

Assignment 1: Energy Intensity

Country: Germany

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1 Energy Intensity: An Introduction

SDG 7 i.e. "Ensure access to affordable, reliable, sustainable and modern energy for all" highlights the importance of energy for present as well as future generations. Under SDG 7, Target 7.3 i.e. "By 2030, double the global rate of improvement in energy efficiency" deals with the efficient energy uses. Under Target 7.3, Indicator 7.3.1 is energy intensity which is measured in terms of primary energy and GDP. Unit of measurement is Megajoules per dollars. Energy intensity is a measure of how much energy a society uses relative to its economic scale. It can be used to compare the energy consumption pattern of different countries and regions.

2 Germany vs World

Germany is one of those countries which have been able to keep their level of energy intensity below the world average for quite a long period of time. The following graph compares the trend in energy intensity for the last 30 years [see Figure 1]¹.

Germany's energy intensity is notably lower than the world average, reflecting its advanced energy efficiency measures and a shift towards renewable energy sources. The analysis of energy intensity trends indicates that Germany has achieved significant reductions in energy consumption per unit of GDP, particularly in the manufacturing sector, which is crucial for its economy²³. The summary statistics for comparison is given in Table 1.

3 Exploring the gap

Now we will look at how did Germany made it possible. The reasons have been extensively explored in the literature. Some of the reasons such as its energy

¹IEA (2024), SDG7: Data and Projections, IEA, Paris

²Graevenitz & Rottner, 2023

³Sari et al., 2023

Country	CAGR (%)	Min Value	Max Value	Mean Value	Standard Deviation
Germany	-2.0229	2.73	5.04	3.7848	0.6241
World	-1.3918	4.63	7.05	5.8232	0.7543

Table 1: Comparison of Energy Intensity Statistics between Germany and World

transition policies, industrial efficiency, and energy mix are discussed below:

1. **Energy Transition Policies:** The German "Energiewende" aims to transform the energy system towards renewable sources, significantly reducing reliance on fossil fuels and nuclear energy (Sonnenschein & Henricke, 2015). This transition is supported by government policies promoting energy efficiency and renewable energy investments, which have been in place since 2000⁴. It has led to increased investments in renewable energy technologies, which are generally less energy-intensive than traditional fossil fuel sources⁵.
2. **Industrial Efficiency Improvements:** Germany has implemented stringent energy efficiency measures across various sectors, particularly in manufacturing, which has seen a decrease in energy intensity from 2003 to 2017⁶.
3. **Energy Mix:** The integration of renewables into the energy mix has not only reduced carbon emissions but also contributed to lower energy intensity levels⁷. The government has invested in the development of energy-efficient technologies and infrastructure, such as smart grids and electric vehicle charging stations. This has resulted in Germany now producing over 40% of its electricity from renewables,⁸ having set a goal of reaching 80% by 2030⁹. The country has introduced several policies aimed at increasing the share of renewables in the energy mix, phasing out nuclear power (with the last plant closing in April 2023) and reducing GHG emissions, resulting in the country becoming a leader in the energy transition.

⁴Schiffer, 2017

⁵Beestermöller & Fahl, 2013

⁶Graevenitz & Rottner, 2023

⁷Koilakou, 2022

⁸Alkousaa, Riham, 2022

⁹Enerdata, 2022

Appendix

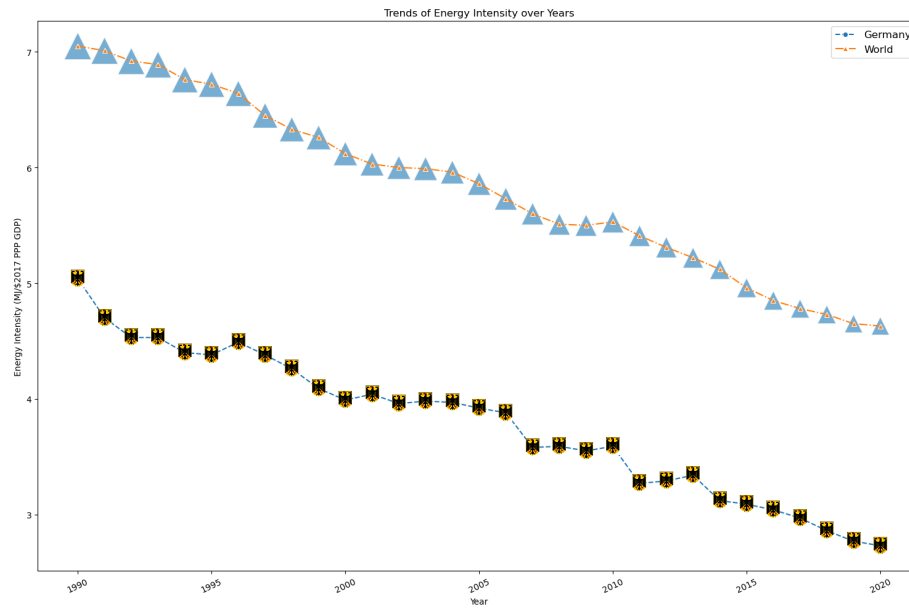


Figure 1: Comparing energy intensity