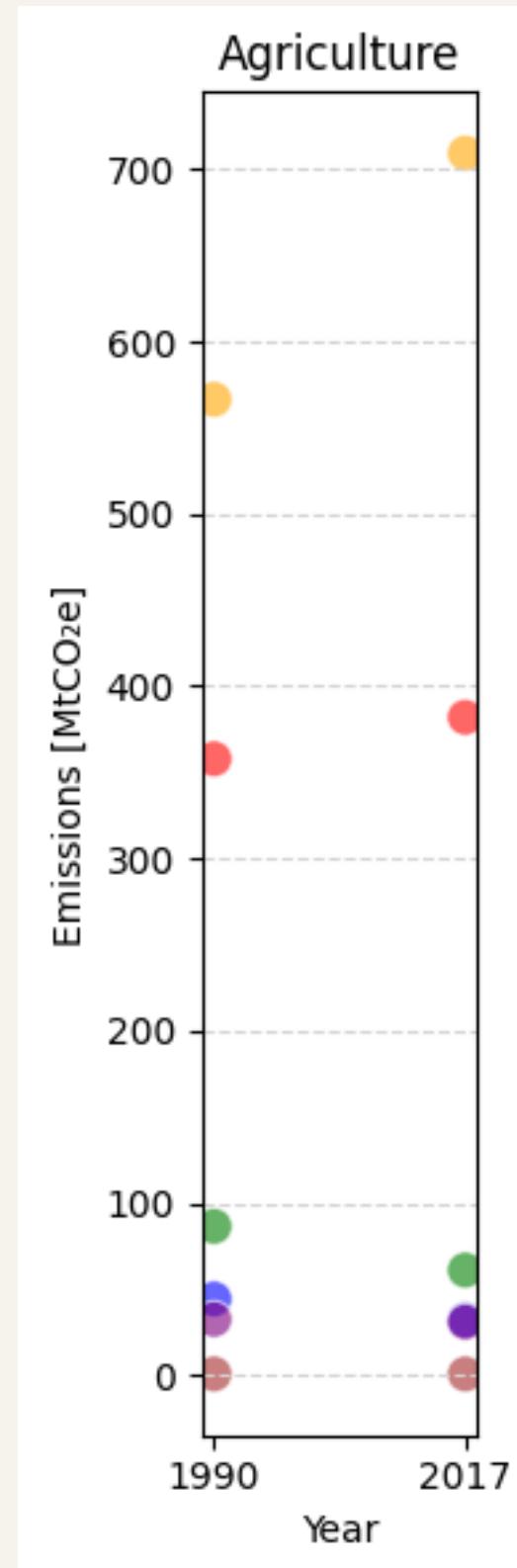
GHG Emissions in India by Sector



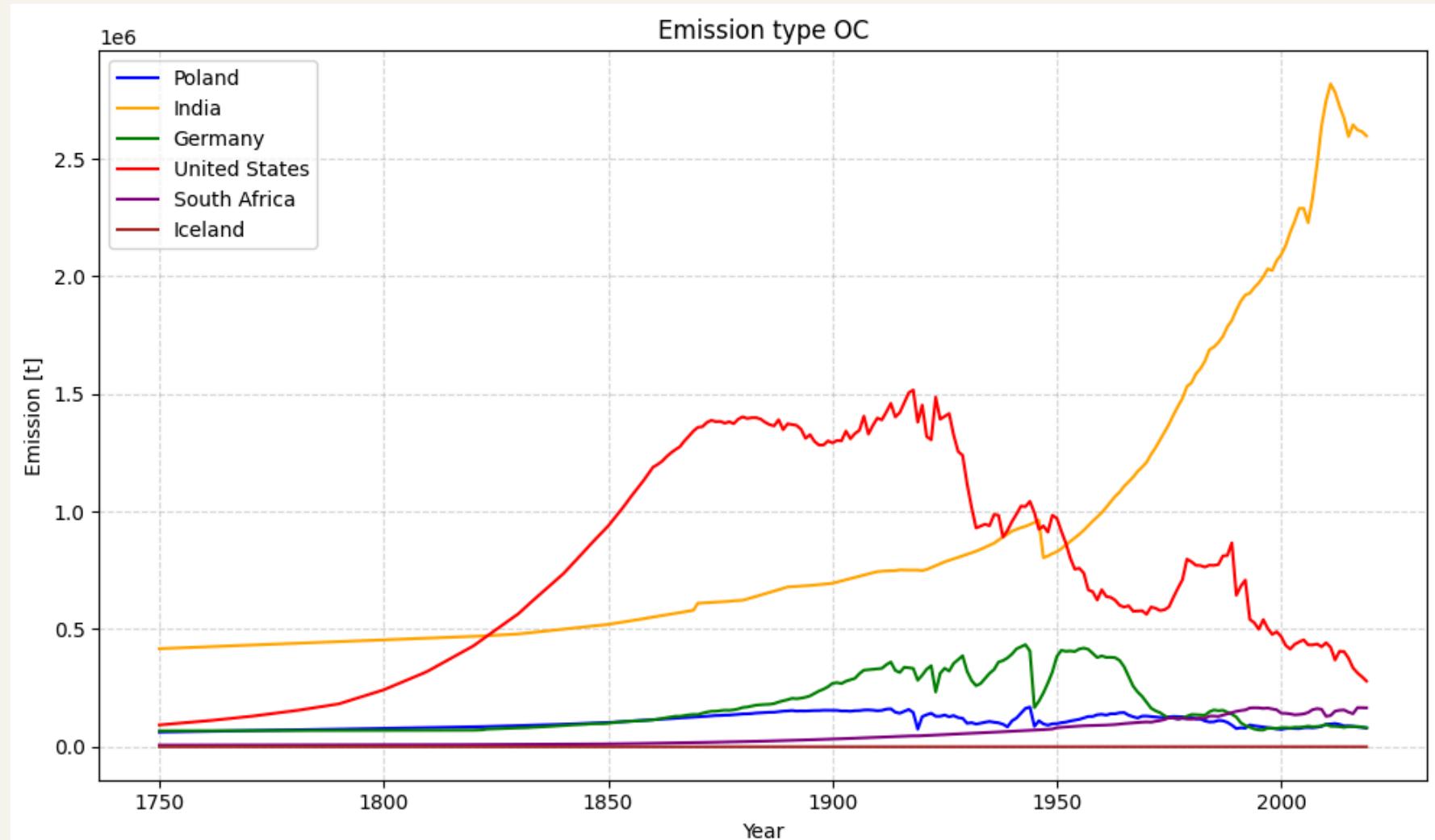
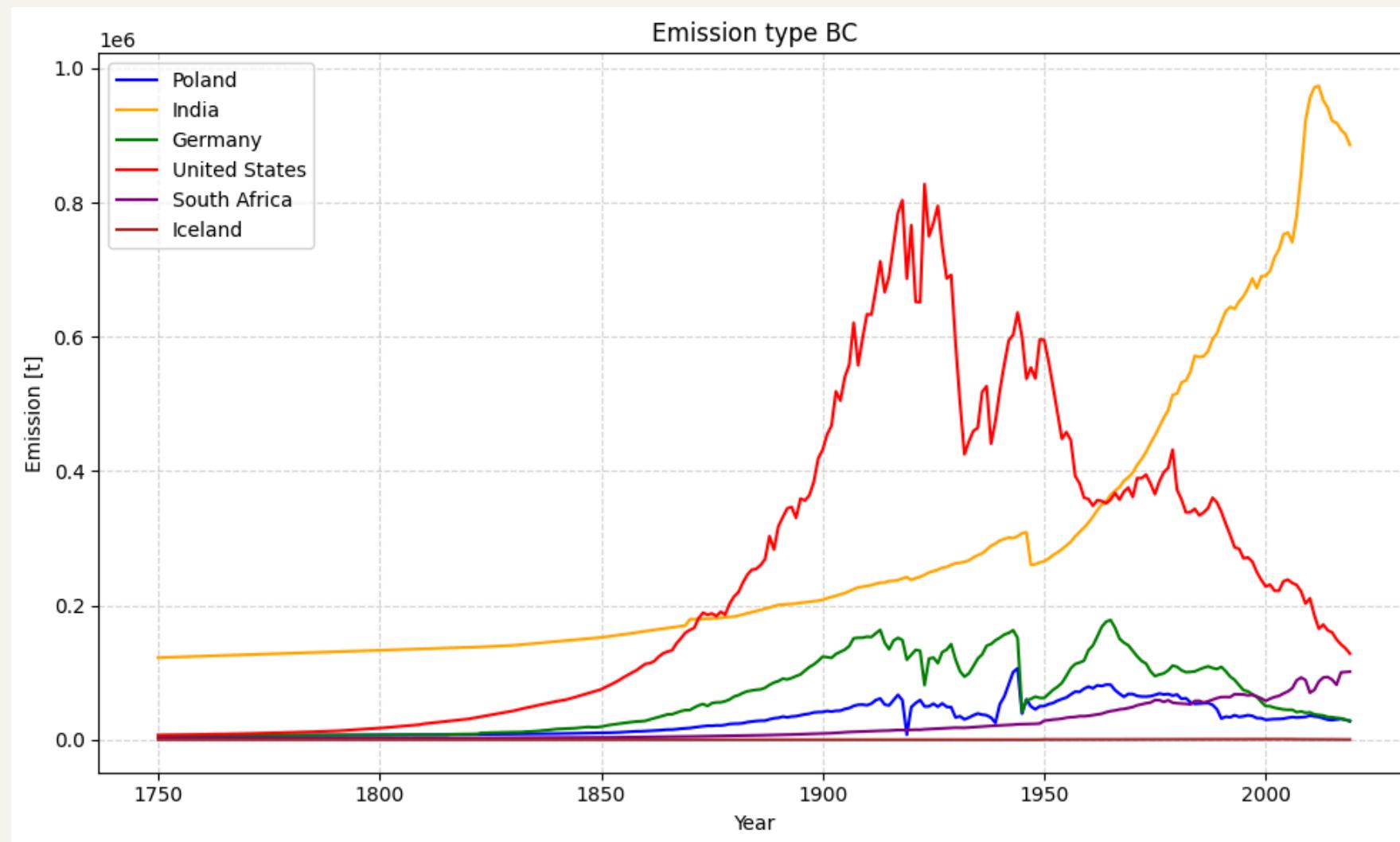
GHG Emissions in United States by Sector



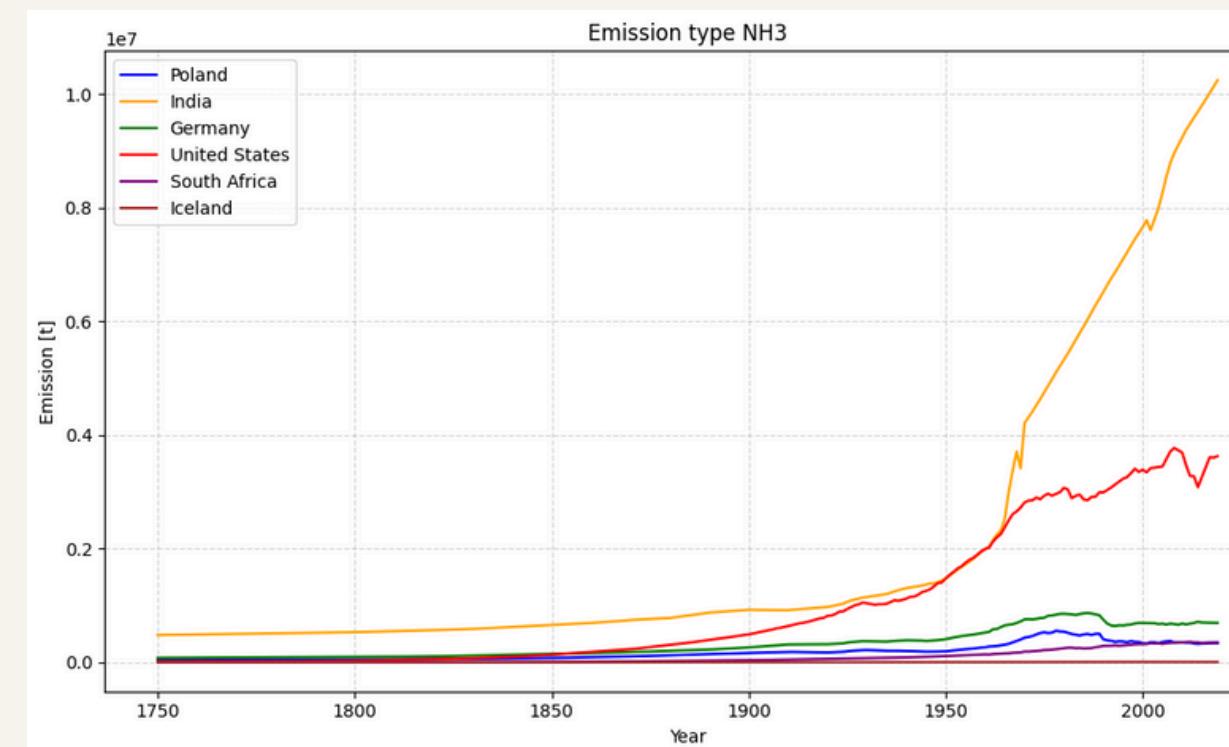
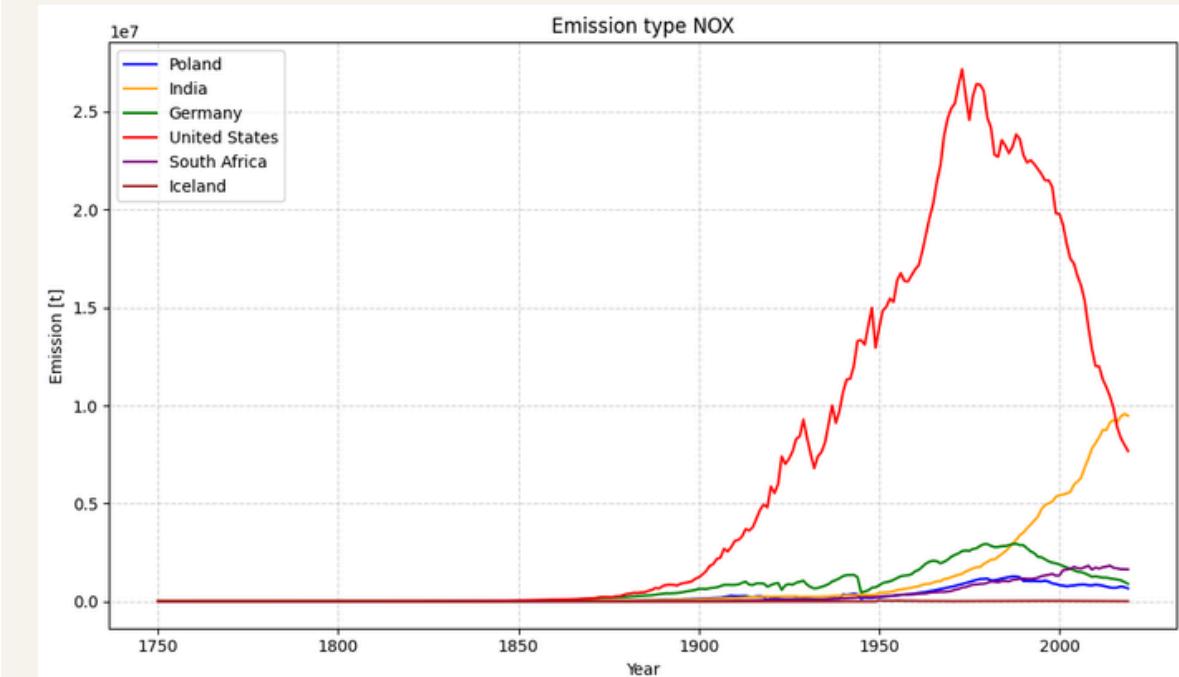
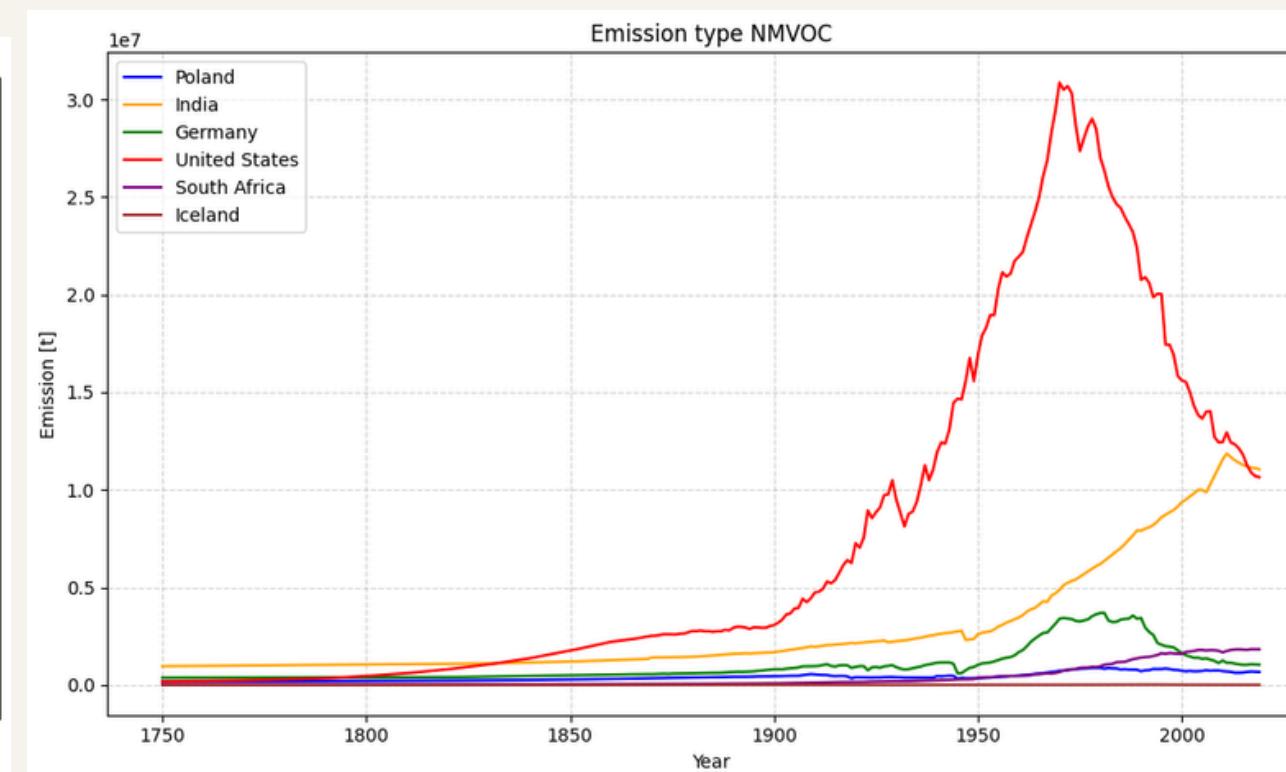
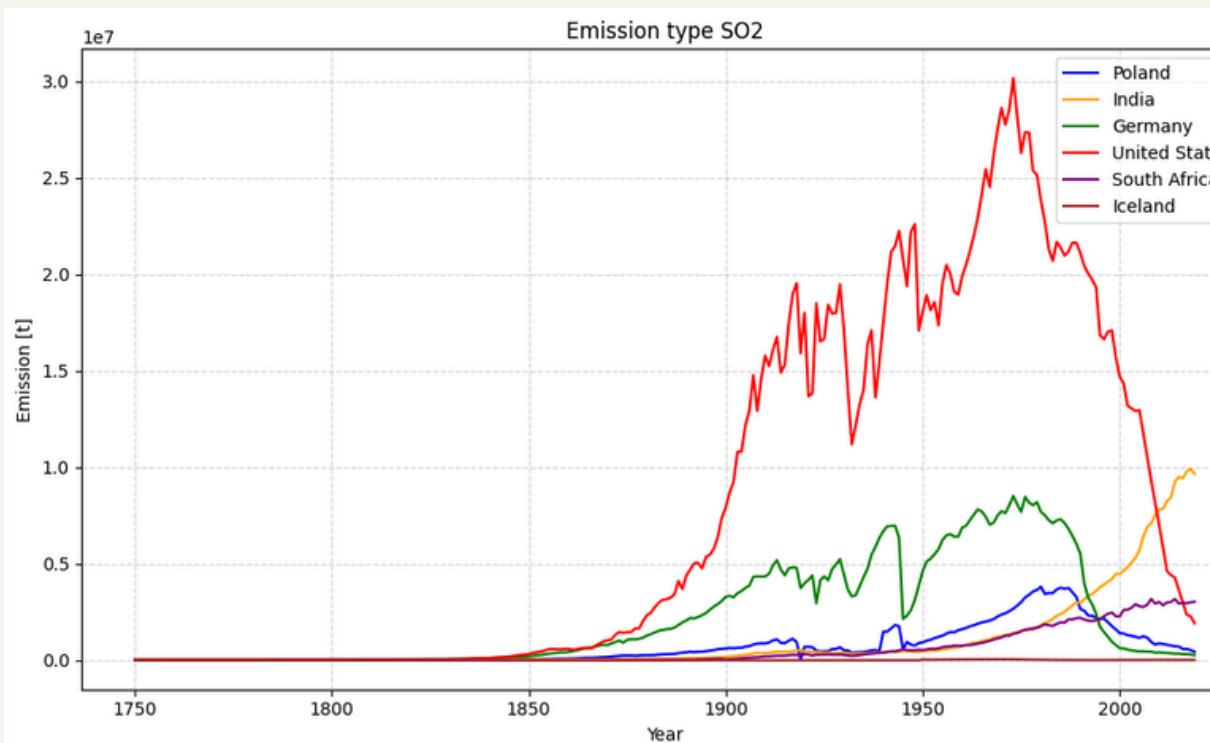
Greenhouse Gas Emissions in selected sectors & countries for years 1990 and 2017



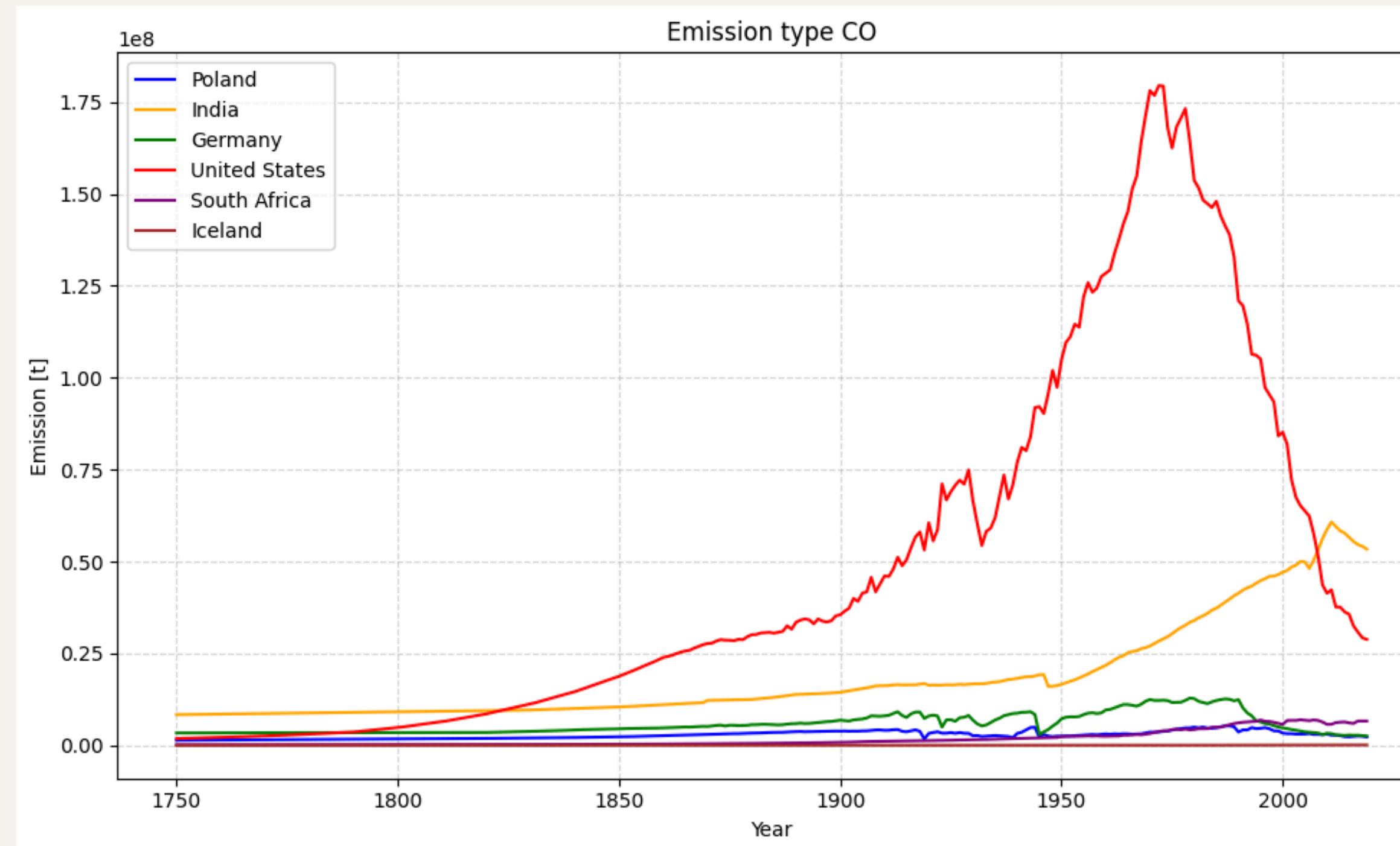
Air pollution emissions of different types in selected countries



Air pollution emissions of different types in selected countries



Air pollution emissions of different types in selected countries



Conclusions:

1. HDI (Human Development Index):

The USA, Germany and Iceland have a very high level (above 0.90), which indicates an advanced economy, health and education system.

Poland: High (approx. 0.87) – advancement from the category of medium-development countries.

India and South Africa have a medium HDI (between 0.65 and 0.75), which is quite different from that of developed countries.

2. Per capita energy consumption:

Highest: Iceland and the USA due to high energy comfort, air conditioning, transport and distances.

Germany and Poland have moderate levels, almost at the level of middle-developed countries, due to efficiency and regulation.

India and South Africa have the lowest values due to limited access and a lower level of industry and infrastructure.

3. CO₂ emissions per capita:

Higher: USA: lifestyle, transport and petrochemicals.

Medium-high: Iceland (heavy industry), Poland and Germany (coal, although Germany has more RES).

Lower: India and South Africa, despite their lower energy use, often rely on coal, but their per capita values are lower.

4. Energy efficiency vs clean sources:

Iceland: high energy consumption, but clean energy sources (geothermal and hydroelectric).

Germany: moderate consumption and relatively low emissions due to RES.

Poland: moderate consumption, but high emissions due to dependence on coal.

The USA has very high consumption and emissions due to its coal and gas infrastructure and lifestyle.

India and South Africa: low efficiency and high unit emissions, but still lower per capita.

- Iceland and Germany - examples of countries that, with relatively high consumption, maintain lower emissions through RES.
- USA and Poland - high consumption and emissions, but USA operates on a different scale (more consumption).
- India and South Africa - low consumption and emissions, but lack of infrastructure development and high carbon intensity of sources.