Carbon Footprint Analysis Report (2013–2017)

Overview

This report presents an analysis of total carbon emissions data collected over the period from **2013 to 2017**, focusing on country-level emissions and the underlying industrial contributors.

Total Carbon Footprint by Country

An evaluation of the total carbon footprint across all countries revealed that **Spain** recorded the highest emissions, with a total of **9,786,126.2 units**. In comparison:

- **Germany** ranked second with **2,251,224.9 units**, and
- **Japan** followed in third place with **519,344.3 units**.

These findings highlight a significant disparity, particularly between Spain and the other top emitters.

Source of Emissions in Spain

To better understand Spain's elevated emissions, a sector-level investigation was conducted. The data identified **Gamesa Corporación Tecnológica, S.A.**, operating within the **Electrical Equipment and Machinery** industry group, as the primary contributor. In **2015**, this company alone accounted for **9,778,464 units** of carbon emissions—nearly the entirety of Spain’s total in that year.

Gamesa's reported products included:

- Wind Turbine G90 (2 MW)
- Wind Turbine G114 (2 MW)
- Wind Turbine G128 (5 MW)
- Wind Turbine G132 (5 MW)

In contrast, the second-highest emitter in 2015 was **Germany’s Automobiles & Components** industry group, which generated only **778,127 units** of emissions—over **12 times less** than Spain’s figure.

Carbon Emissions Normalized by Product Weight

Given the substantial weight of wind turbines—up to **600,000 kg**—it is important to assess carbon emissions in relation to product weight. This normalization provides a more accurate picture of carbon efficiency across countries.

When calculating **total carbon footprint per kilogram of product weight**, the results are as follows:

- **Spain**: 31.8
- **USA**: 13,751.4 (highest)
- **Japan**: 4,938.3
- **Canada**: 2,220.9

Despite Spain's large absolute emissions, its normalized emissions are relatively low, indicating that the high totals are driven by the **massive scale of the products**, not by inefficiency.

Year 2015: Emissions per Product Weight

Focusing specifically on **2015**, the emissions per kilogram of product weight were:

- **USA**: 2,964.2
- **Japan**: 1,294.6
- **Germany**: 502.1
- **Spain**: 19.1

These figures reinforce the conclusion that **Spain's emissions are attributable to the production of exceptionally large products (wind turbines)**. However, once normalized by weight, **the USA emerges as the leading country in carbon emissions per product weight**.

Conclusion

Spain leads in total carbon emissions over the 2013–2017 period primarily due to the large-scale production of wind turbines. However, when emissions are evaluated relative to product weight, **the USA shows the highest emissions intensity**, suggesting lower carbon efficiency compared to other countries.