Chart 1

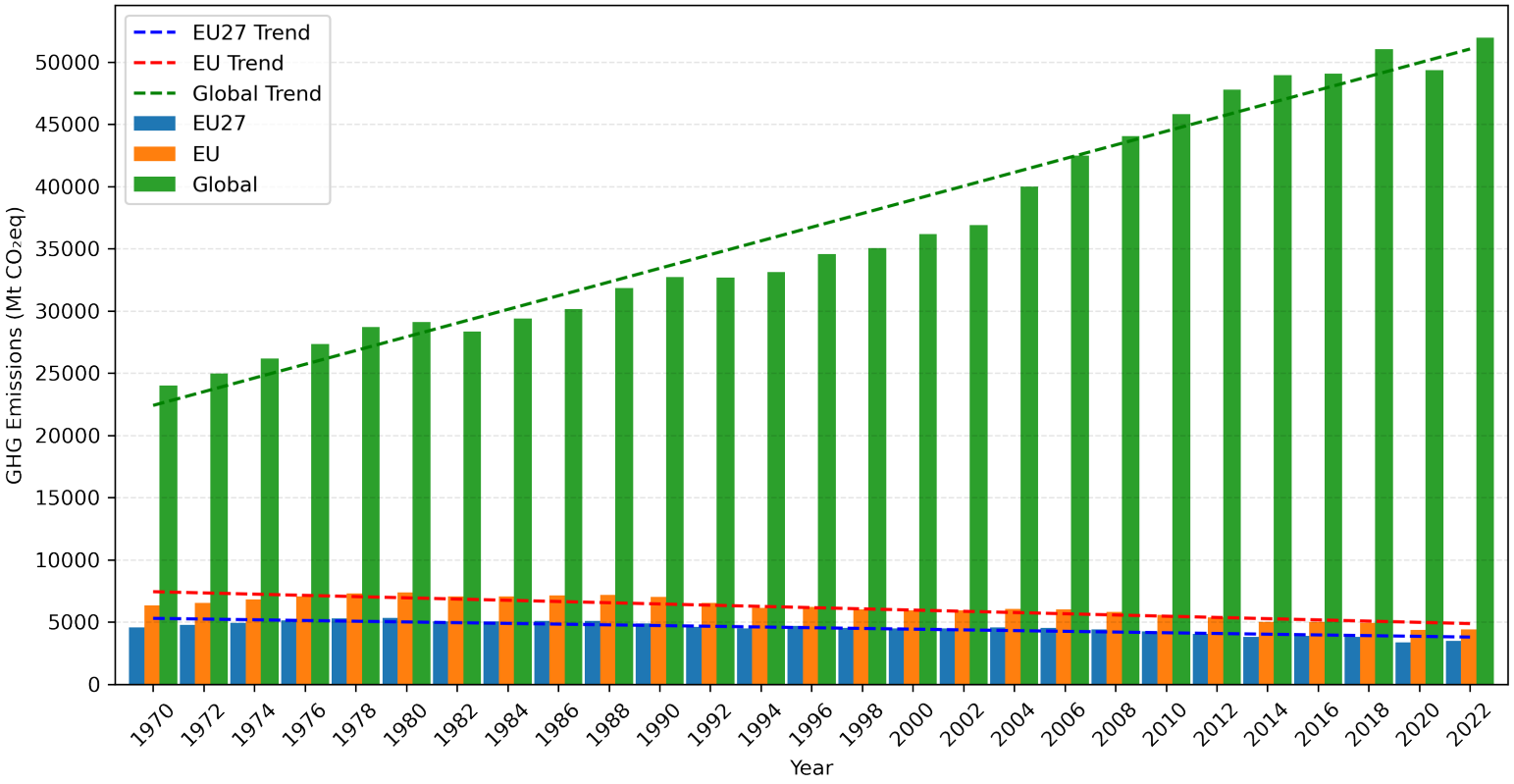

Figure 1: Evolution of greenhouse gas (GHG) emissions in European Union (blue), Europe (orange), and globally (green). Dashed lines represent the trend for each group.

The grouped bar chart (Fig. 1) above was created using Python libraries, including Pandas, NumPy and Matplotlib. A list of EDGAR country codes was utilized to filter the European group, consisting of countries whose geographical territory lies entirely within Europe (40 countries in total). The total contribution of this group was calculated by summing the emissions of all these countries. To enhance clarity and readability, the data was filtered to display greenhouse gas (GHG) emissions at two-year intervals. Additionally, trend lines were added for each dataset by fitting a first-degree polynomial, emphasizing the underlying trends and facilitating comparisons among regions.

- **Reduction in European Emissions**: Over the years, both the European Union and the broader European region have significantly reduced their greenhouse gas (GHG) emissions, reflecting a shift towards more sustainable and eco-friendly practices.
- **Global Increase in Emissions**: In contrast, global emissions have shown a concerning linear increase, surpassing the 50,000 Mt CO_2eq level in 2022, just two years after the COVID-19 lockdowns. This growth is primarily driven by top-emitting countries, such as China and the United States, which have significant industrial activities.

Chart 2

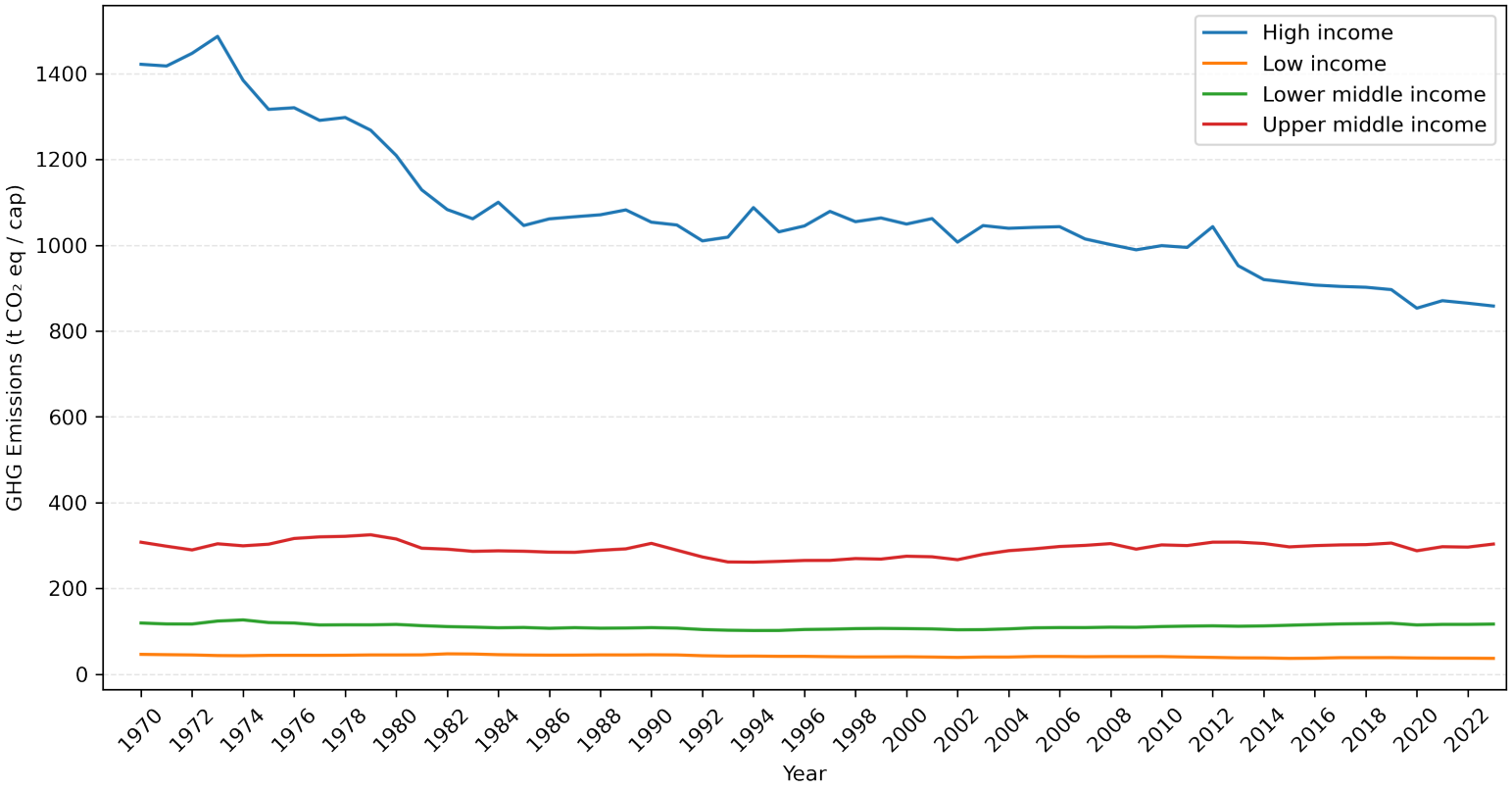

Figure 2: Greenhouse gas (GHG) emissions per capita of countries based on their World Bank income group.

For the creation of the chart above (Fig. 2) the classification of countries on income groups by World Bank, was obtained from the official World Bank website. The countries on this list, along with their assigned income groups, were matched with the corresponding entries in the GHG emissions per capita dataset based on their country codes. This process allowed each country in the emissions dataset to be categorized by its respective income group. Subsequently, the total greenhouse gas (GHG) emissions of all countries within each income group were aggregated, and the results are presented in Fig. 2.

- **Higher GHG emissions per capita in high-income countries**: High income countries exhibit significantly higher GHG emissions per capita compared to low, lower middle and upper middle income countries. However, their emissions per capita show a declining trend over the years.
- **Stable GHG emissions per capita in low and middle-income countries**: In contrast, GHG emissions per capita for low, lower middle and upper middle income countries have remained relatively stable over time, with minimal variations.

Chart 3

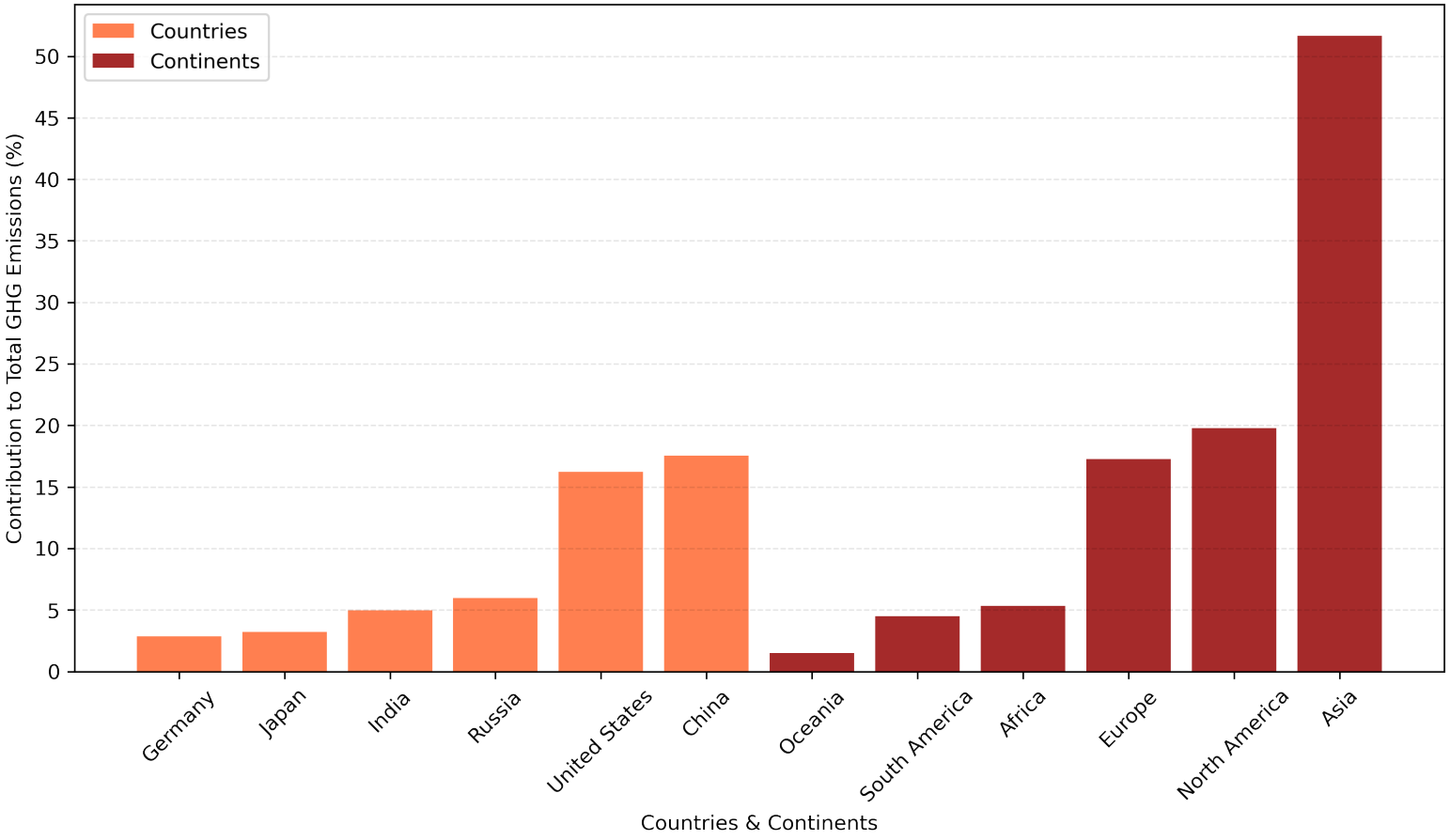

Figure 3: Countries with the highest GHG emissions (>2.5%), along with the contributions of six continents, as a percentage of total global GHG emissions (1970–2023).

In order to assign each country, from the GHG_totals_by_country sheet, its respective continent label, a list of country and continent codes was obtained from this GitHub repository. The two datasets were merged based on country codes, effectively assigning a continent label to each country. Then the total GHG emissions for each country were calculated by summing their annual emissions over the years, while total emissions for each continent were determined by aggregating the emissions of all countries within that continent. The contributions of both countries and continents were then expressed as percentages of the total global emissions. For clarity, countries with a contribution greater than 2.5% are displayed. The resulting bar chart (Fig. 3) provides a clear comparison of the contributions of top 6 emitting countries alongside their respective continents, highlighting their relative impact on global emissions.

- **Asia's Dominance**: Asia contributes over 50% of the total GHG emissions ever produced, significantly surpassing all other continents, each of which remains below 20%.
- **Top Emitters**: China and the United States stand out as the leading contributors, collectively accounting for more than 30% of global GHG emissions, with each exceeding 15%.