

GLOBAL ENERGY TRENDS: REGIONAL AND COUNTRYSPECIFIC INSIGHTS (1990–2020) - REPORT

INTRODUCTION

This project looks at global energy trends using data from 1990 to 2020, focusing on CO2 emissions, the usage of renewable energy, and energy production and consumption. The analysis is divided into dashboards specific to each region and country to provide helpful information to politicians, corporations, and environmental organizations. The goal of identifying patterns in energy use, emissions, and the incorporation of renewable energy sources is to support sustainable development initiatives.

DATASET OVERVIEW

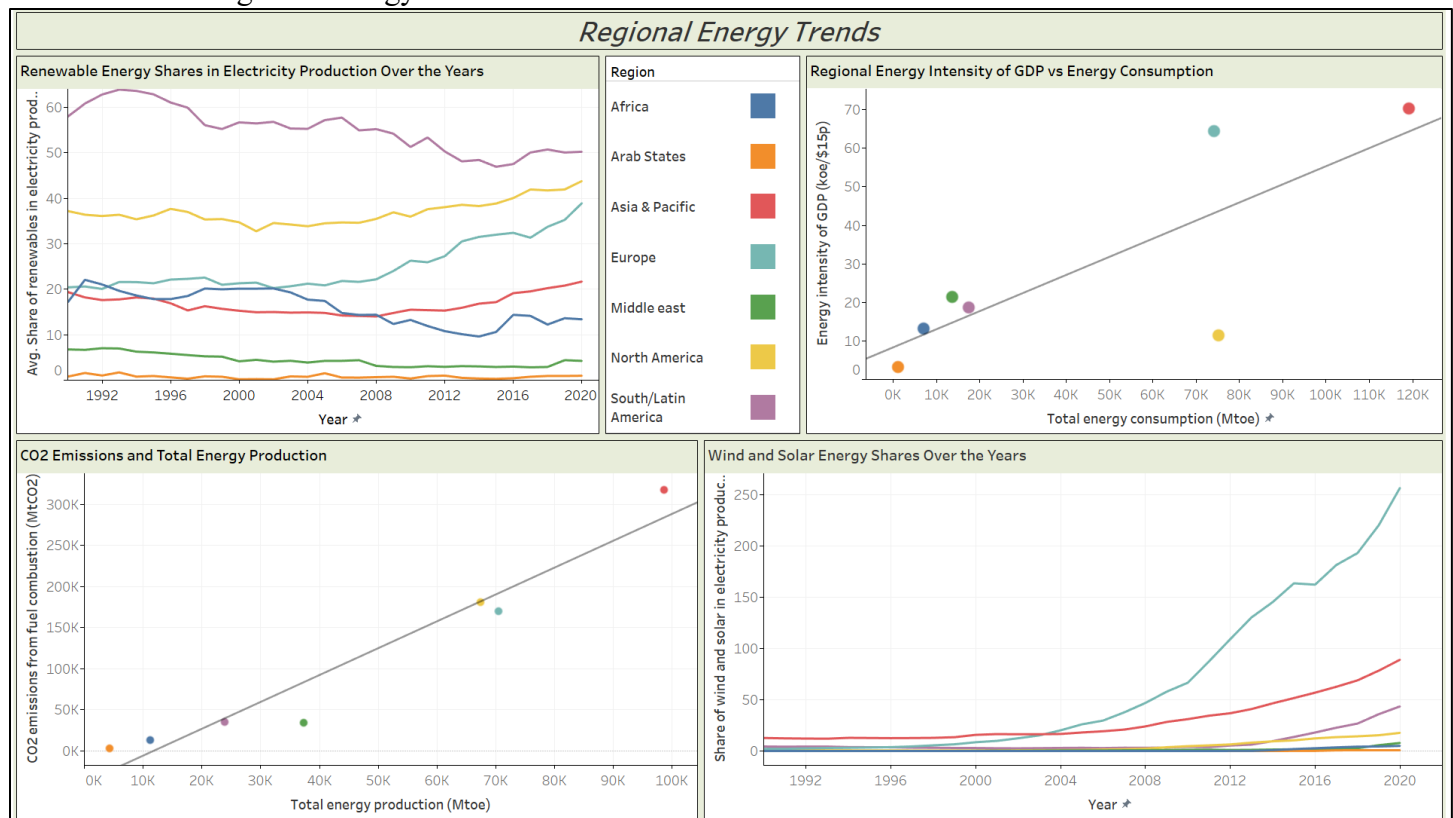
Energy-related variables for several nations and areas spanning 30 years are included in the dataset. Important columns consist of:

- Emissions of CO2 from burning fuel (MtCO2): total emissions of carbon dioxide from fossil fuels.
- GDP energy intensity (koe/\$15p): GDP energy intensity (koe/\$15p) is the amount of energy used per GDP unit.
- Renewables' percentage of power production (%): The proportion of electricity produced from renewable resources.
- Production and consumption of energy overall (Mtoe): Millions of tons of oil equivalent are used to measure energy production and consumption.
- Wind and solar power production share (%): The percentage of electricity produced by wind and solar power.

Because the dataset includes nations from every continent and region (such as Europe, Asia & Pacific, and the Middle East), it can be used for both macro (regional) and micro (country-specific) analysis.

DATA VISUALIZATION

Dashboard 1 – Regional Energy Trends



This dashboard focuses on analyzing energy trends across different regions, including Africa, Arab States, Asia & Pacific, Europe, Middle East, North America, and South/Latin America.

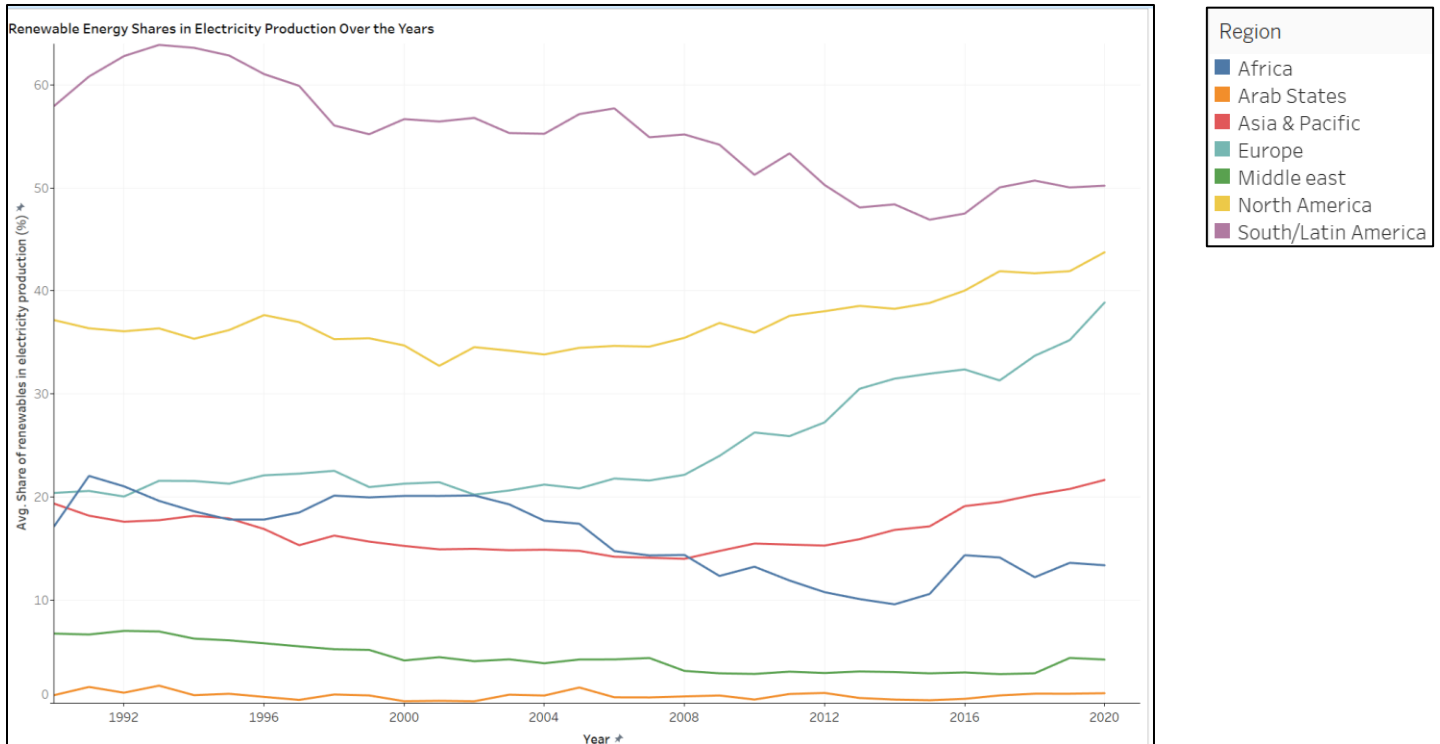


Fig1. Renewable Energy Shares in Electricity Production Over the Years

The line chart displays the average percentage of electricity generated from renewable sources for each region over time.

Insights

- The use of renewable energy is steadily rising in Europe.
- Compared to other regions, the Middle East has a low level of integration of renewable energy.
- The share of renewable energy is gradually rising in Asia and the Pacific.

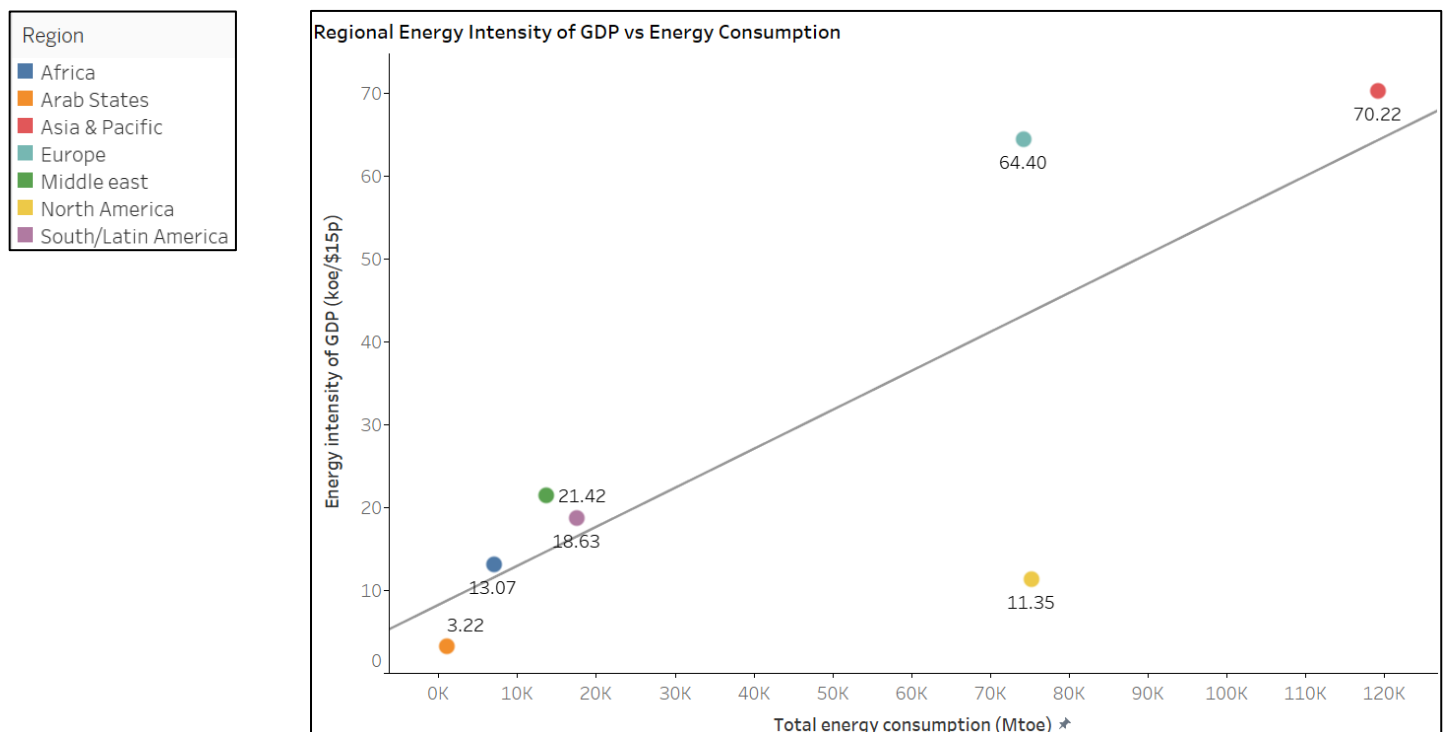


Fig3. Relation Between a Region's GDP and Its Energy Consumption

A scatter plot that contrasts the energy intensity of GDP (koe/\$15p) for each region with the overall energy consumption (Mtoe).

Insights

- Although energy intensity varies, regions such as Asia & Pacific and North America consume large amounts of energy.
- Compared to other places, Africa uses less energy and does it with less intensity.

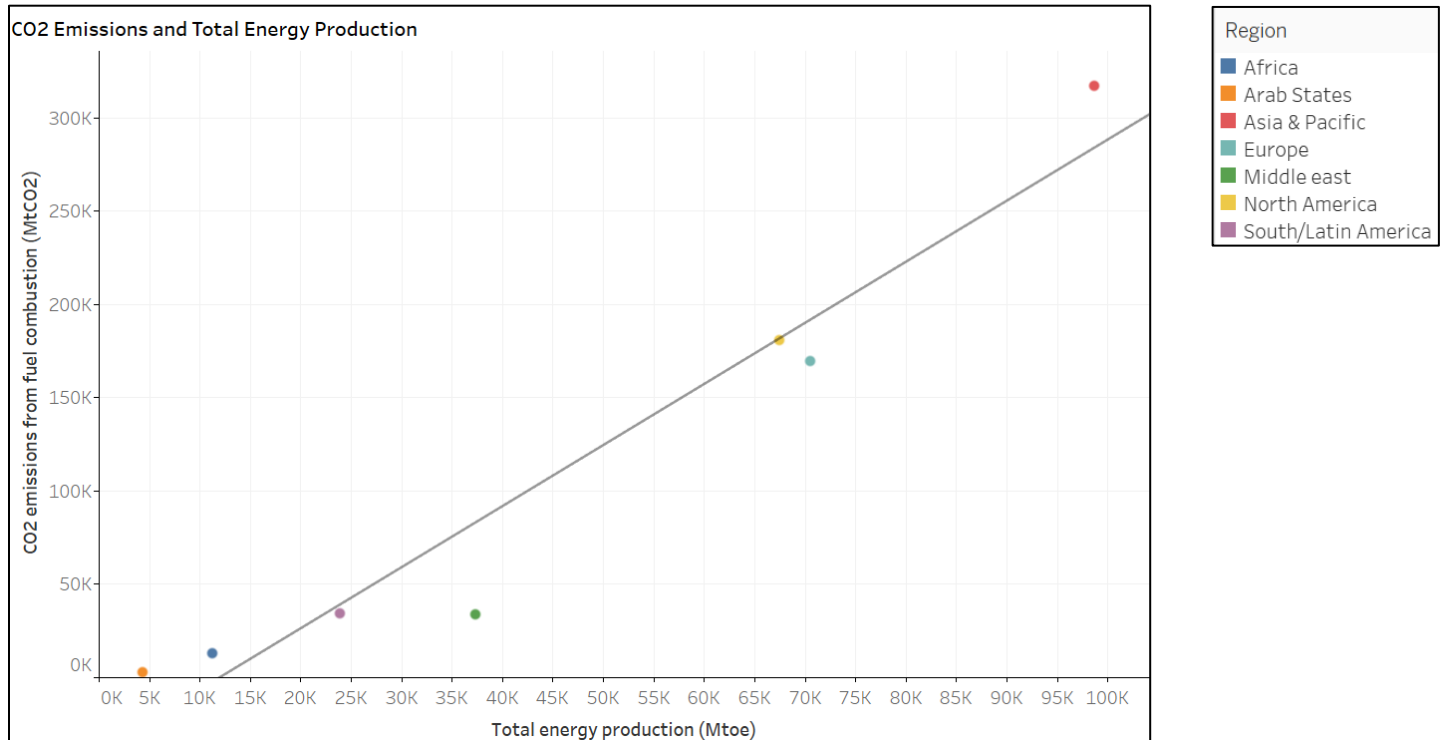


Fig4. Correlation Between CO2 Emission and Total Energy Production

The scatter plot illustrates the correlation between total energy output (Mtoe) and CO2 emissions from fuel burning (MtCO2).

Insights:

- In regions like Asia & Pacific and North America, there is a strong correlation between increasing energy output and higher CO2 emissions.
- CO2 emissions are substantially lower in areas like Africa that produce less energy.

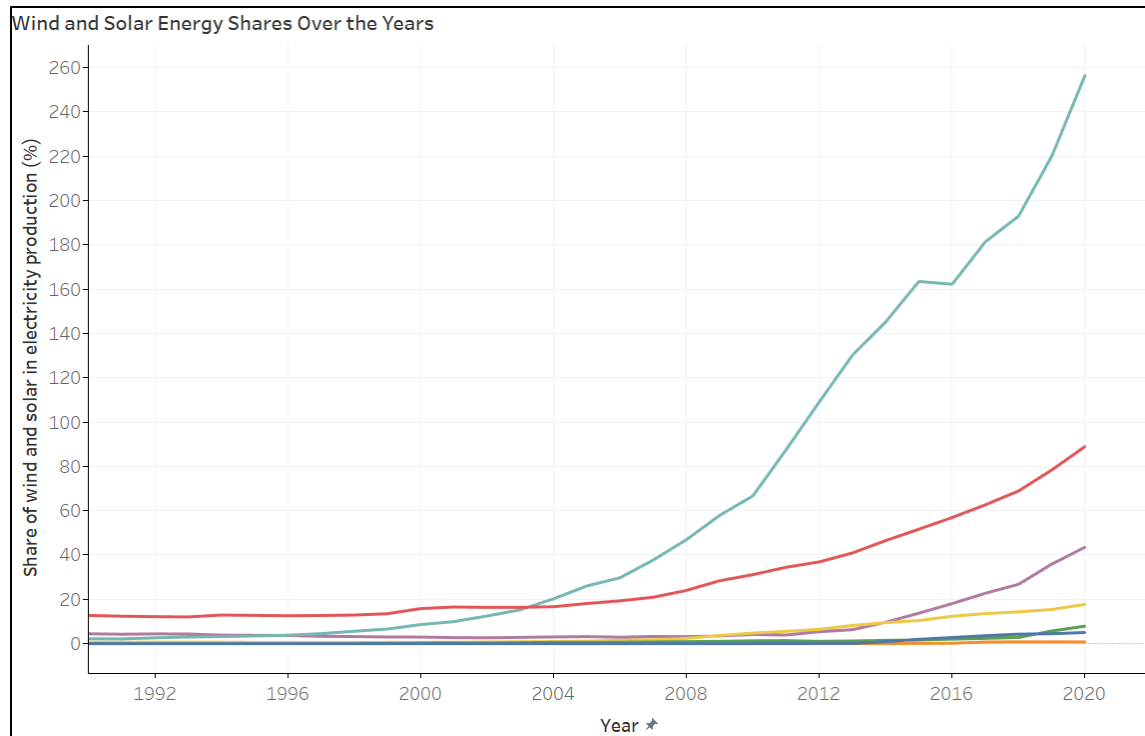
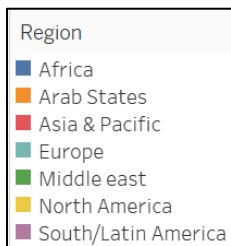


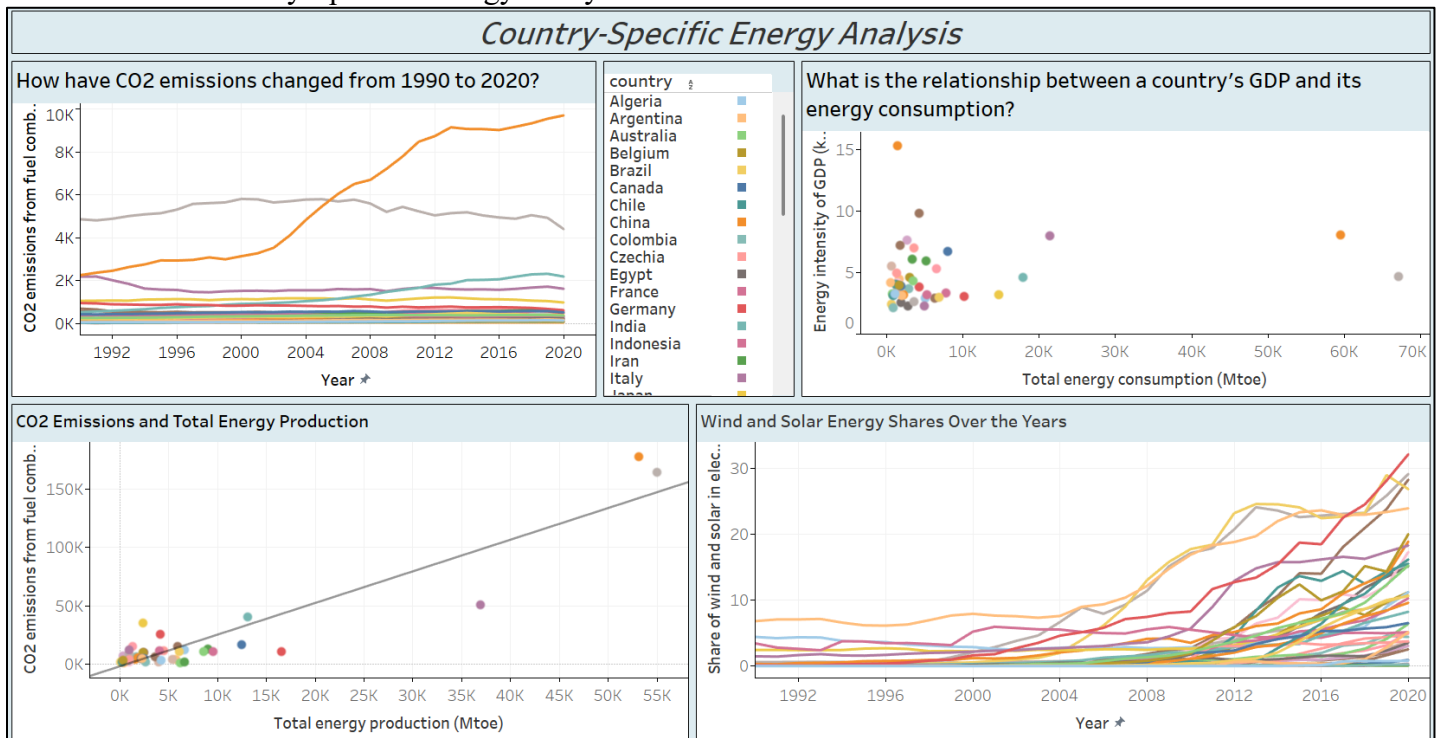
Fig5. Wind and Solar Energy Shares in Total Energy Production over the Years

The line chart displays the percentage of electricity produced by wind and solar power in various regions over time.

Insights:

- Wind and solar adoption is highest in Europe, and it increased significantly after 2005.
- While Asia and the Pacific are catching up, they are still lagging behind Europe.

Dashboard 2 – Country Specific Energy Analysis



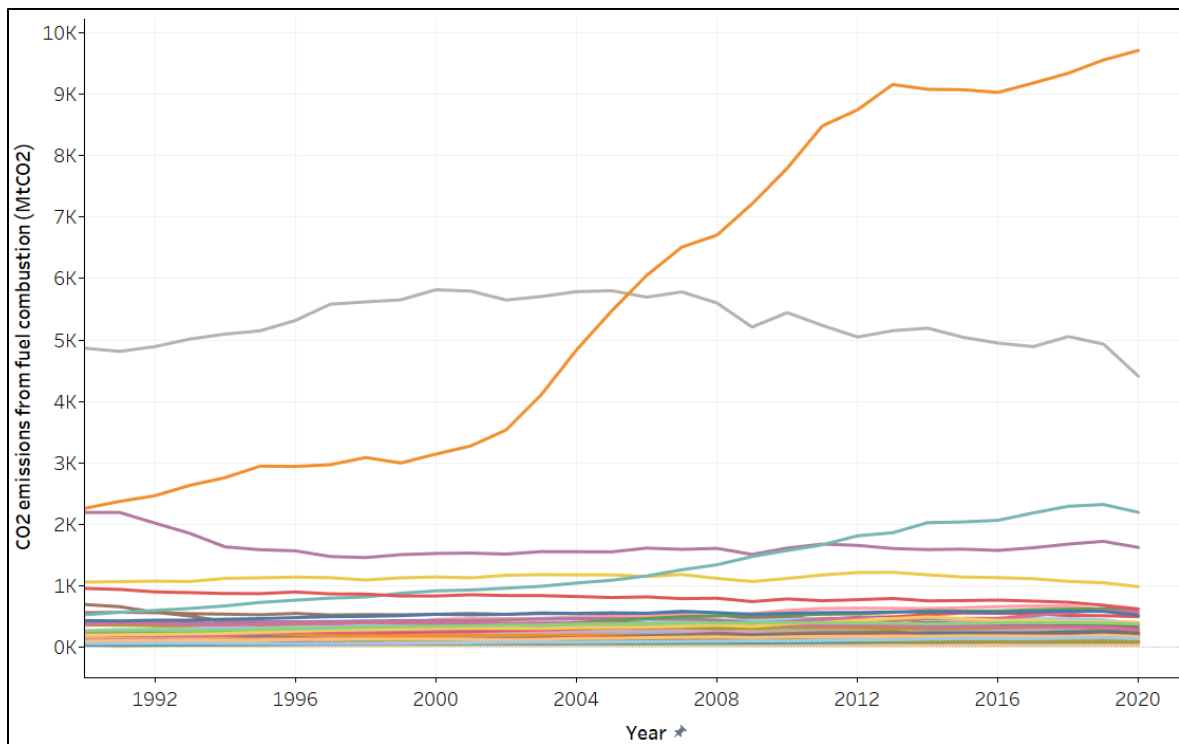


Fig7. Changes in CO2 Emissions Over Time:

The line graph displays the CO2 emissions from burning fuel (MtCO2) over time for a few chosen nations.

Insights:

- Emissions in China increased sharply between 2000 and 2015 before leveling off.
- Emissions have decreased in developed nations like Germany as a result of increased use of renewable energy sources and efficiency upgrades.

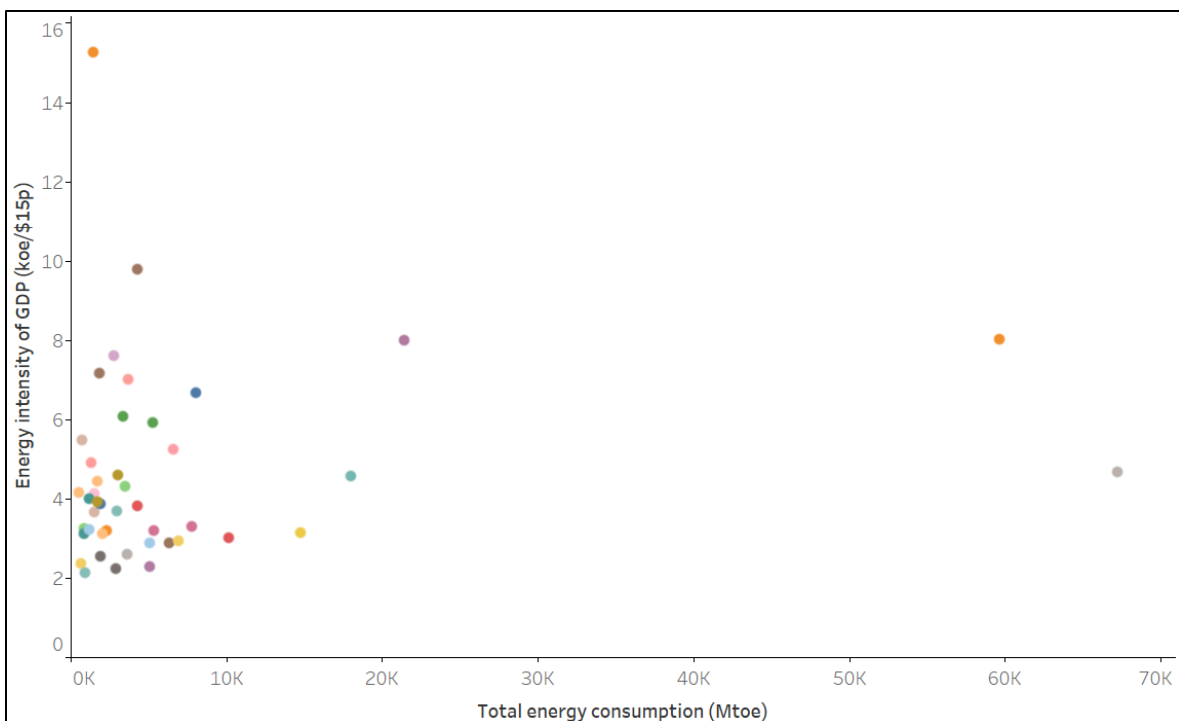


Fig8. Relationship between Specific Country's energy use and GDP

A scatter plot is displayed that contrasts each country's overall energy consumption (Mtoe) with its energy intensity of GDP (koe/\$15p).

Insights:

- Because of efficiency measures, nations like the United States have high consumption but reduced intensity.
- In comparison to their GDP, emerging economies such as India exhibit higher intensities.

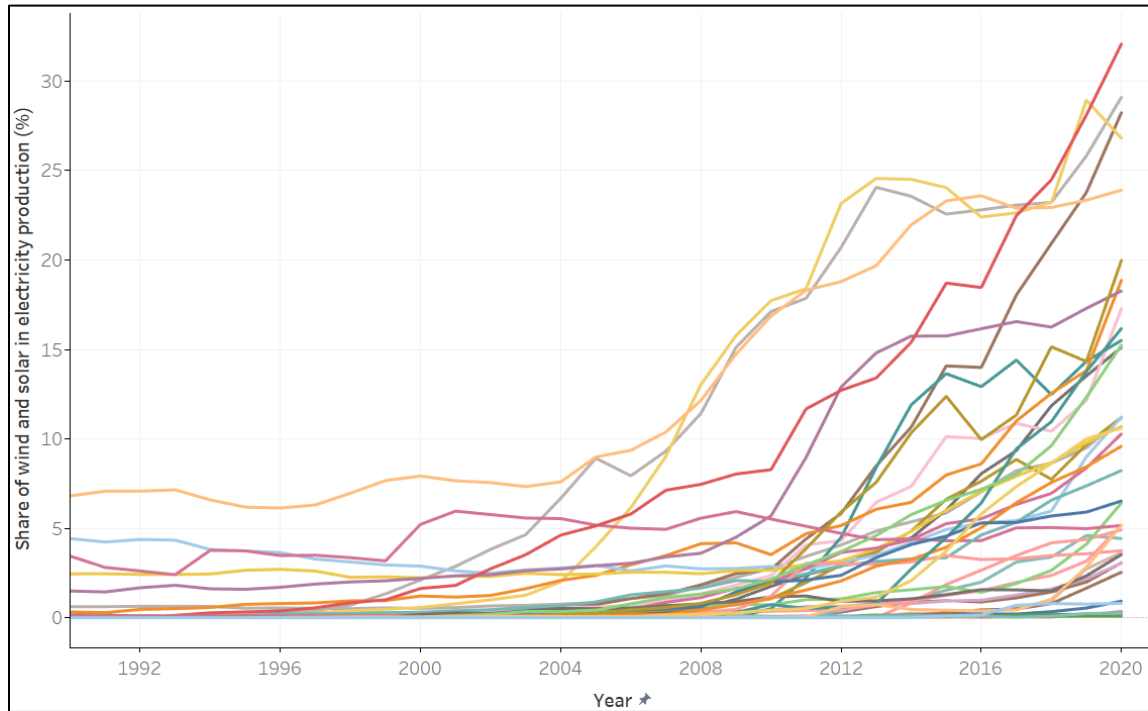


Fig 9. Wind and Solar Energy Shares in Total Energy Production over the Years

A line graph showing the percentage of electricity produced by solar and wind power in a few chosen nations throughout time.

Insights:

- After 2000, Germany's share of wind and solar energy increased significantly.
- Though more slowly, developing nations like India are progressively expanding their renewable capacity

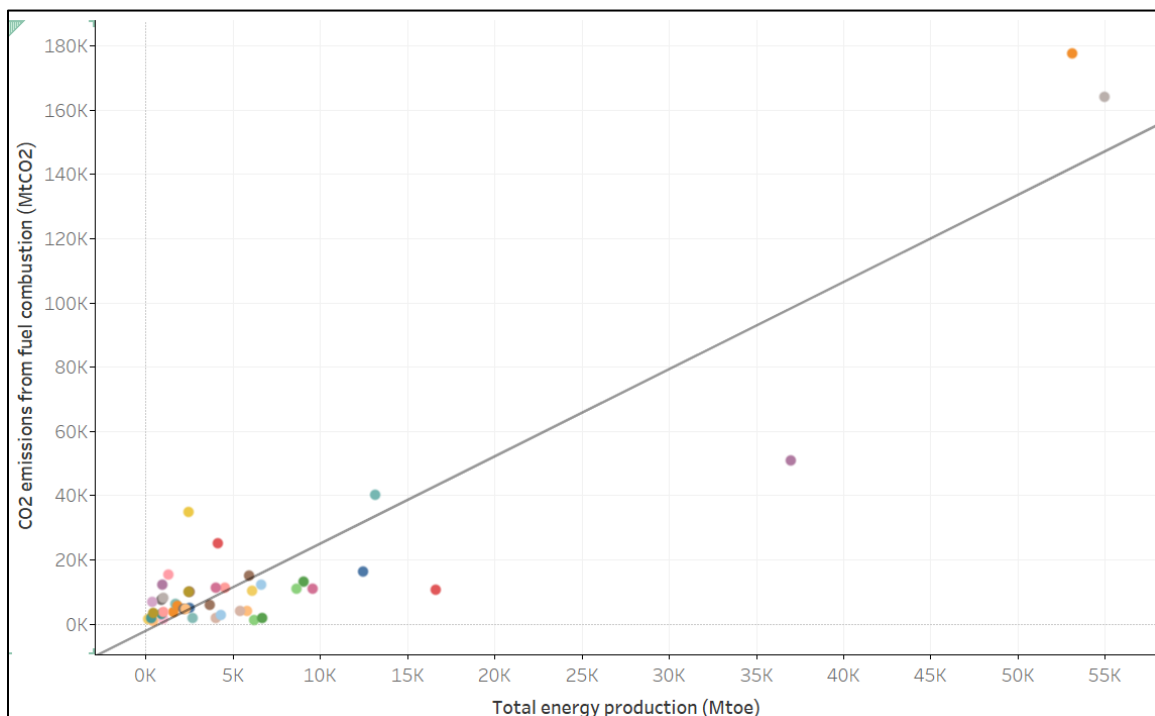


Fig10. Correlation between CO2 Emission and Total Energy Produced (Country-Specific)

A scatter plot illustrating the correlation between total energy output (Mtoe) and CO2 emissions from fuel burning (MtCO2).

Insights:

- Given their reliance on fossil fuels, China and India exhibit substantial relationships between emissions and output.
- Despite producing a lot of energy because they rely on nuclear power, nations like France have lower emissions.

CONCLUSION

The research identifies important worldwide trends:

- The use of renewable energy is expanding quickly, however regionally.
- By increasing efficiency and switching to sustainable energy, developed countries are separating economic growth from energy use.
- Although they struggle to strike a balance between sustainability and economic growth, emerging economies are making progress in their investments in renewable energy.

The following are important conclusions:

- Asia & Pacific propels worldwide wind and solar growth, while Europe leads in renewable integration.
- For cleaner transitions, specific policies are required in fossil fuel-dependent regions, such as the Middle East.
- To reduce rising emissions, nations like China and India need to adopt renewable energy sources more quickly.

FURTHER WORK AND RECOMMENDATIONS

Future work

- Examine how policy modifications affect the rates of renewable adoption by nation or region.
- Examine trends in energy use by sector (e.g., transportation vs. industrial).
- Use machine learning algorithms to forecast future trends.

Recommendation:

1. Regarding governments:

- Put laws in place to encourage investments in renewable energy, particularly in areas like the Middle East that rely heavily on fossil fuels.
- Encourage the development of carbon capture technologies for sectors with high emissions.

2. For Companies:

- To lower carbon footprints and support global sustainability objectives, invest in renewable infrastructure.
- Reduce pollutants and operating expenses by implementing energy-efficient technologies.

3. For Environmental Organizations:

- Promote global collaboration on renewable energy projects.
- Concentrate your efforts on teaching sustainable development principles to developing nations.

By leveraging this analysis, stakeholders can make informed decisions to drive sustainable development while addressing climate change challenges effectively.