**Introduction**

Energy commodities, such as crude oil and natural gas, play a vital role in the global economy. The United States is one of the leading producers and exporters of energy commodities, and its export trends have significant implications for both the U.S. economy and the global energy market. The recent COVID-19 pandemic and the Russian invasion of Ukraine have created unprecedented changes in the energy market, and understanding the impact of these events is crucial for policymakers, analysts, and investors.

This group project aims to analyse the trends in the United States' export of critical energy commodities, including natural gas, crude oil, and petroleum products. Specifically, we will examine the monthly reliance on Russian oil products, natural gas exports by country from the USA, total crude oil exports by destination from the USA, and petroleum products exports by destination from the USA. Our focus is on detecting seasonality, cyclicity, and trends in these series and exploring the differences between the series in terms of these features.

The main goals of this work are to:

* Identify the main patterns and trends in the selected series, including any seasonality, cyclicity, or trends, and determine if any series are a white noise process.
* Use time series decomposition methods to identify the effects of different components, such as trend, seasonality, and residual, on the series and determine if any adjustments or transformations are needed.
* Apply different forecasting methods, including simple forecasting methods, exponential smoothing, and ARIMA models, to forecast future values of the selected series and evaluate the accuracy of these methods.
* Explore other forecasting methods not covered in class, such as dynamic regression models, Prophet model, and Neural Network Autoregression, to compare their performance with the methods covered in class.

The dataset used in this project includes monthly data from January 1920 to January 2023 for crude oil exports by destination from the USA, monthly data from January 1973 to January 2023 for natural gas exports by country from the USA, monthly data from January 1993 to January 2023 for petroleum products exports by destination from the USA, and monthly data from January 2021 to December 2022 for the reliance on Russian oil products. The data sources include the US Energy Information Administration and other reputable sources.

We would like to mention that our data sources primarily come from the website [www.eia.gov](http://www.eia.gov), which is an independent statistical and analysis collector for the U.S. Energy Information Administration. We would also like to inform you that for the analysis of US exports, we will be focusing on data from 1993 onwards, as not all sources contain data from earlier periods. Additionally, our analysis on the reliance on Russian products will only cover the last two years, as there is no further data available beyond that time frame.

The methodologies and strategies used in this project include time series graphics, time series decomposition, the forecaster's toolbox, exponential smoothing, ARIMA, and other forecasting methods. By using these methodologies, we aim to provide a comprehensive analysis of the selected series and gain insights into the impact of recent events on the energy market.