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Final Report: CO_2 Emissions Analysis

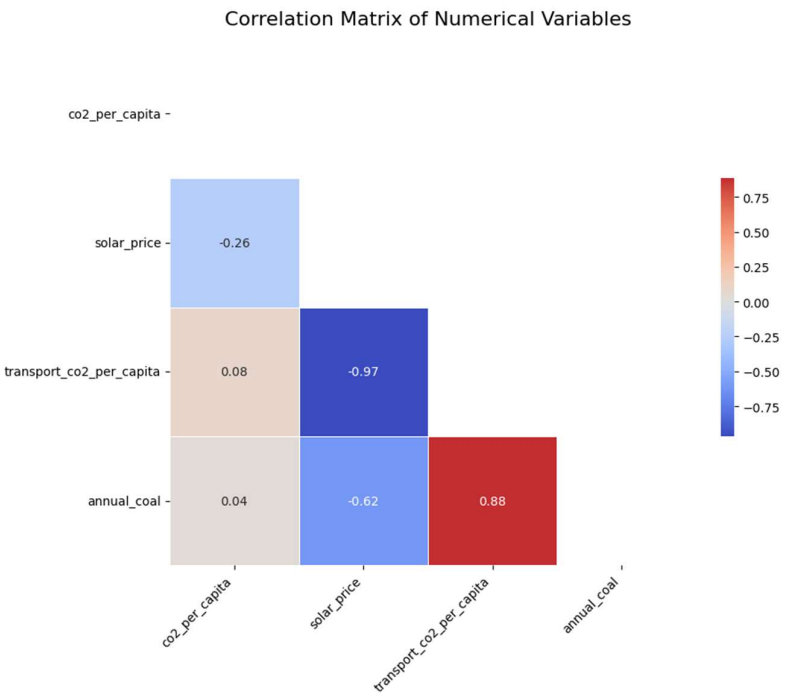
Winc Academy: Data Analytics with Python course final project

Introduction

This report analyses three key questions related to CO_2 emissions and renewable energy pricing. Using data from Our World in Data, we explored the following aspects:

1. The biggest predictor of CO_2 emissions per capita
2. The countries that have made the most progress in reducing CO_2 emissions
3. The potential price prediction of select non-fossil energy sources

Biggest Predictor of CO_2 Output Per Capita

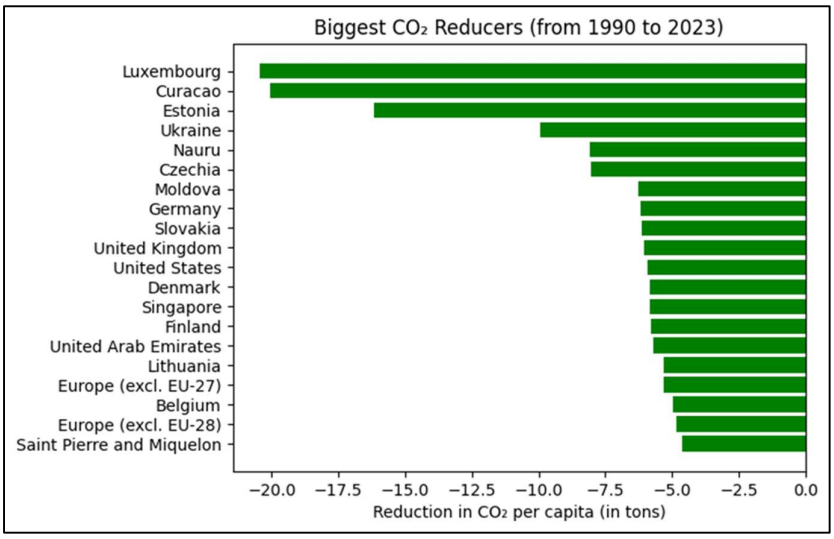


CO_2 emissions in a country depend on multiple factors. In this study, we examined the correlation between CO_2 emissions per capita and key influencing factors: emissions from public transport per capita, annual CO_2 emissions from coal, and the price of solar cells.

To conduct the analysis, we first calculated the average values of these factors across all countries. Then, we merged the datasets based on the corresponding years and performed a correlation analysis.

Our findings indicate a mild negative correlation between CO_2 emissions and solar cell prices, suggesting that lower solar cell prices may contribute to reduced emissions. Additionally, we observed a minor positive correlation between CO_2 emissions and public transport emissions per capita. However, this correlation is expected to decline in the coming years as more public transport systems transition to renewable energy sources.

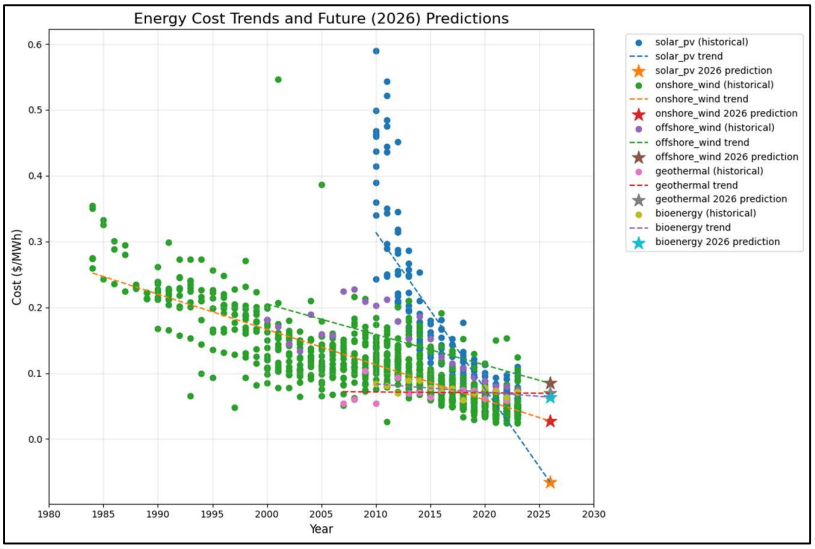
The countries that have made the most progress in CO2 emission reduction



We identified the countries that have achieved the most significant reductions in CO_2 emissions per capita between 1990 and 2023. The analysis was conducted by calculating the average CO_2 emissions per capita for each country over this period and ranking them in descending order based on the total reduction.

The results, as illustrated in the accompanying graph, show that Luxembourg and Curaçao lead the rankings, each reducing their CO_2 emissions by approximately 20 tons per capita. Other notable countries include Estonia, Ukraine, and Nauru, with reductions exceeding 10 tons per capita. Several European nations, such as Germany, the United Kingdom, and Denmark, also demonstrated substantial progress. These trends highlight both individual national efforts and broader regional progress, particularly within the European Union.

The potential price prediction of some non-fossil energy sources



In this section, we analysed the projected future prices of several non-fossil fuel energy sources using global average price data. The energy sources examined include solar cells, onshore wind farms, offshore wind farms, geothermal energy, and bioenergy.

To predict future prices, we plotted historical price trends and applied a linear regression model. Our analysis indicates that all these energy sources are on a downward pricing trend, with solar cell prices declining the most rapidly. However, the model suggests that solar cell prices could become negative in the future, which is not realistic. This is a limitation of the linear model, as it oversimplifies market dynamics. In

reality, these prices will likely stabilize at a certain threshold rather than continue decreasing indefinitely.