Energy Trading and Risk Management (ETRM) Analysis

Overview

This documentation covers the analysis of an Energy Trading and Risk Management (ETRM) dataset containing 100 commodity trades across Power, Gas, Coal, and Oil commodities. The analysis focuses on understanding trading patterns, volume distributions, currency exposures, and periodicity trends.

Dataset Structure

The dataset is provided in various format with the following structure for each trade:

TradeID	Commodity	TradeType	Volume	Price	Currency	DeliveryStart	DeliveryEnd	Periodicity
1	Power	BUY	193.52	191.13	GBP	2025-01-08	2025-01-16	Monthly
2	Gas	BUY	368.68	127.76	GBP	2025-01-29	2025-02-16	Quarterly
3	Power	SELL	86.45	48.08	USD	2025-01-03	2025-01-10	Daily
4	Gas	BUY	38.46	175.91	GBP	2025-01-23	2025-02-13	Daily
5	Coal	BUY	304.55	147.45	EUR	2025-01-09	2025-02-04	Quarterly

Primary Objective

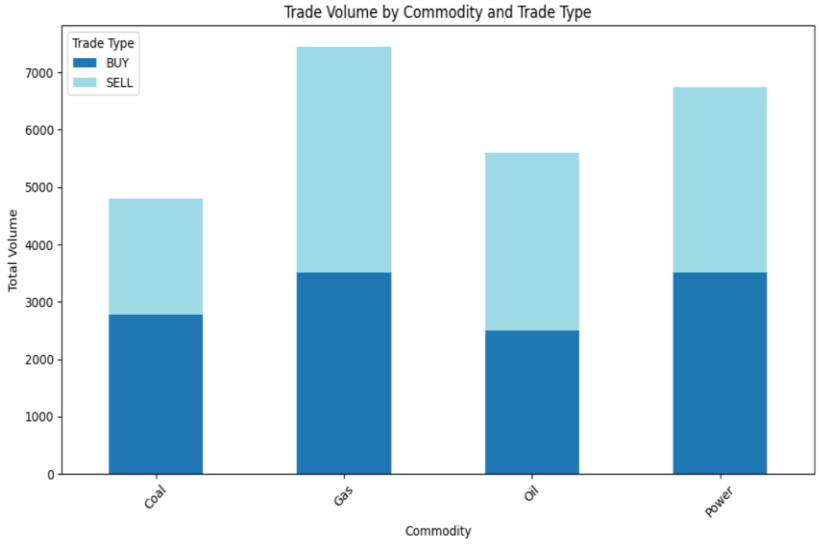
To analyse and extract meaningful insights from the Energy Trading and Risk Management (ETRM) dataset containing 100 commodity trades across Power, Gas, Coal, and Oil commodities.

Tasks done:

1. **Loading of Data**: The trade data was parsed and converted into a structured pandas Data Frame for analysis.
2. **Datatype consistency**: All fields were validated and converted to appropriate data types (objects type to datetime) to ensure analysis accuracy.
3. **Exploratory Data Analysis**: Comprehensive analysis was conducted across volume, trade type, currency, and periodicity dimensions.
4. **Drawing insights from the graphs**: Visualizations revealed trading patterns, risk exposures, and strategic positioning across commodities.

Insights drawn from graphs:

1. Trade Volume by Commodity and Trade Type Graph(Stacked Bar graph):



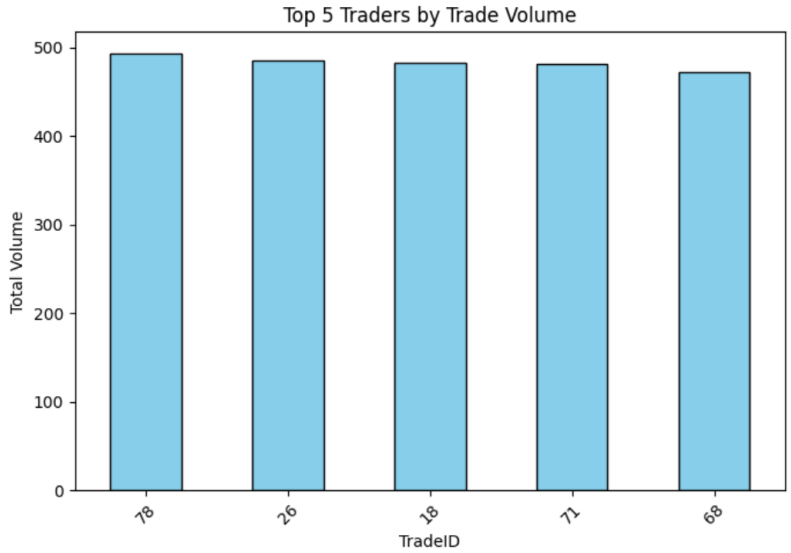
Trade Volume by Commodity and Trade Type:

Commodity	BUY	SELL
Coal	2781.44	2017.81
Gas	3510.05	3931.97
Oil	2494.21	3100.17
Power	3509.18	3226.31

Insights:

- Gas has the highest trade volume, followed by Power, then Oil, and finally Coal.
- Both BUY and SELL volumes are balanced across commodities, but SELL tends to dominate slightly in Gas and Oil.

2. Top 5 Traders by Trade Volume(Bar graph):



Top 5 Traders by Trade Volume:

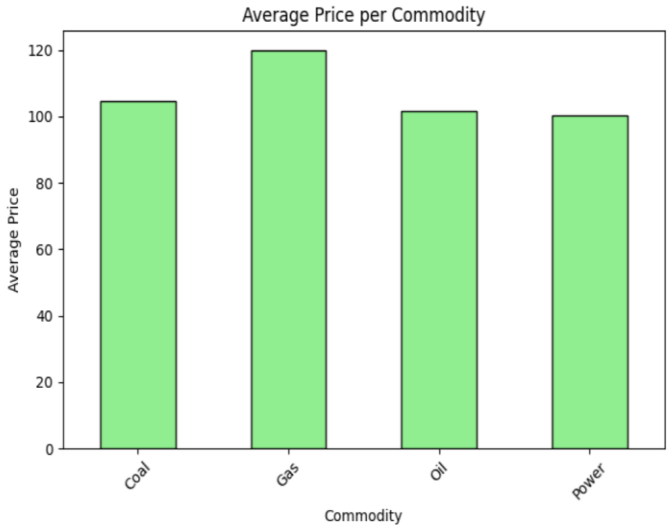
TradeID	
78	492.97
26	485.10
18	483.16
71	481.60
68	472.03

Name: Volume, dtype: float64

Insights:

- The top 5 traders (IDs: 78, 26, 18, 71, 68) each trade ~480–500 in total volume, showing no extreme dominance.
- Market participation seems fairly distributed among top traders.

3. Average Price per Commodity:

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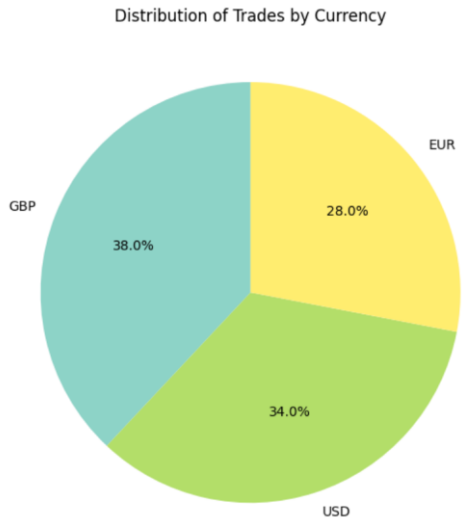
Average Price per Commodity:
 Commodity
Coal     104.642941
Gas      119.778437
Oil      101.757826
Power    100.469643
Name: Price, dtype: float64
```

Insights:

- Gas has the highest average price (~120).
- Other commodities (Coal, Oil, Power) average close to 100–105.
- Suggests Gas is priced at a premium compared to others.

4. Distribution of Trades by Currency:

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Distribution of Trades by Currency:
 Currency
GBP    38
USD    34
EUR    28
Name: count, dtype: int64
```
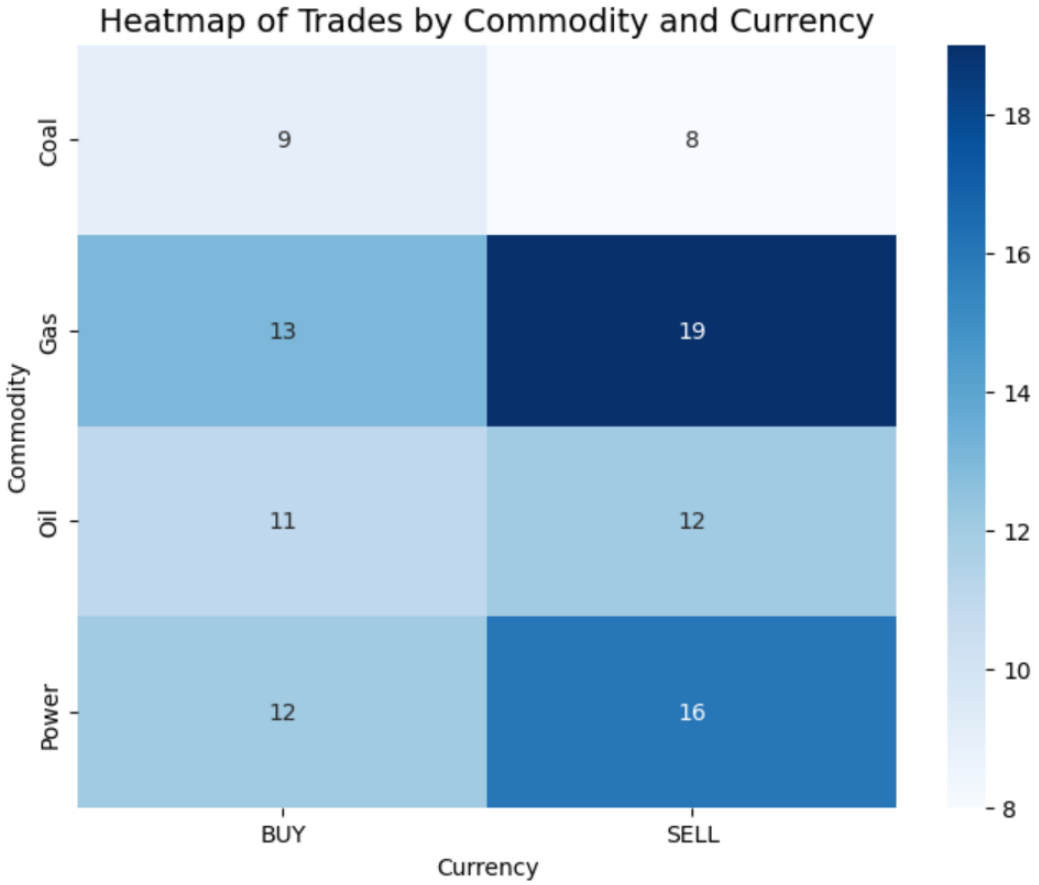

Insights:

- Trades are most common in GBP (38%), followed by USD (34%) and EUR (28%).
- Market is slightly GBP-dominated but relatively balanced across currencies.

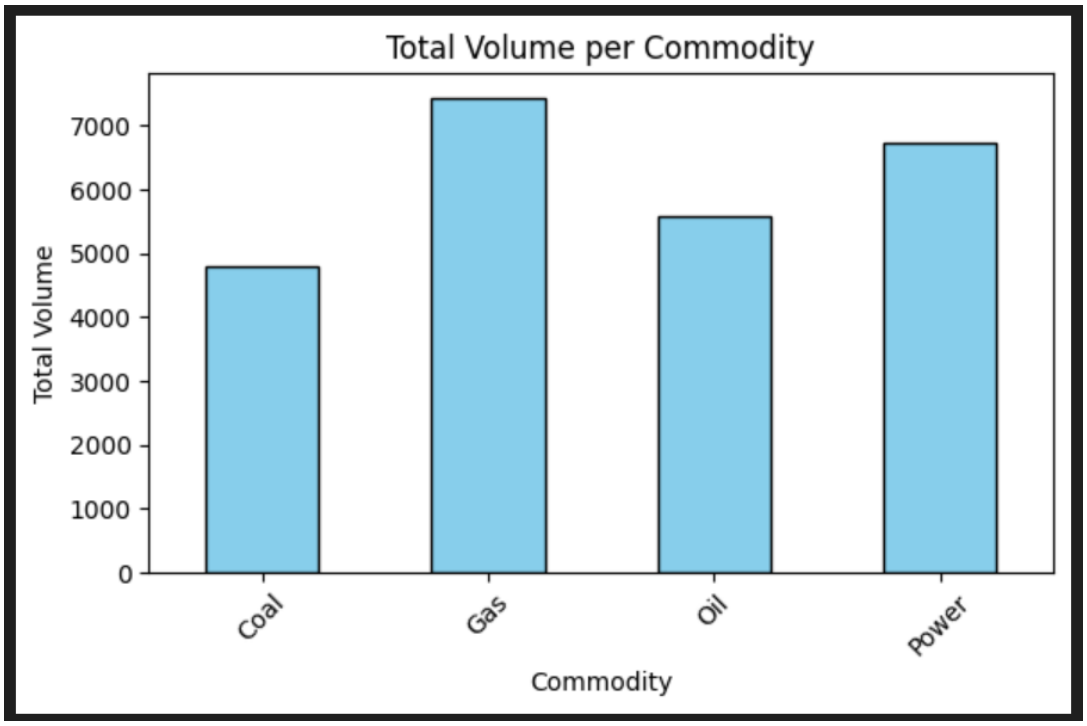
5. Heatmap of Trades by Commodity and Currency:



Insights:

- Coal : Trade activity is relatively low with a slight buying bias (53% buy vs. 47% sell), indicating potential accumulation rather than profit realization.
- Gas : Exhibits the highest trading activity with a dominant selling share (59% sell vs. 41% buy), reflecting strong profit-taking behavior.
- Oil : Trading remains balanced and stable (52% sell vs. 48% buy), suggesting equilibrium in market positions without significant directional pressure.
- Power : Shows a moderate sell-side dominance (57% sell vs. 43% buy), pointing towards profit booking and cautious market sentiment.

6. Total Volume per Commodity:



Insights:

- Gas has the highest total volume (around 7,400), making it the most traded commodity.
- Coal has the lowest total volume (below 5,000), indicating relatively less activity compared to others.
- Power and Oil are in the middle, with Power slightly higher (~6,700) and Oil lower (~5,600).
- The gap between the highest (Gas) and lowest (Coal) is quite large (~2,600 units), showing uneven distribution across commodities.

Conclusion

This analysis provides a comprehensive view of the energy trading activities, highlighting volume distributions, currency exposures, and periodicity patterns. The insights can inform risk management strategies and trading decisions to optimize portfolio performance while managing associated risks.