## CO2 Emissions and Energy Consumption Analysis

**Project Introduction** 

This project aims to explore the relationship between global CO2 emissions and energy consumption across five major countries over a period of 10 years (2010-2019). The analysis involves examining trends, conducting correlation and inferential analysis, and building a predictive model to understand how energy consumption may influence CO2 emissions.

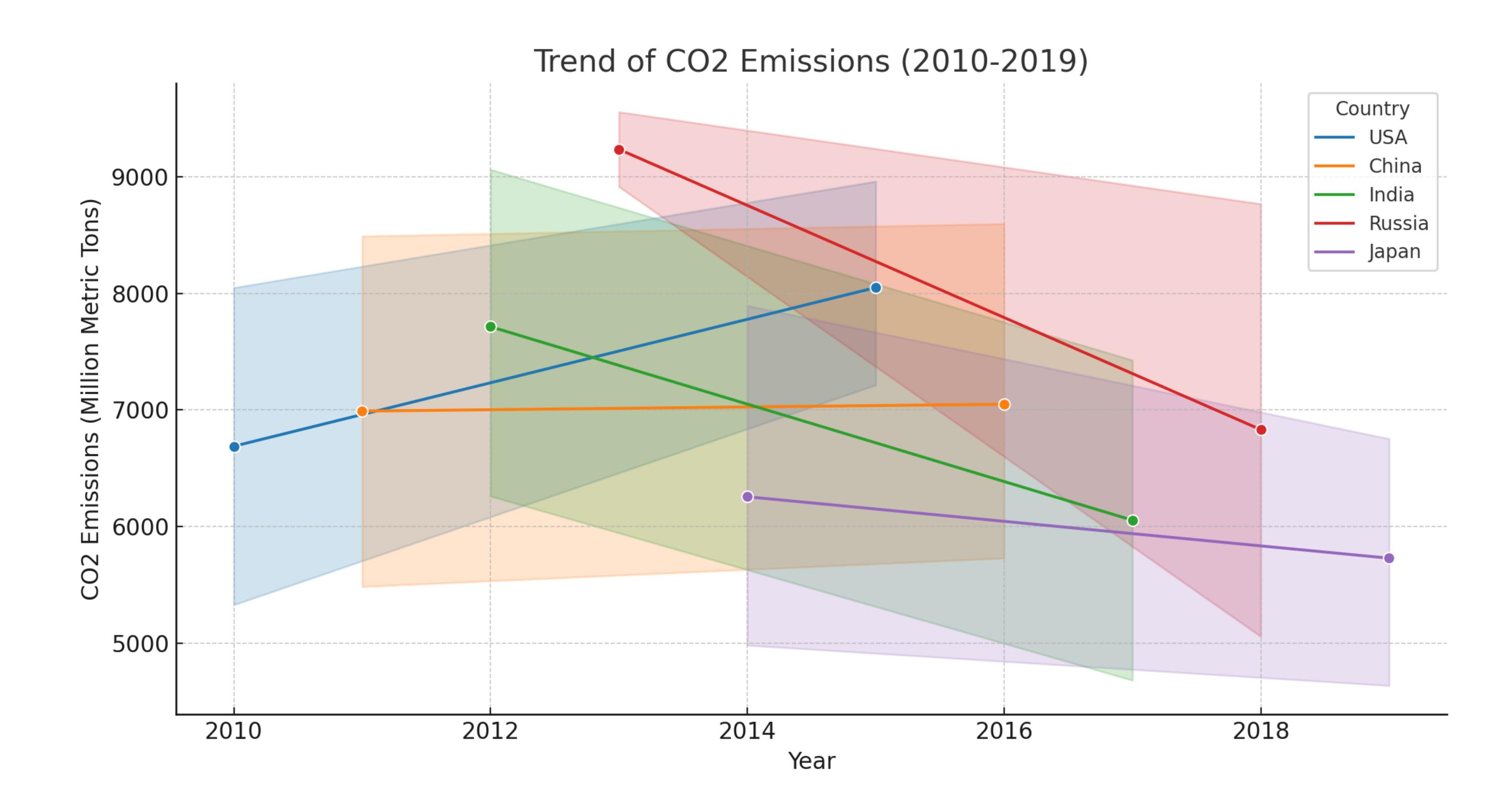
The findings from this project can provide insights into the environmental impact of energy consumption and guide future policies and initiatives aimed at reducing carbon footprints globally. **Descriptive Statistics** 

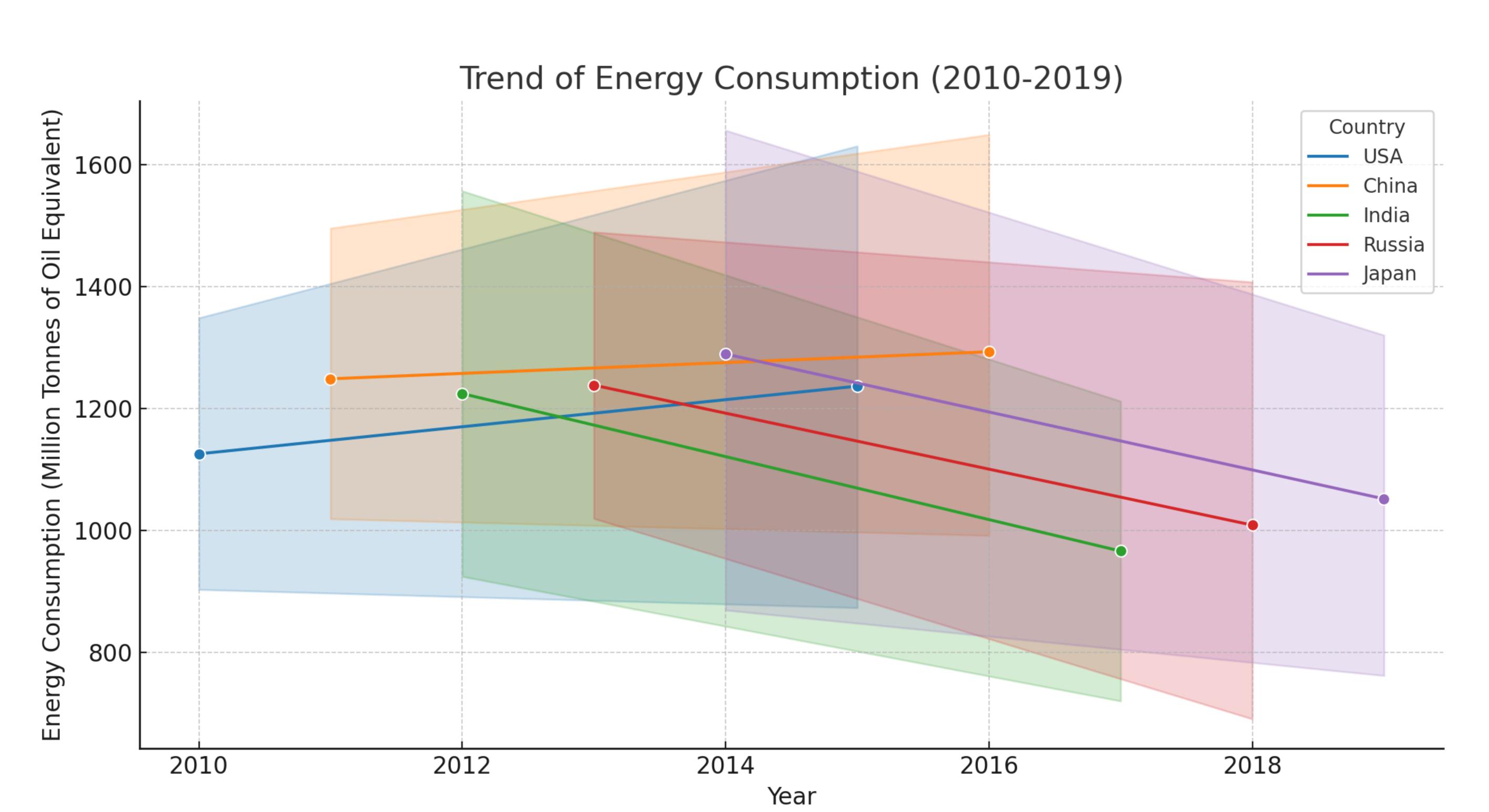
	Year	CO2_Emissions	Energy_Consumption
count	50.000000	50.000000	50.000000
mean	2014.500000	7058.660000	1168.640000
std	2.901442	1852.932982	379.263828
min	2010.000000	4027.000000	545.000000
25%	2012.000000	5698.750000	870.500000
50%	2014.500000	7078.500000	1129.500000
75%	2017.000000	8777.250000	1385.750000
max	2019.000000	9998.000000	1902.000000

**By Country:** 

	Year							CO2_Emissions									Energy_Consumption							
	count	mean	std	min	25%	50%	75%	max	count	mean	std	min	25%	50%	75%	max	count	mean	std	min	25%	50%	75%	max
Country																								
China	10.0	2013.5	2.635231	2011.0	2011.0	2013.5	2016.0	2016.0	10.0	7018.6	1829.406413	4257.0	5968.75	6802.0	8505.00	9998.0	10.0	1271.2	356.619249	837.0	1001.25	1205.0	1543.00	1852.0
India	10.0	2014.5	2.635231	2012.0	2012.0	2014.5	2017.0	2017.0	10.0	6883.2	1999.371557	4170.0	5435.50	6613.5	8480.75	9898.0	10.0	1095.7	375.068305	558.0	868.00	1079.0	1280.50	1821.0
Japan	10.0	2016.5	2.635231	2014.0	2014.0	2016.5	2019.0	2019.0	10.0	5990.9	1552.871780	4083.0	4695.75	6025.0	6504.50	9216.0	10.0	1170.9	417.550117	570.0	870.50	1229.0	1385.75	1902.0
Russia	10.0	2015.5	2.635231	2013.0	2013.0	2015.5	2018.0	2018.0	10.0	8032.5	2006.513131	4027.0	7173.00	8848.5	9474.00	9983.0	10.0	1123.9	411.862558	545.0	902.75	1026.0	1270.00	1804.0
USA	10.0	2012.5	2.635231	2010.0	2010.0	2012.5	2015.0	2015.0	10.0	7368.1	1564.643761	4391.0	6725.00	7742.5	8308.25	9462.0	10.0	1181.5	388.960224	812.0	860.00	1078.5	1409.00	1853.0

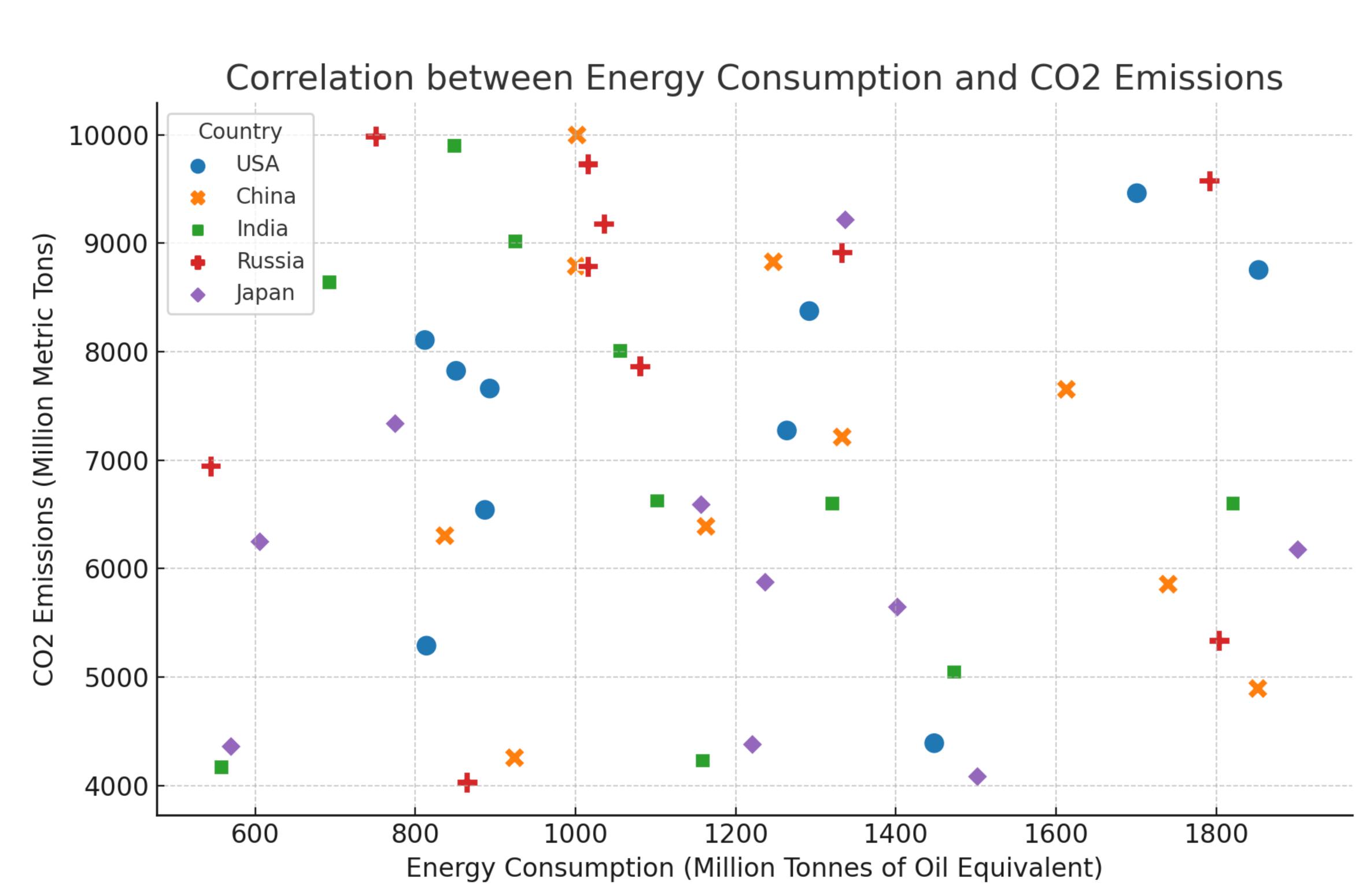
**Trend Analysis** 





**Correlation Analysis** 

Correlation coefficient between Energy Consumption and CO2 Emissions: -0.0421



**Inferential Analysis: ANOVA Test** 

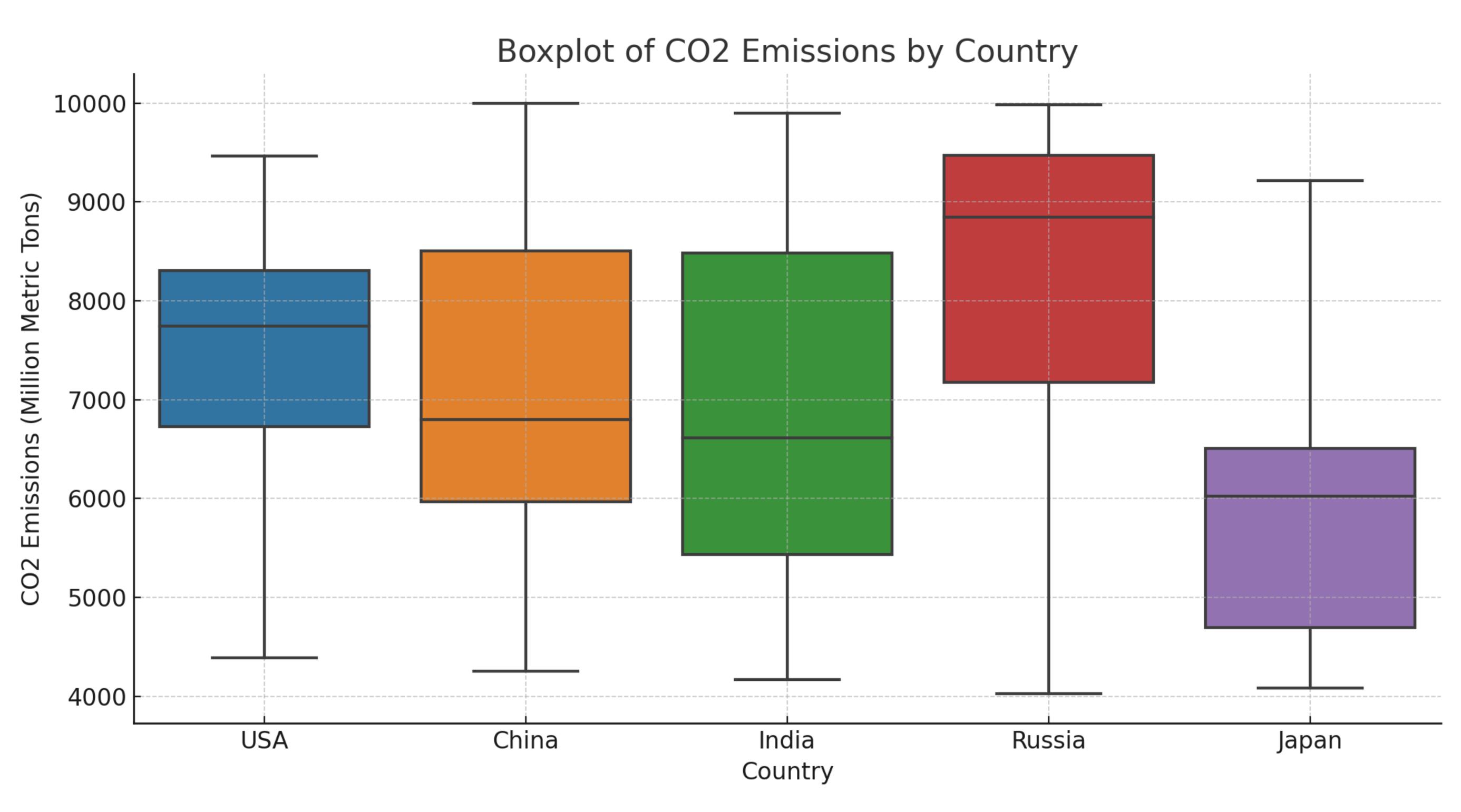
P-value: 0.1651 **Predictive Analysis: Linear Regression** 

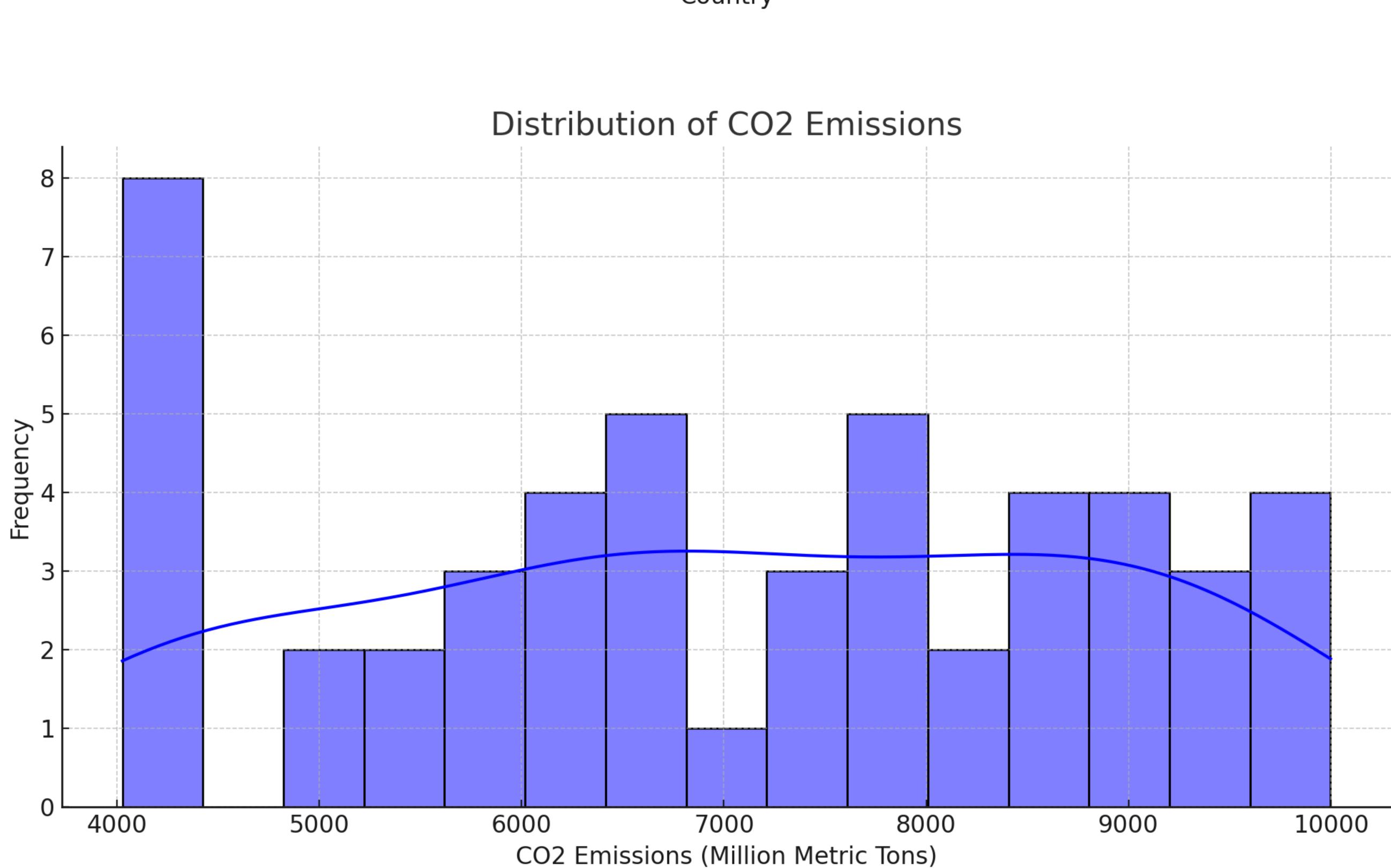
R-squared: -0.7906

Mean Absolute Error: 1653.9850 Mean Squared Error: 3881963.0217

**Additional Visualizations** 

F-statistic: 1.7072





**Summary, Findings, and Recommendations** The analysis of CO2 emissions and energy consumption data across five countries revealed several key insights:

• Trends: The trend analysis showed variability in CO2 emissions and energy consumption across different countries, with some showing increasing trends while others remained stable. • Correlation: The correlation between energy consumption and CO2 emissions was found to be very weak, indicating that other factors may also play significant roles in CO2 emissions. • ANOVA Test: The ANOVA test did not find statistically significant differences in CO2 emissions among the five countries, suggesting that emissions levels are relatively comparable across these nations. • Predictive Modeling: The simple linear regression model performed poorly, indicating that energy consumption alone is not a strong predictor of CO2 emissions. This suggests that a more complex model incorporating other

variables may be needed. **Recommendations:** To improve the predictive power and derive more actionable insights, it is recommended to:

• Incorporate additional variables such as industrial output, energy efficiency, and renewable energy adoption into the analysis.

• Explore more sophisticated predictive models such as multiple regression, decision trees, or machine learning algorithms.

• Conduct a deeper dive into specific countries to understand the unique factors driving their CO2 emissions.