Team MetaMinds

Category: Energy Forecasting

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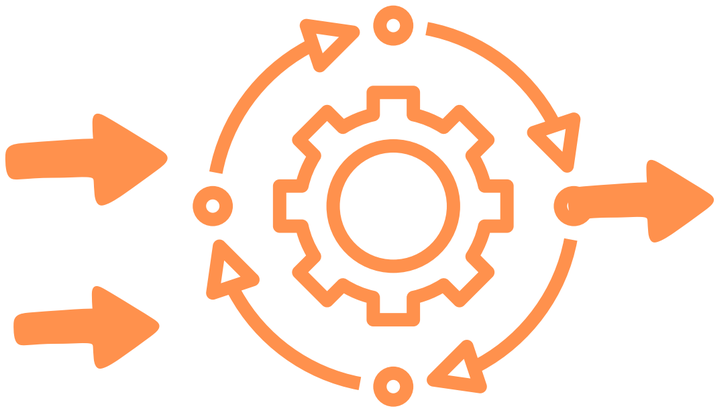
Problem Statement

Previous Demand

Weather



Demand forecasting

Previous Prices

Price forecasting

Data Exploration

Demand Forecasting
Demand Data

- 27552 entries
- till 2/21/2023

Demand Forecasting
Weather Data

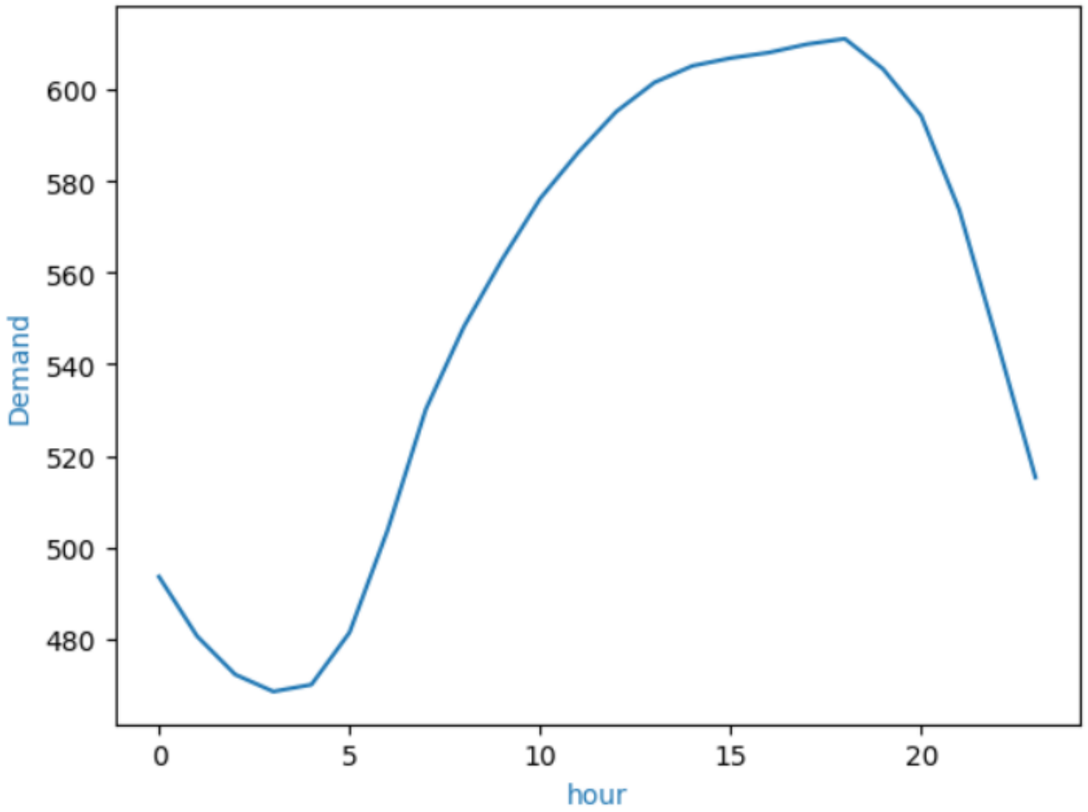
- 27720 entries
- till 2/28/2023
- Lots of missing values

Price Forecasting data

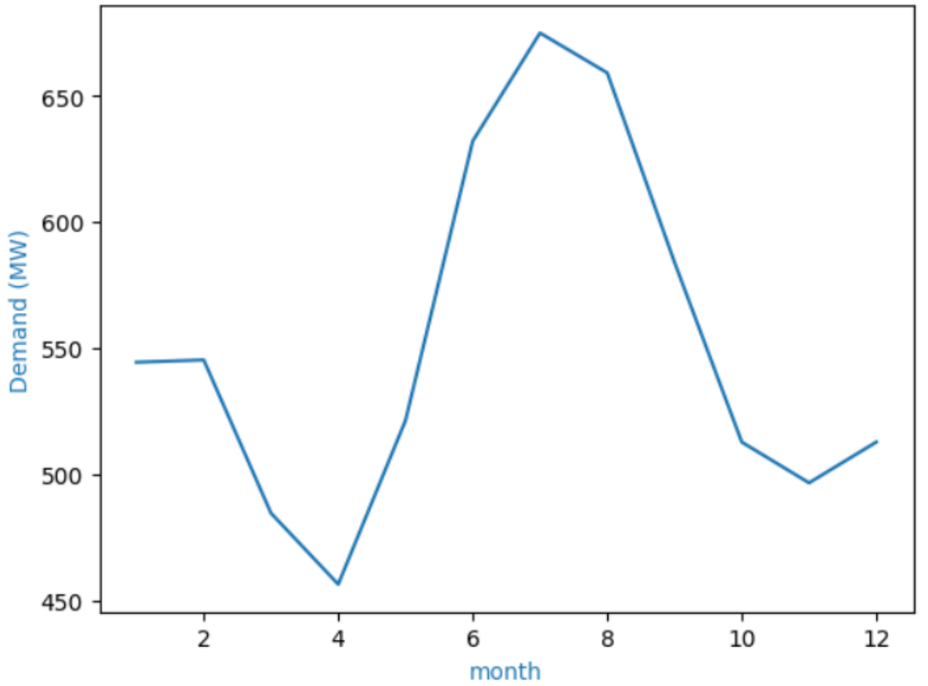
- 35352 entries
- till 12/24/2023

All data starting from 1/1/2020 0:00

Key Data Analysis

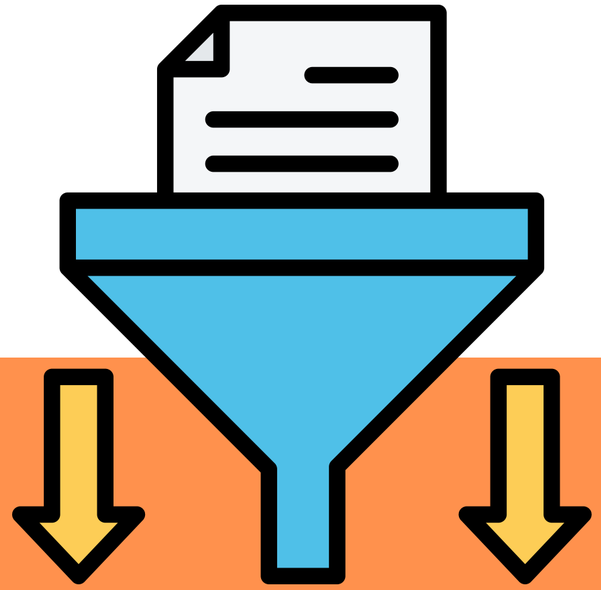


Peak hour: 6-8 PM

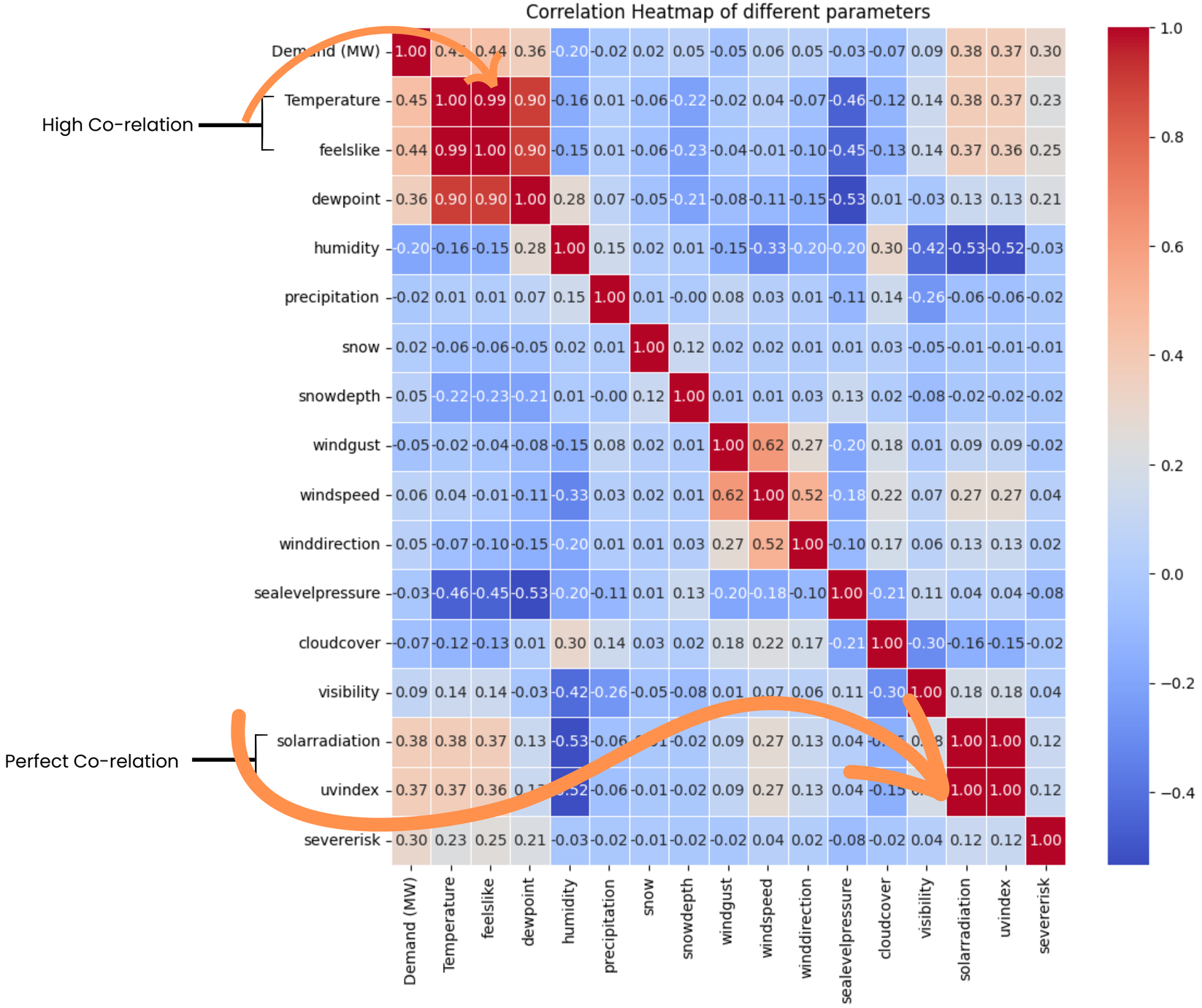


Peak Energy Consumption on June-July-August

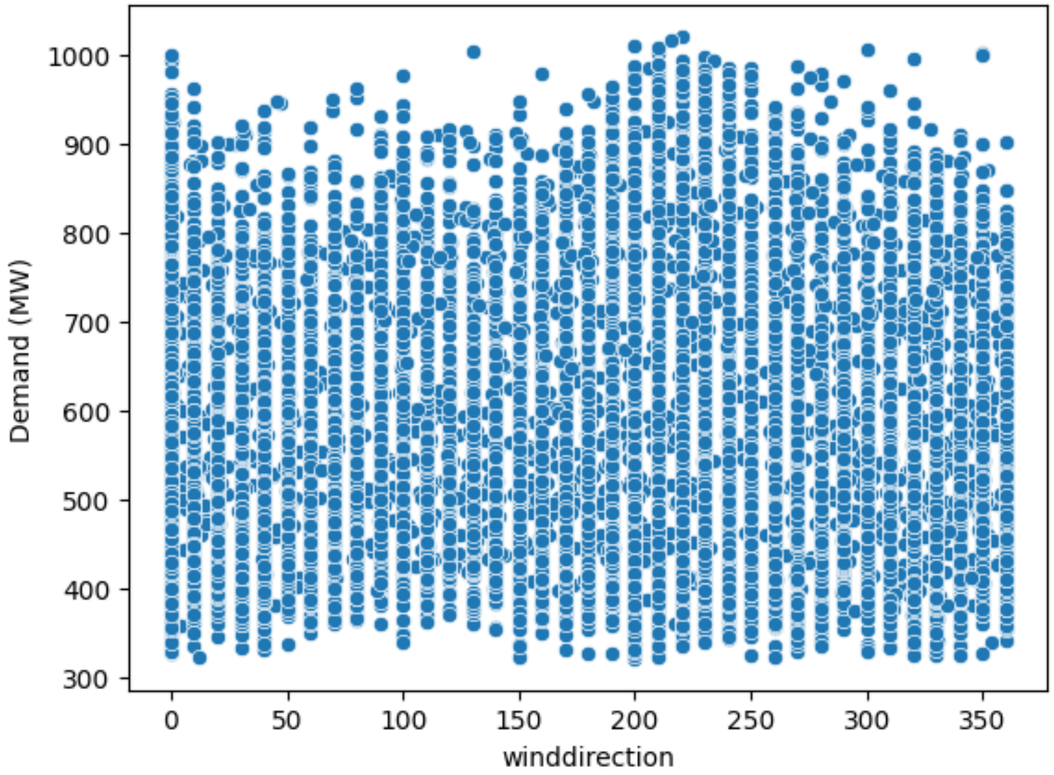
Feature Extraction



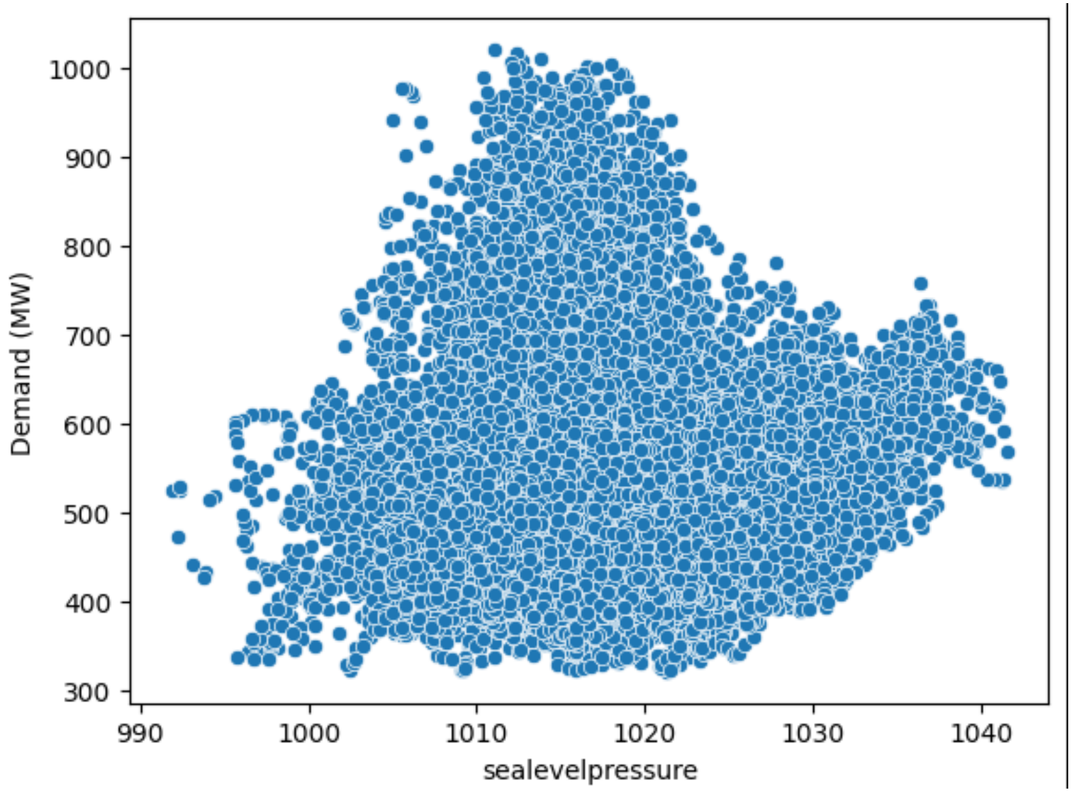
Dropping feelslike uvindex



Non-linear co-relation of features with demand

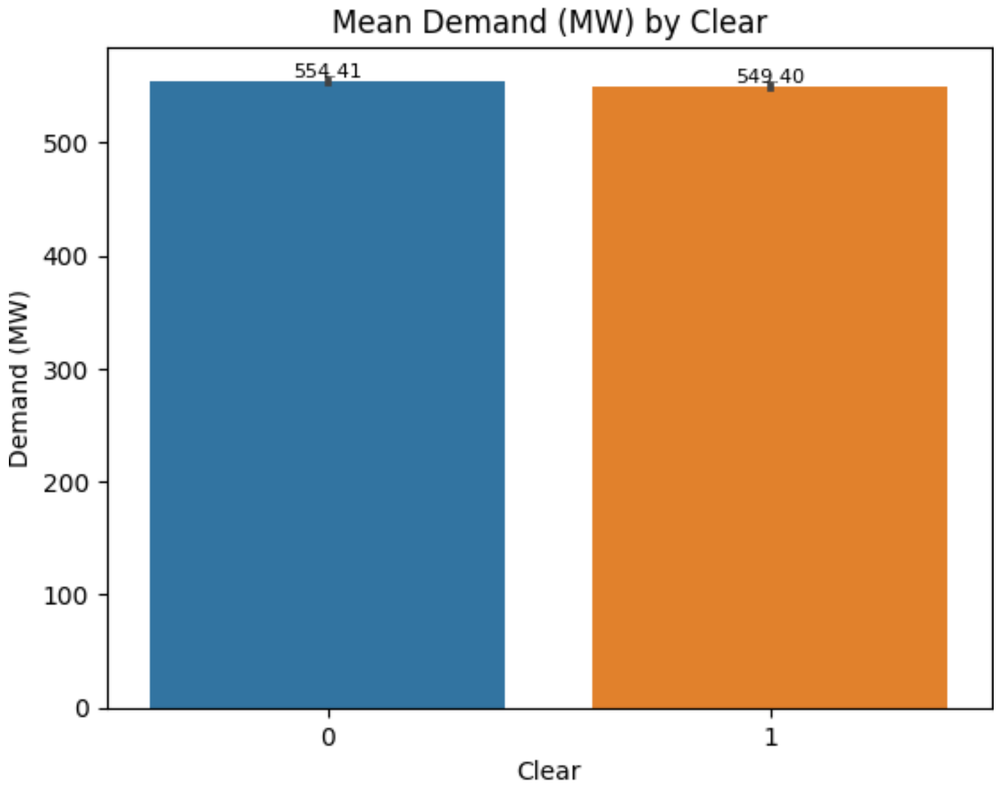


No co-relation so dropped winddirection

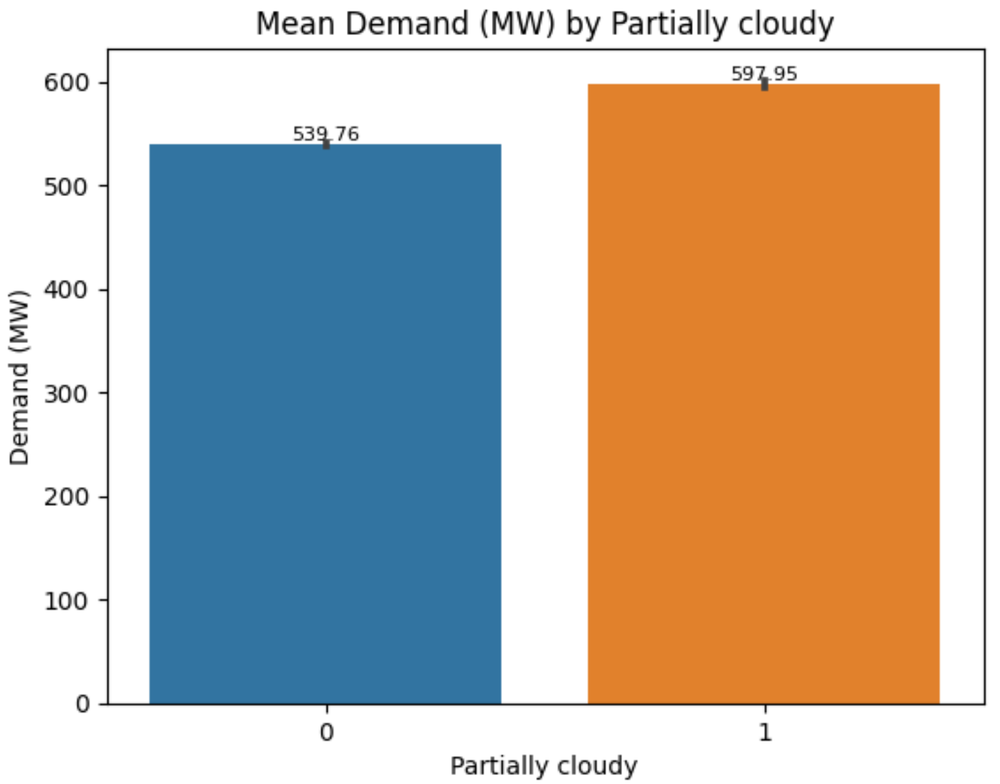


Shows co-relation so take sealevelpressure as feature

Feature Selection for Categorical Value

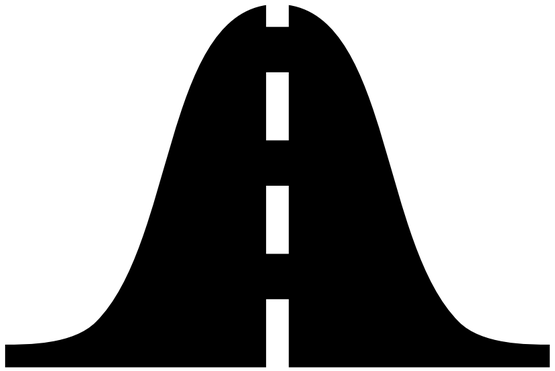


Difference ~ 6MW

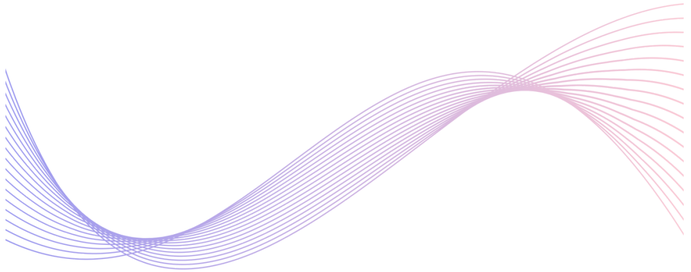


Difference ~ 58MW

Data Imputation



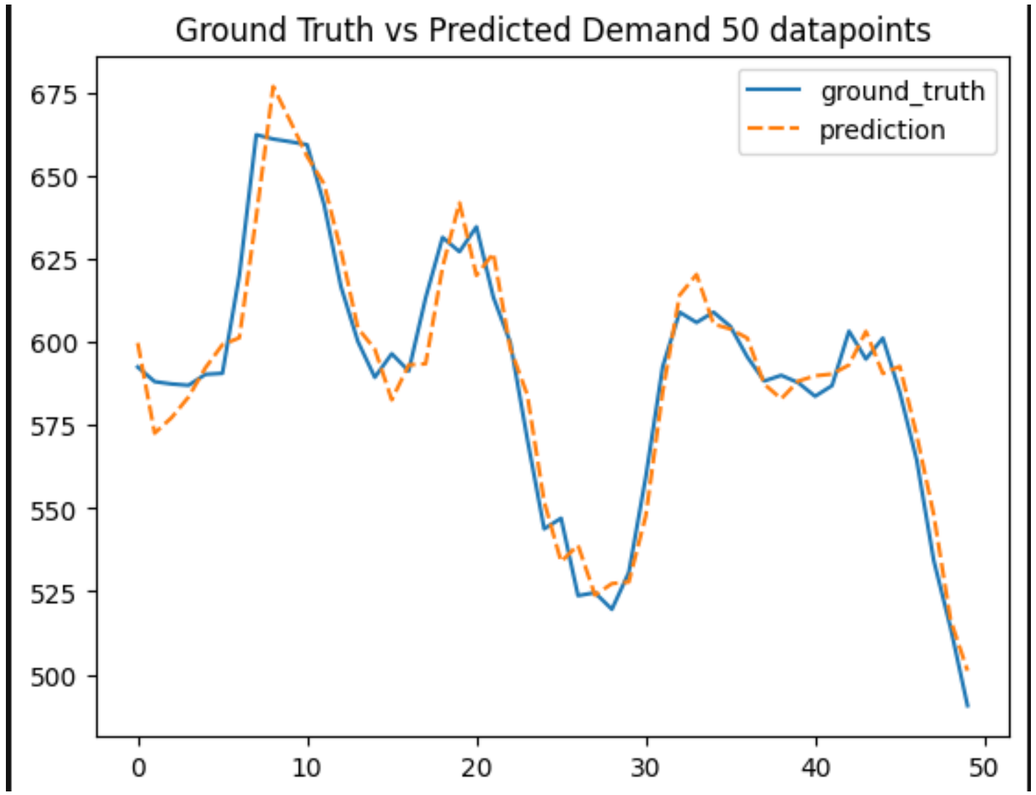
Distribution of 'windgust', 'severerisk',concentrated at a point so **fill NaN with mean**

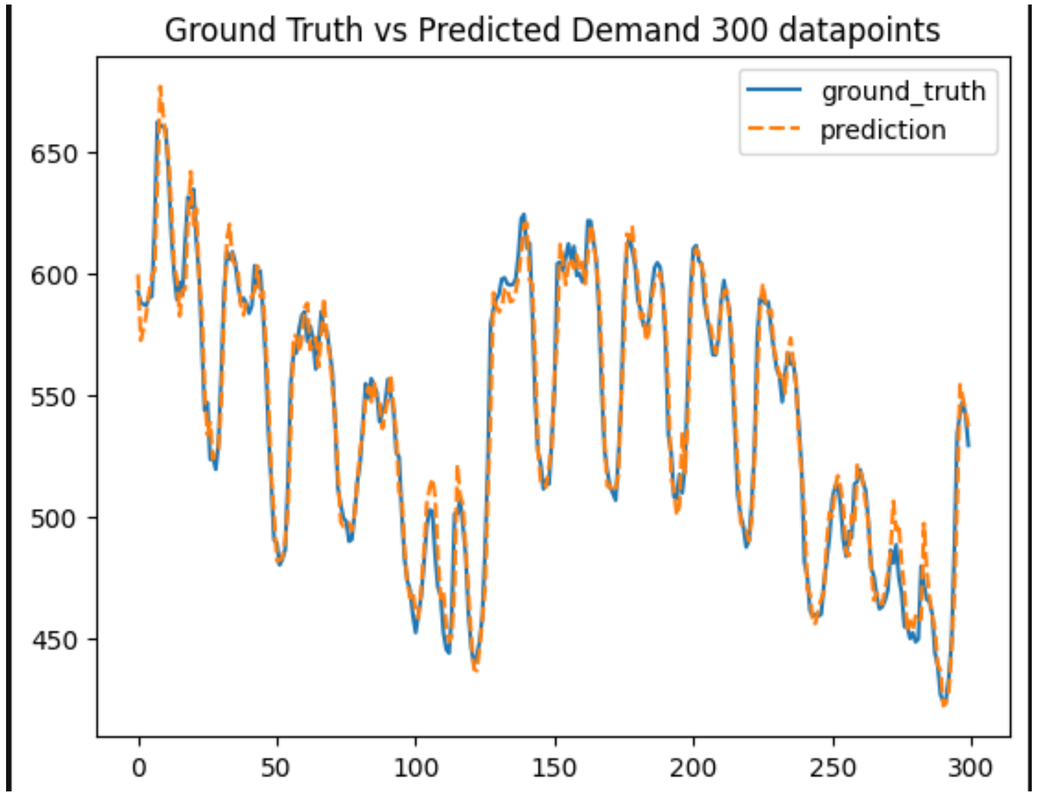


Interpolation in remaining columns

Model Building for Demand Forecasting

Univariate Demand Random Forest Regressor



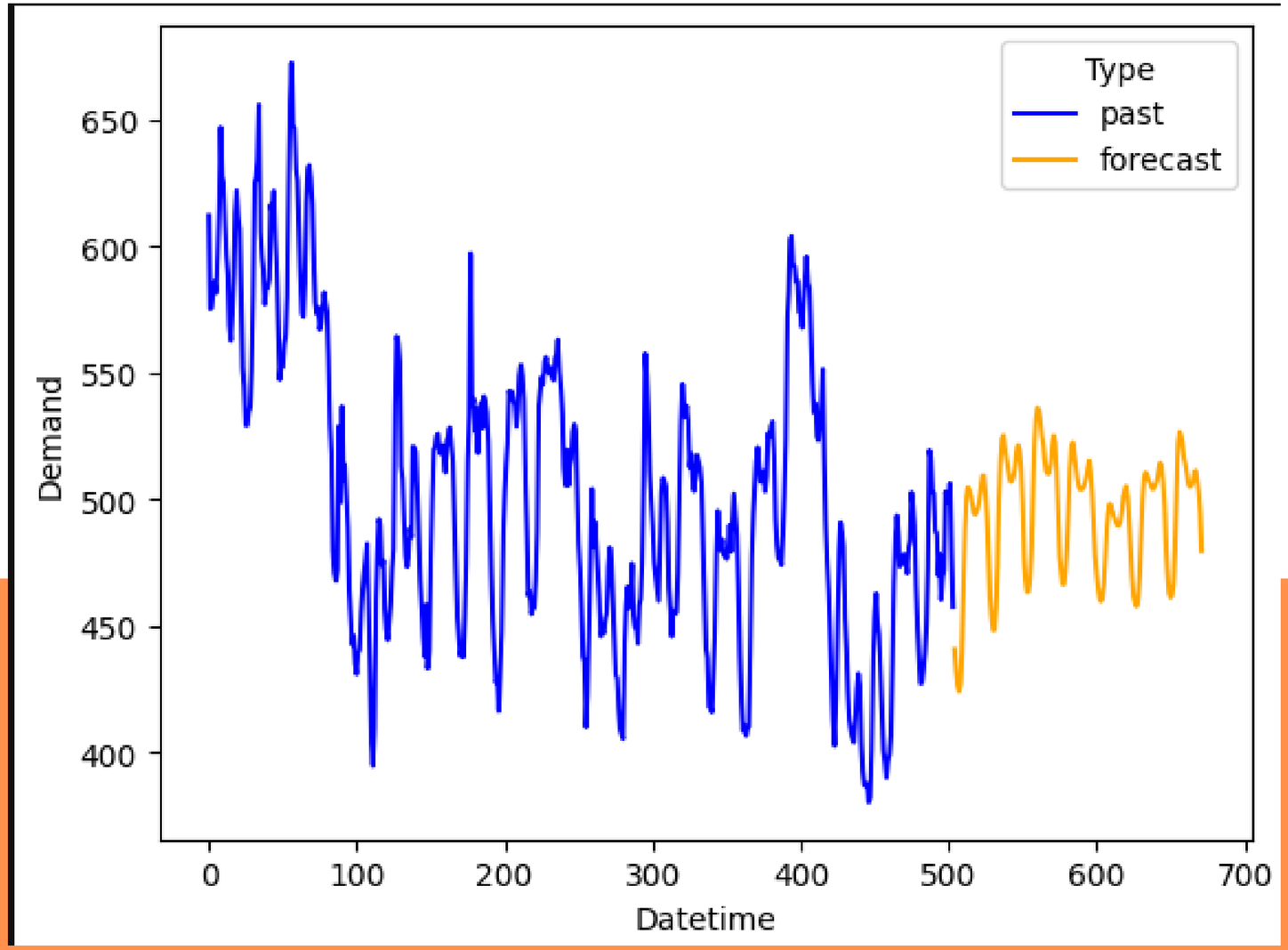


Mean squared Error = 133.1053

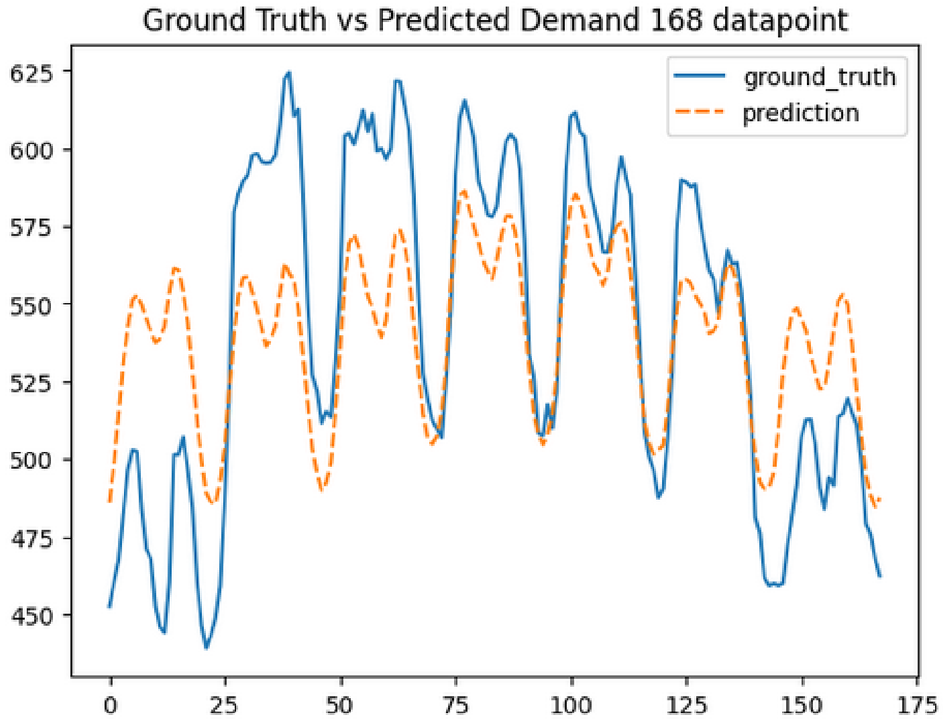
Mean Absolute Percentage Error= 1.651%,

Mean Absolute Error= 8.72

Univariate Demand Random Forest Regressor Test Data Prediction

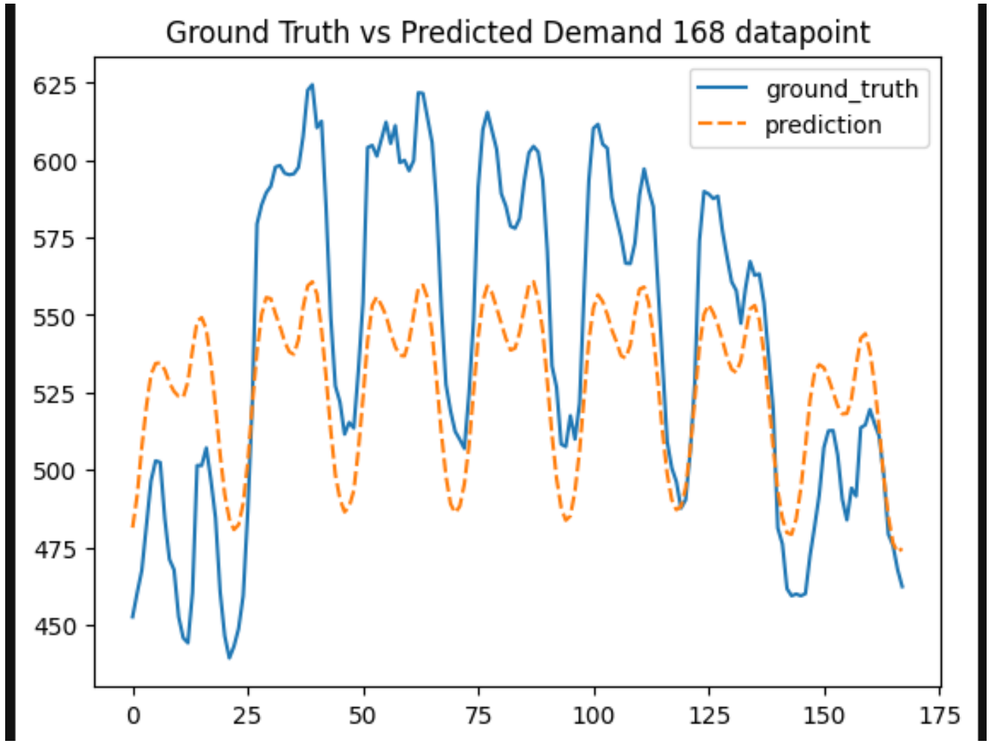


Multivariate Random Forest Regressor



n_estimators = 30

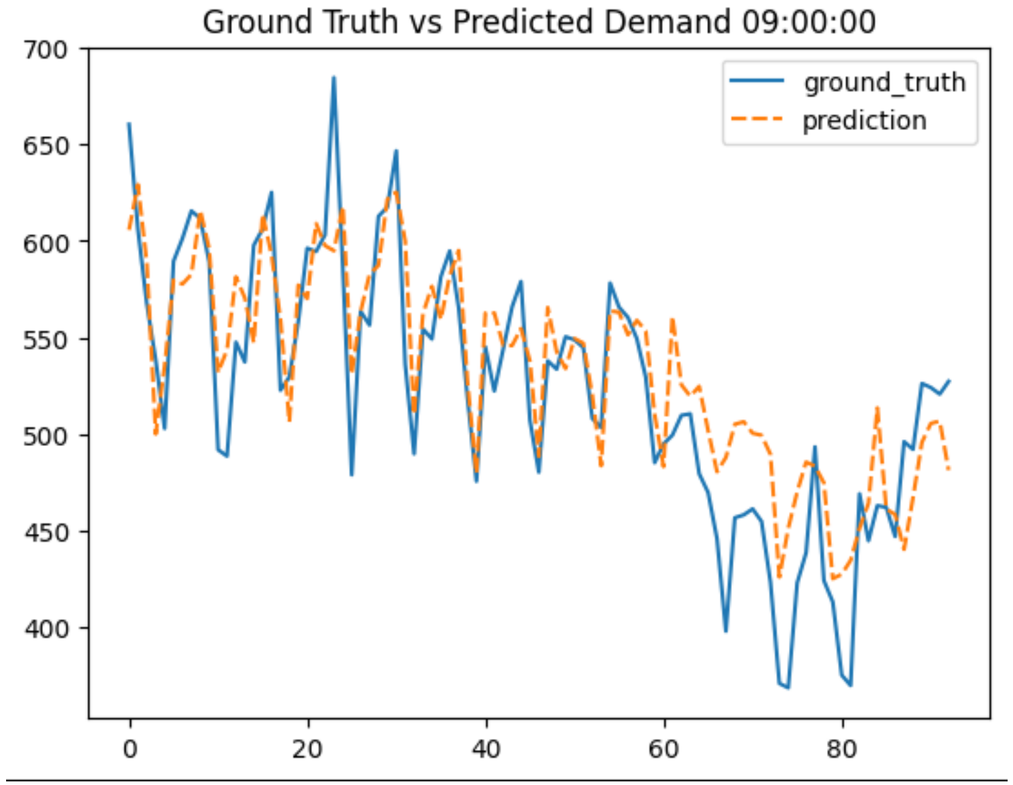
Mean squared Error = 1405.814,
Mean Absolute Percentage Error=0.058979,
Mean Absolute Error=31.288



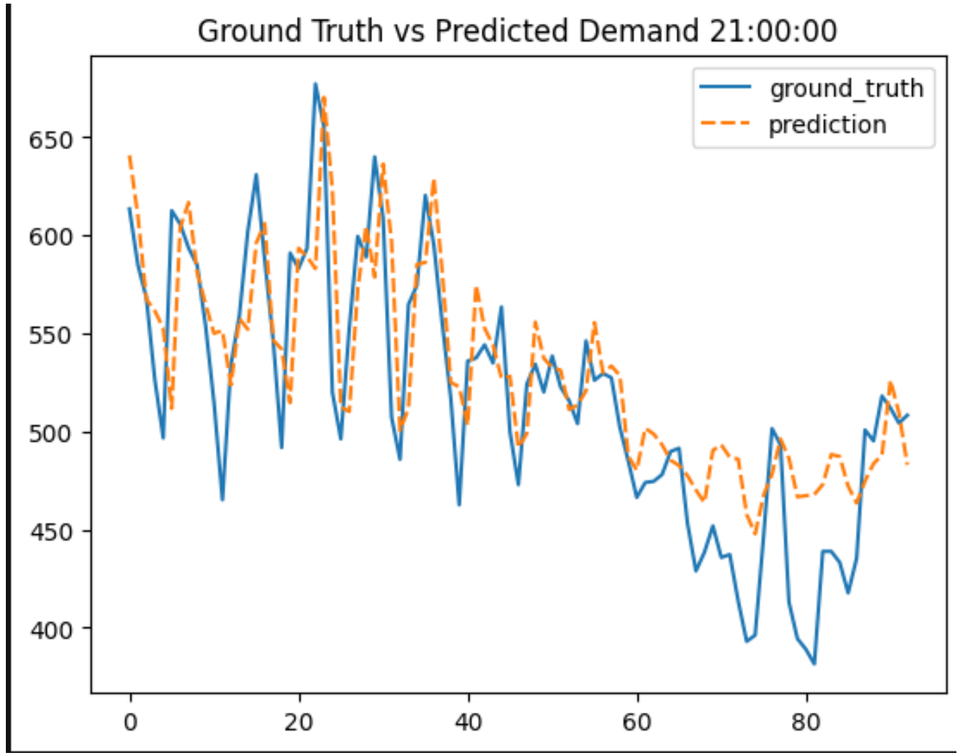
n_estimators = 200

Mean squared Error = 1621.5309
Mean Absolute Percentage Error=0.06597,
Mean Absolute Error=35.9930

Hourly Demand Forecasting using Random Forest Regressor



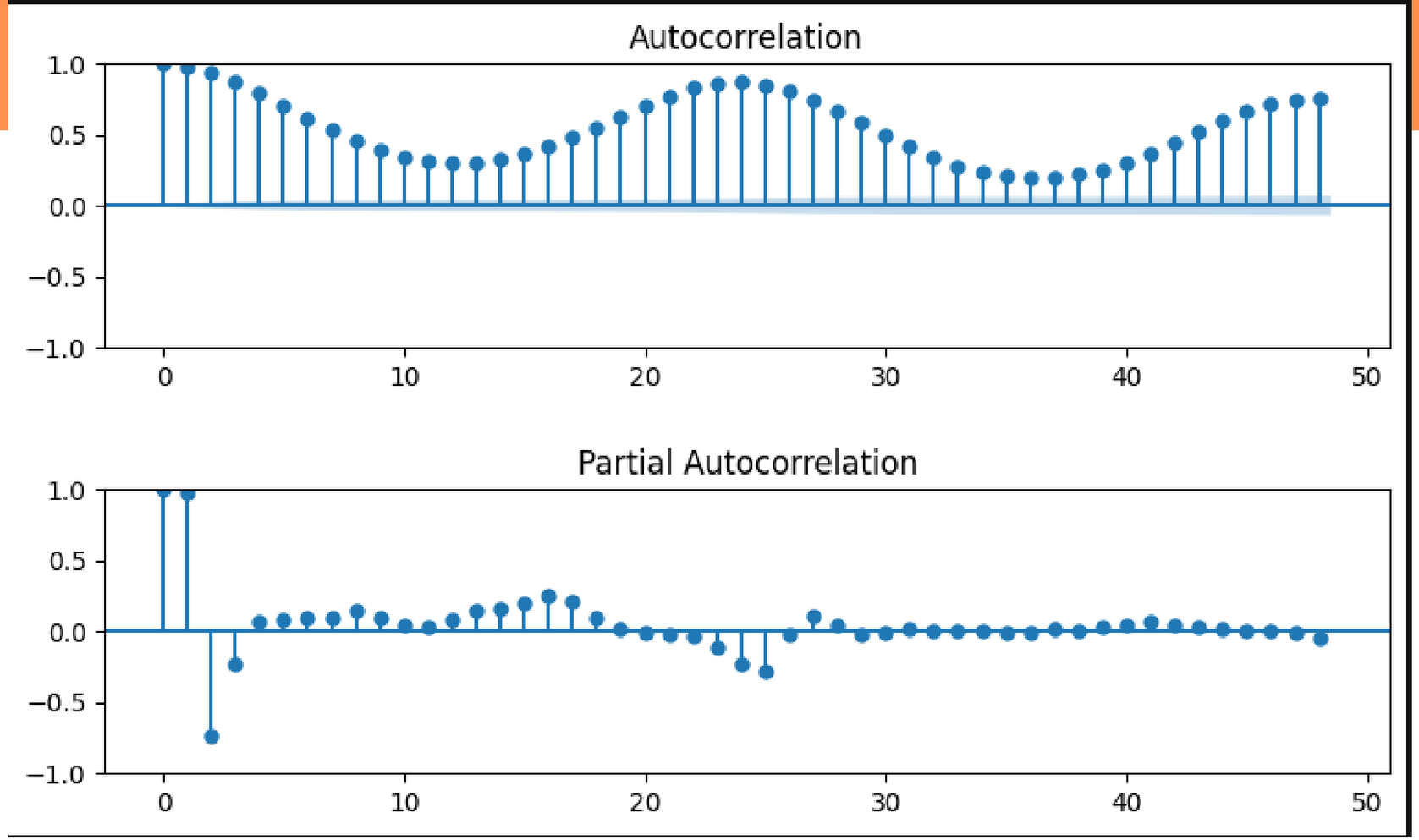
MSE = 1219.906
MAPE = 5.7688%
MAE = 28.431



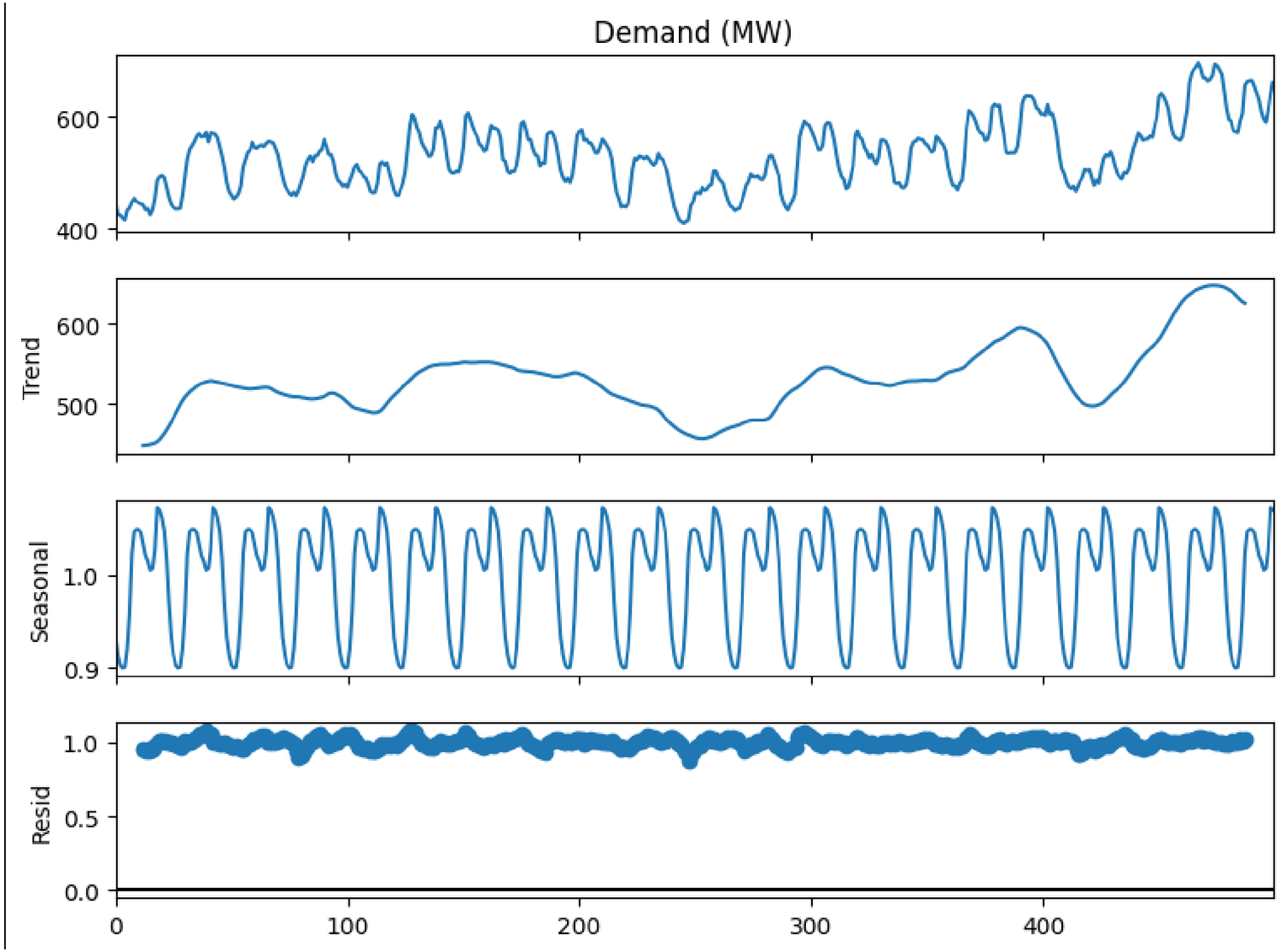
MSE = 1657.369
MAPE = 0.06457
MAE = 31.799

ACF And PACF for Demand

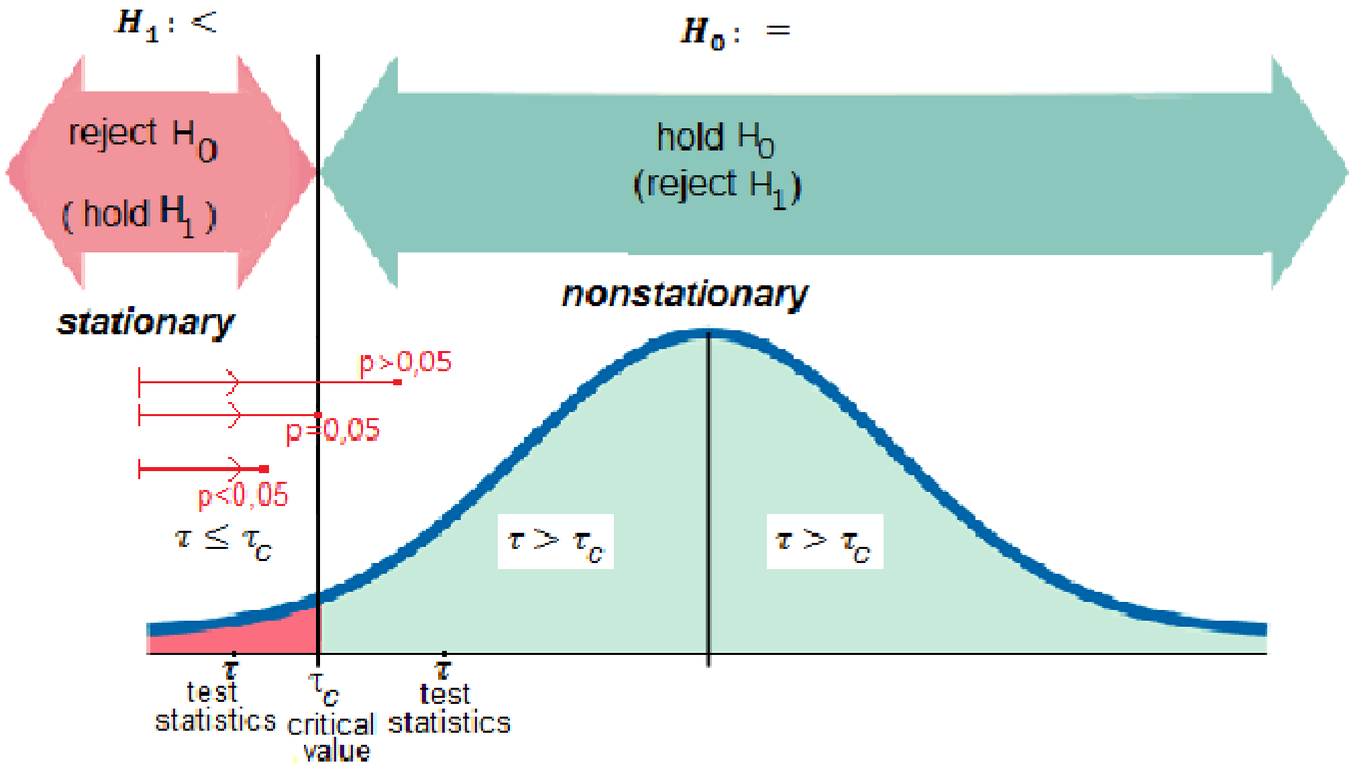
```
plot_acf_pacf_graphs(X=demand_data, lags=48)
```



Multiplicative Seasonal Decomposition of Demand Series

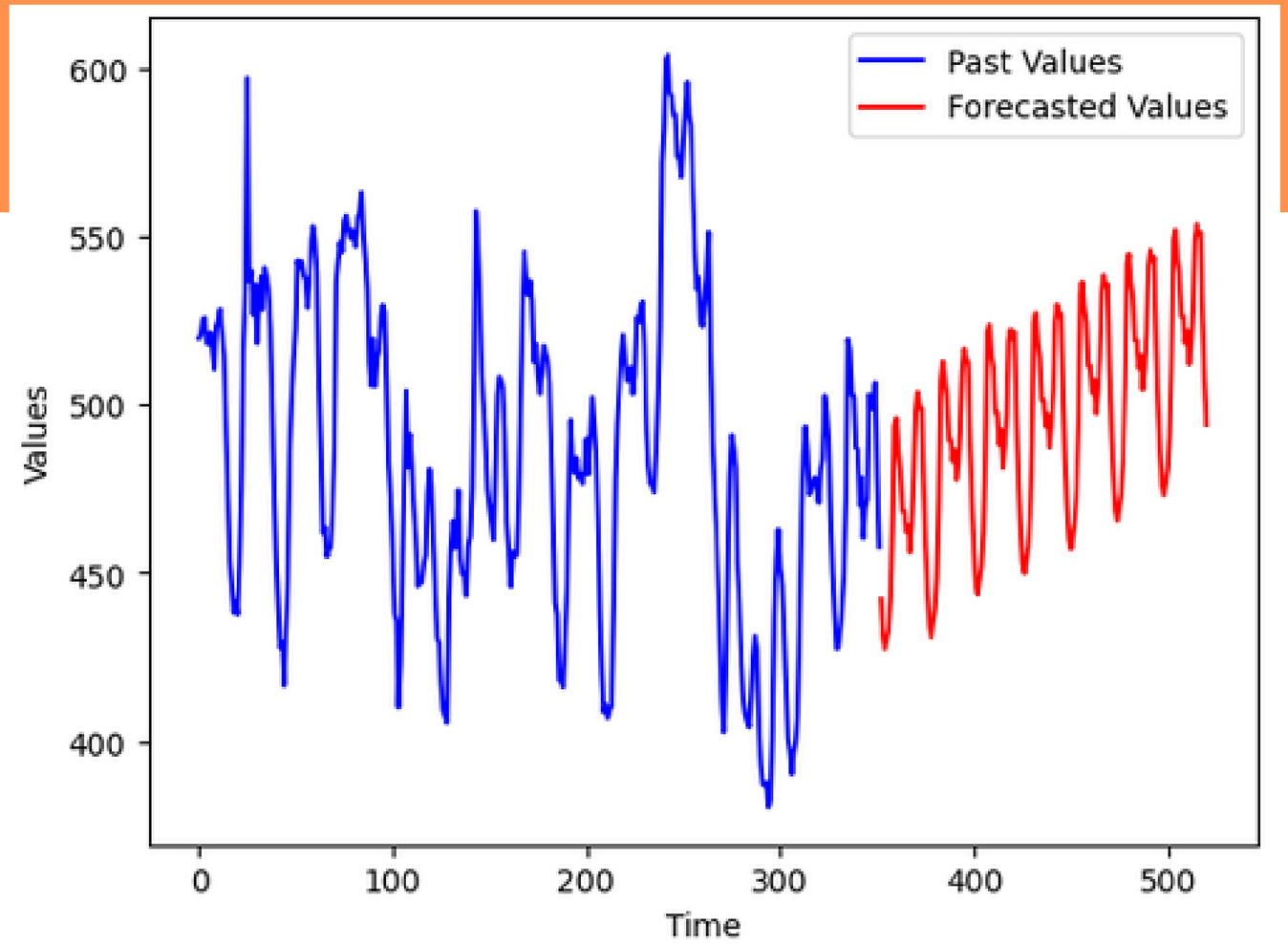


ADF TEST

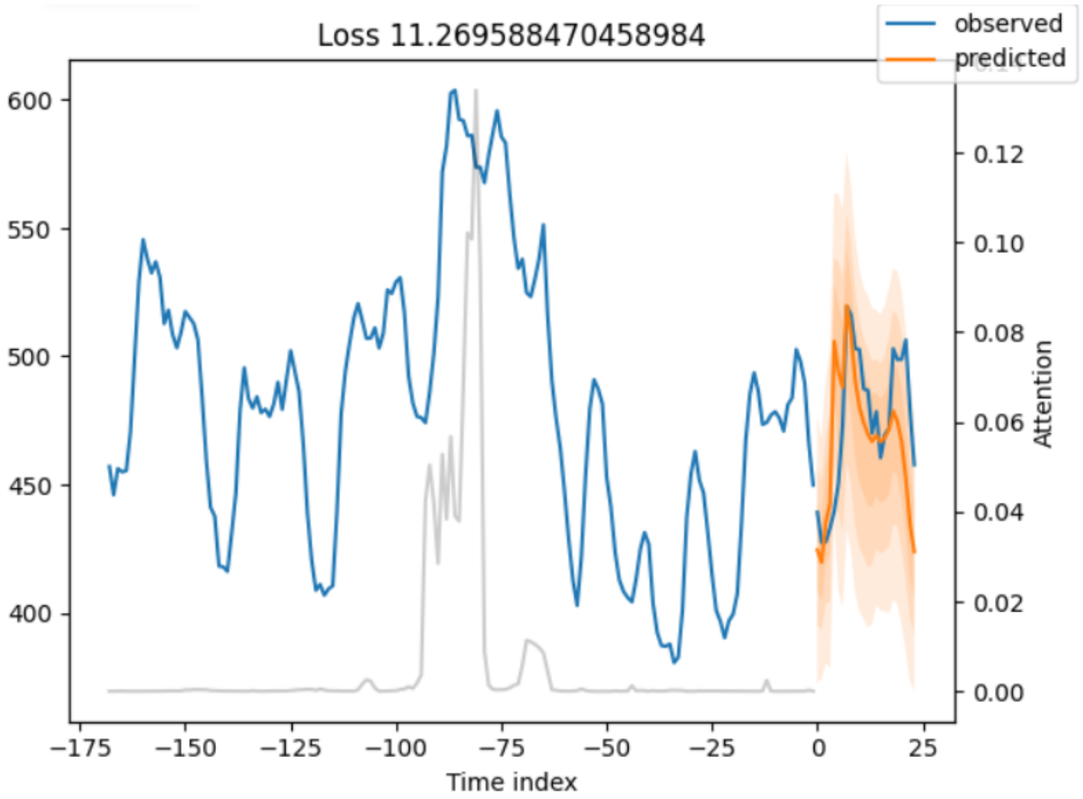


Data is stationarity

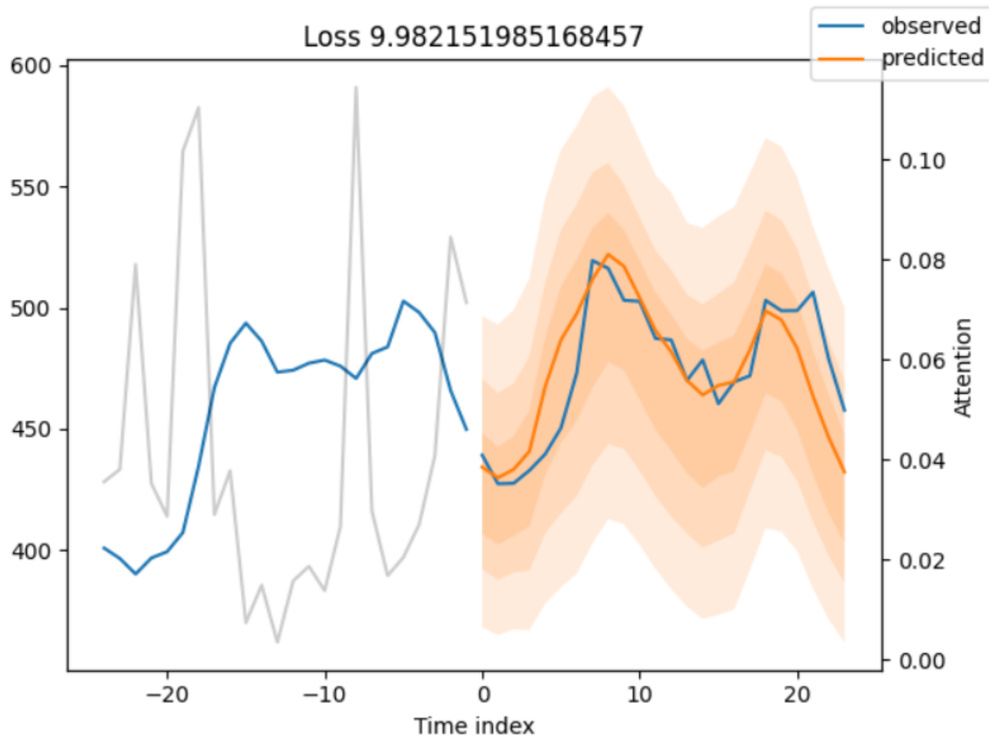
SARIMA (Seasonal - ARIMA)



TFT (Temporal Fusion Transformer)



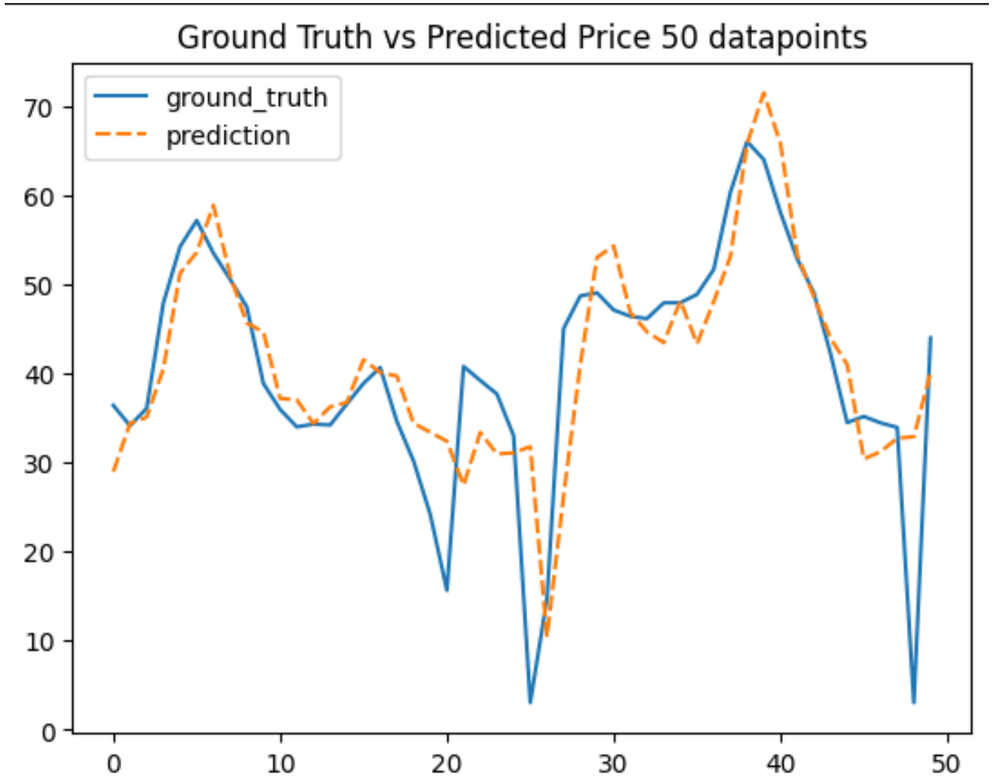
Previous data = 7 days
Prediction = 1day

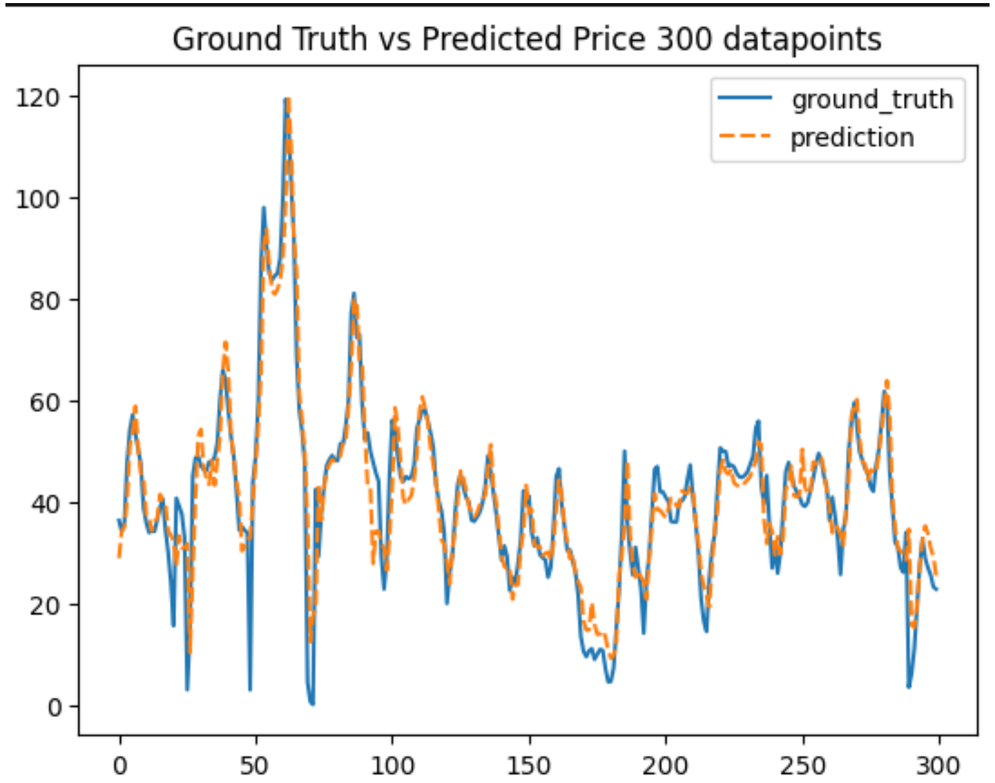


Previous data = 1 days
Prediction = 1day

Model Building for Price Forecasting

Univariate Price Forecasting
Random Forest Regressor

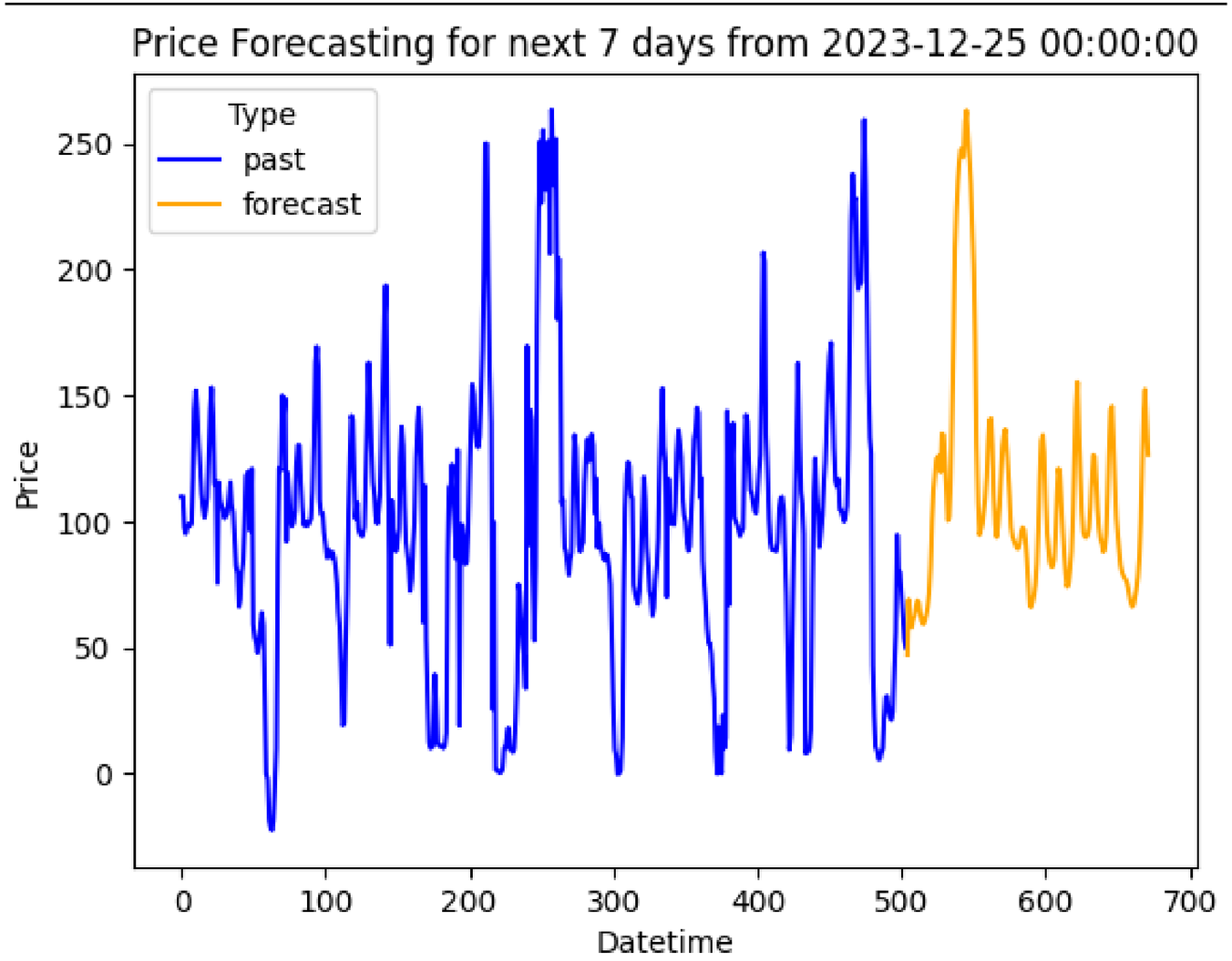




Mean Squared Error = 37.1401

Mean Absolute Error = 3.9510 EUR/MWh

PRICE FORECASTING
Random Forest Regressor



Thank you !

QnA