# COAL PRICE ANALYSIS

## Project Overview

### Introduction

Fluctuations in coal prices pose challenges for procurement planning due to factors such as supply-demand dynamics, geopolitical shifts, and regulatory changes. This project focuses on analyzing price trends, improving data quality through preprocessing, and deriving insights to support data-driven decision-making. By leveraging structured Exploratory Data Analysis (EDA) and interactive visualizations, the goal is to enhance procurement efficiency and mitigate risks associated with price volatility.

### Scope & Approach

A systematic data analysis pipeline is followed to ensure accuracy and reliability. The process includes:

- **Initial EDA:** Examining raw data for missing values, anomalies, and inconsistencies.
- **Data Preprocessing:** Cleaning and transforming data by handling gaps, treating outliers, and optimizing feature representation.
- **Post-Processing EDA:** Validating the cleaned dataset to assess improvements and extract refined insights.
- **Interactive Visualization:** Developing a **Power BI dashboard** that leverages the processed data to highlight key trends and procurement insights.

### EDA & Data Processing

#### ➢ Before Preprocessing:

- Identifying missing values, anomalies, and inconsistencies.
- Conducting statistical analysis, including distribution metrics and correlation patterns.
- Visualizing data trends using histograms, boxplots, and heatmaps.

#### ➢ Preprocessing Techniques:

- **Missing Data Handling:** Imputation using mean for numerical values and mode for categorical values.
- **Outlier Treatment:** Applying the **Interquartile Range (IQR)** method to adjust or remove extreme values.
- **Feature Optimization:** Standardizing data types, eliminating low-variance features, and transforming variables where necessary.
- **Scaling & Transformation:** Using log transformation to correct skewness and Min-Max scaling for normalization.

### ➢ Post-Preprocessing Analysis:

- Re-evaluating data consistency and accuracy.
- Comparing statistical distributions before and after preprocessing.
- Ensuring the dataset is optimized for predictive analysis and trend forecasting.

## Data Visualization & Insights

An interactive Power BI dashboard has been developed by importing the cleaned dataset, enabling intuitive exploration of coal price trends. The dashboard presents key insights through dynamic charts and summaries, facilitating better decision-making and transparency in procurement strategies.

## Conclusion

By integrating structured data analysis, preprocessing, and interactive visualizations, this project enhances the reliability of coal price forecasting. The refined dataset and insights contribute to more effective procurement planning, risk management, and cost optimization in a fluctuating market.