Predicting the Price of Natural Gas

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# Abstract

Natural gas is one of the most important pillars of modern industrial society. According to the US Energy Association it is the largest source of electricity production in the United States constituting 40 percent of the total (EIA). Nearly half of US households rely on natural gas for heating (Vox).

*Keywords:* commodities, electricity, industry. economy

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# Problem Statement

This is only the tip of the iceberg. As the strong trend of replacing coal for natural gas continues there are legs to go much further since coal still generates nearly 20% of the electricity produced, the fourth highest source (EIA). Renewable sources of electricity are notoriously volatile producing as low as 0 percent when the sun isn’t shining, or the wind isn’t blowing. Natural gas at a minimum is an energy bridge to renewables producing half as many emissions as coal. Without significant improvements in battery technology or widespread adoption of nuclear; natural gas will be the core baseload electricity source. Modern life and habitation of cold climates relies on the electricity and heating of natural gas, and it is imperative for the oil and gas industry to predict the prices to invest in production to meet demand. Equally critical for high energy users and manufacturers to be able to predict the cost of one of their major inputs. As the recent Experience in Europe has demonstrated, more renewable electricity reduces the use of fossil fuels but does not eliminate it and without careful planning can increase fossil fuel usage. Germany, one of the highest green energy spenders, installed ~54 gigawatts of solar panels enough to technically provide 25% of its electricity needs but only generates 10% (Hancock, E. 2021).

# Data Exploration, Pre-processing, and Splitting

## *Zero and Near Zero Variance*

## *Missing Values*

## *Data Imputation*

## *Data Preparation*

Following the importation of necessary packages and the raw datasets, the data was prepared for further evaluation. The initial phase of pre-processing began with inspection of the data and calculation of statistical measures. Other properties such as head and dimension were produced to provide additional information. Statistical measures such as median and mean are useful in outlier detection. However, outliers were not removed from the dataset due to having a potential statistical significance on forecasting results and seasonal behavior. Missing values were collected and handled appropriately. The dataset contained only one missing value which was removed completely. Each data frame was converted to a time series object using the date column. Finally, the resulting time series objects were plotted to visualize both the daily and monthly behavior of natural gas prices

### *Sampling*

### *Distribution*

### *Data Partitioning*

# Model Strategies

# Validation and Testing

# Conclusion

# References

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Hancock, E. (2021, February 3). PV-Tech. Germany’s Federal Network Agency registers 54GW of solar PV.

<https://www.pv-tech.org/germanys-federal-network-agency-registers-54gw-of-solar-pv/>

# Appendix A – Reproduceable Markdown Code