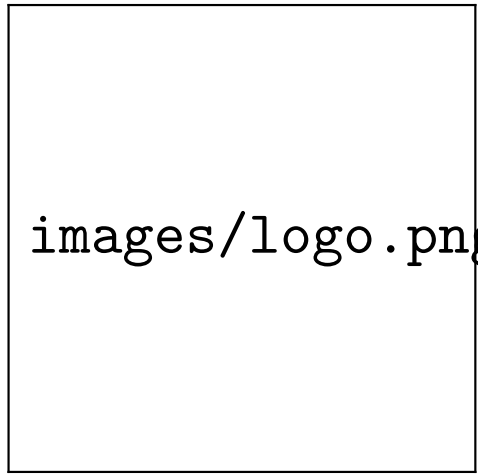
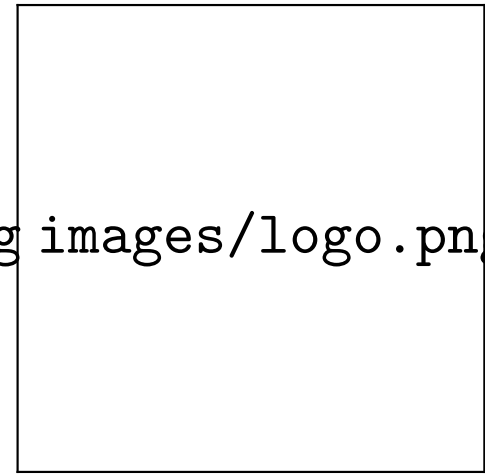




Analysis of Electricity Consumption in India

Group- WATTSUP

November 2021

Table of Contents

1. Objectives

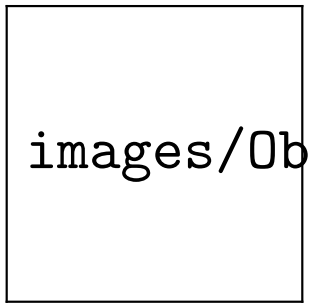
2. Time Series
   - Data Review
   - Decomposition
   - Trend and Seasonality
   - Smoothing - Holts Winters
   - Auto correlation and auto regressive models

Outline

1 Objectives

2 Time Series

What we set out to do



What we will attempt to do

Time series Analysis

Undertake time series analysis of peak electricity consumption and model the time series

Predict Net Zero emission goals

- COP26
  - Reduce Fossil fuel dependence to 50
  - Net Zero carbon emission by 2070

Analyse if we are on track to achieve net zero emission by 2070

Outline

1. Objectives

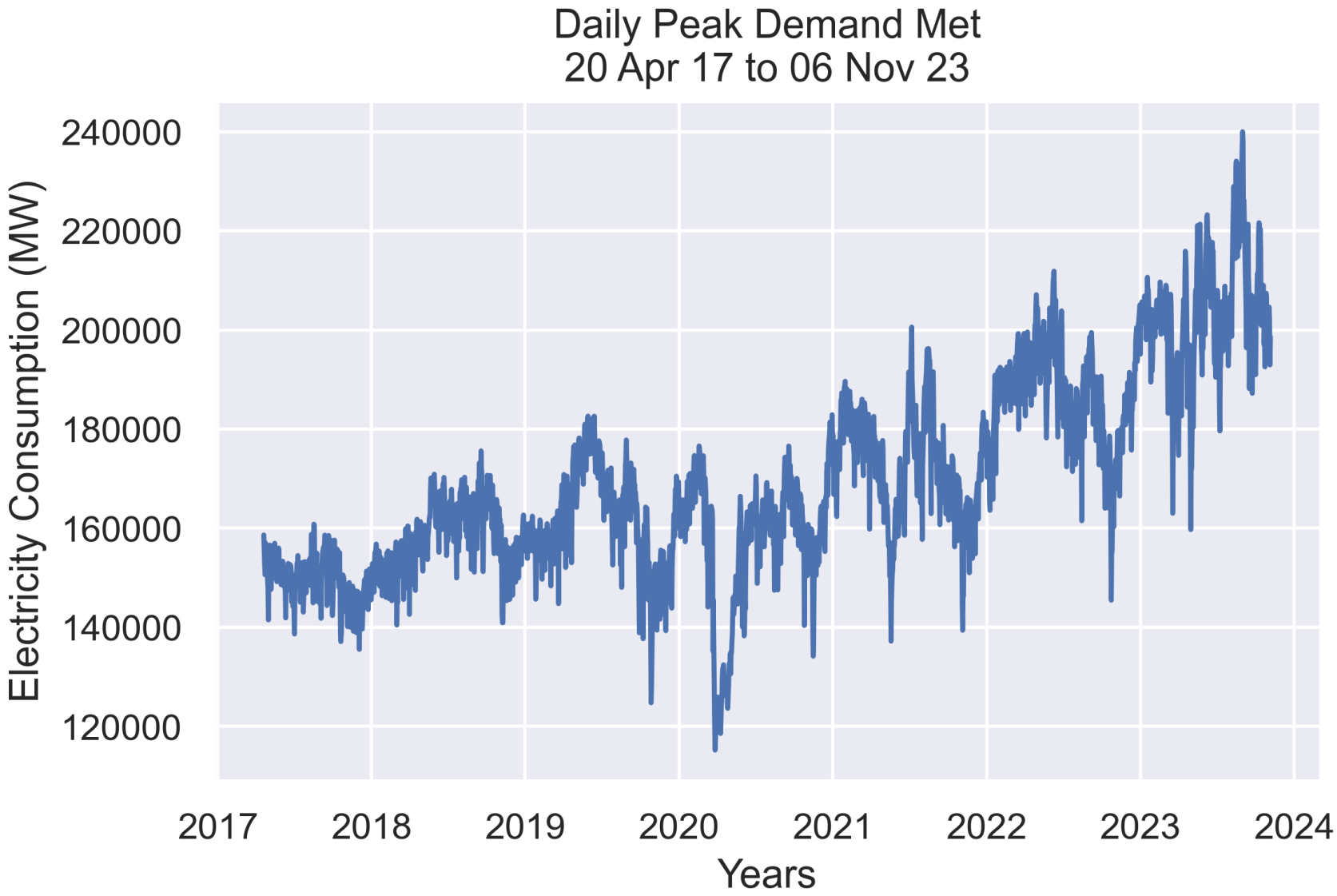
2. Time Series
   - Data Review
   - Decomposition
   - Trend and Seasonality
   - Smoothing - Holts Winters
   - Auto correlation and auto regressive models

Data Quality Characteristics

Characteristic	Description	Remarks
Source	Niti Ayog Website	https://iced.niti.gov.in/
Period	20 Apr 17 to 06 Nov 23	
Periodicity	Daily	
Observation	Daily Peak Demand	in MW
# of Observations	2390	
Range	115232 to 239978	in MW

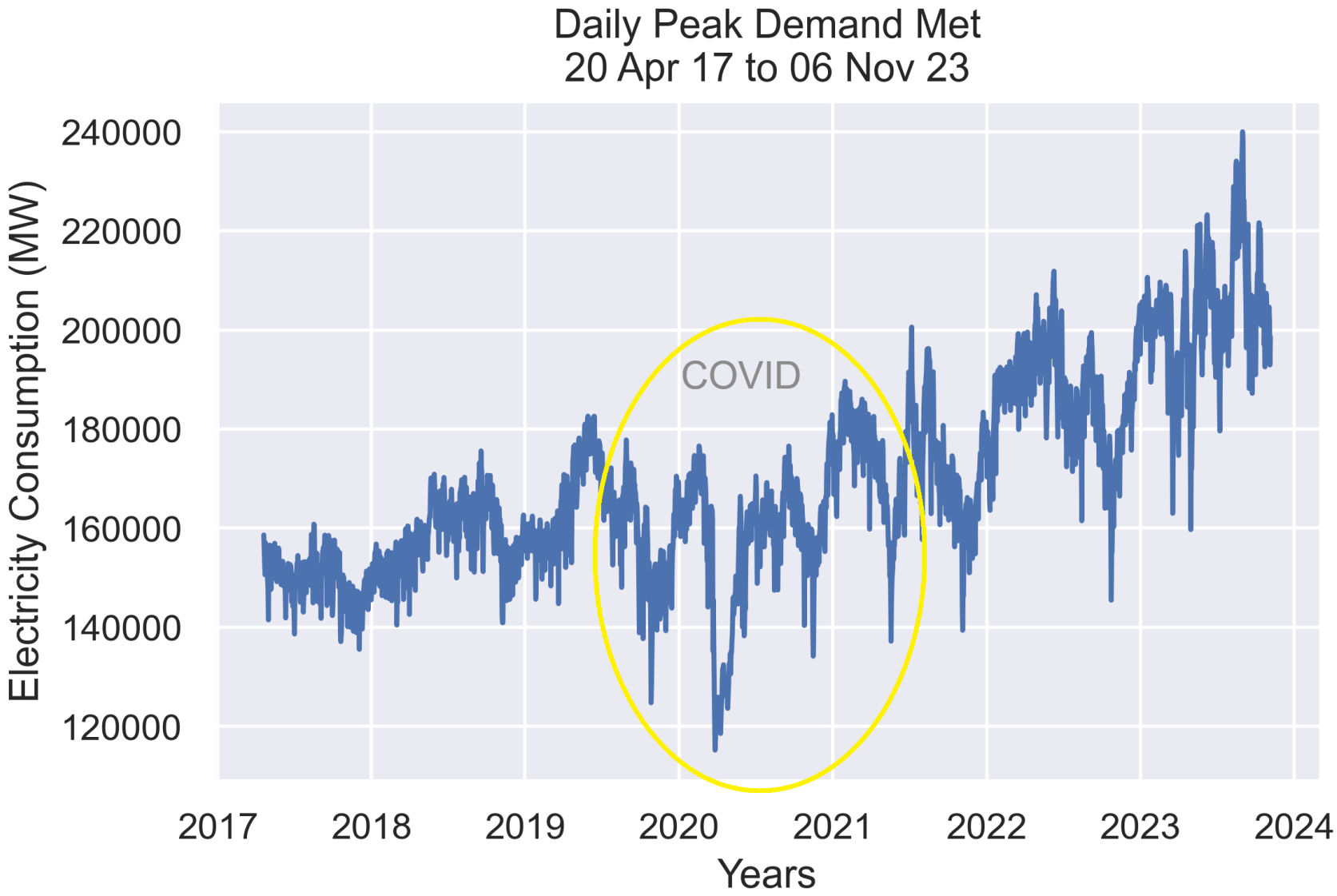
Table: Data Characteristics

Plot of Data



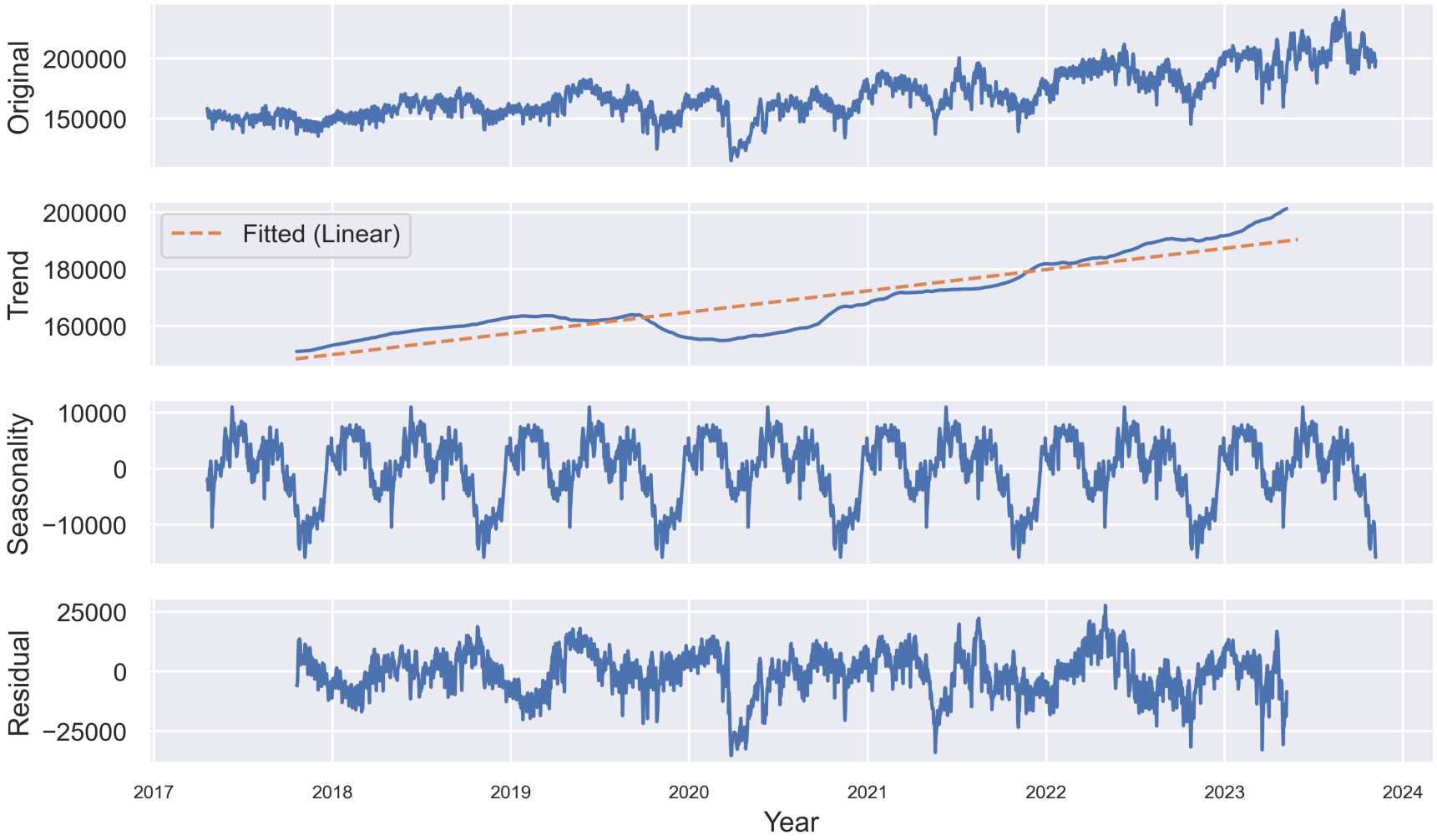
Data Source: *https://iced.niti.gov.in/*

Plot of Data



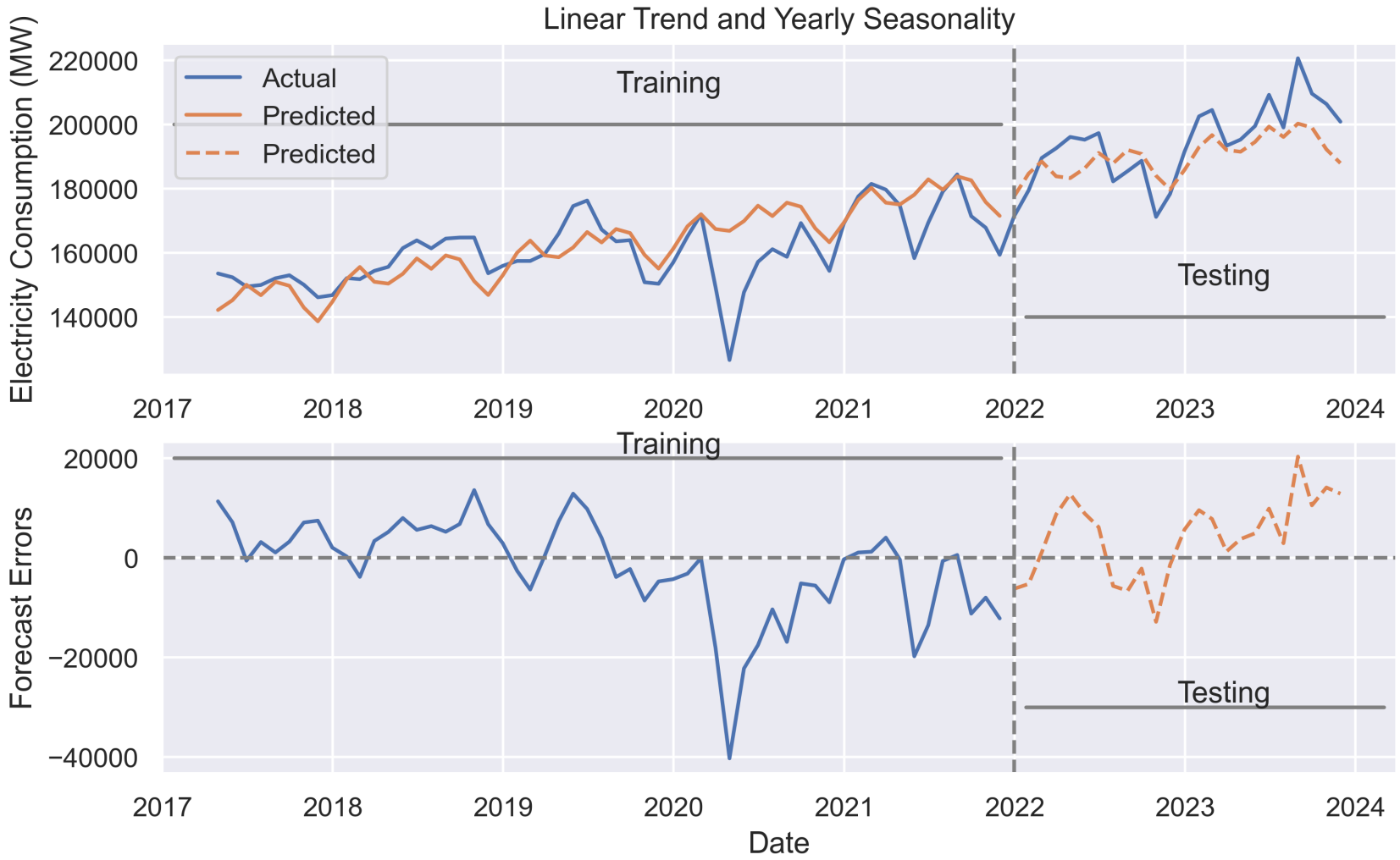
Data Source: *https://iced.niti.gov.in/*

Time series-Decomposed (Yearly Seasonality)



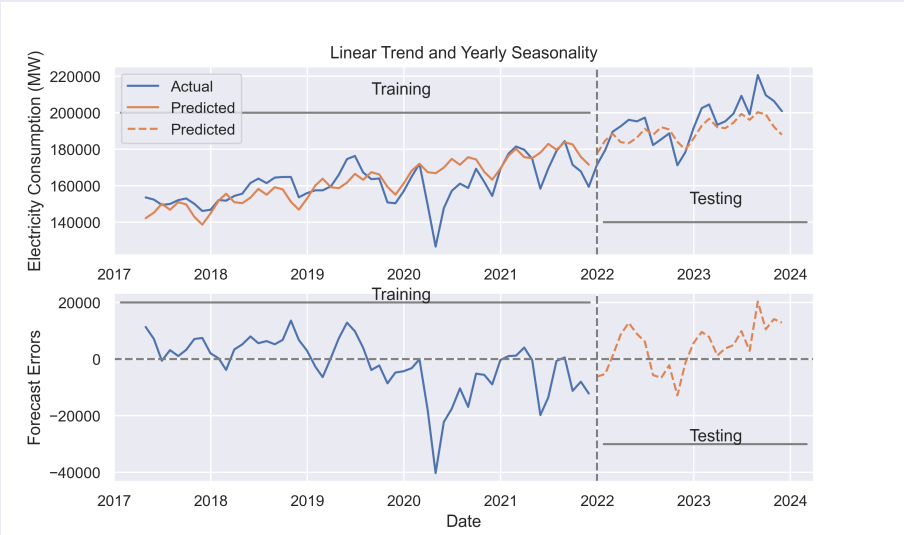
Data Source: *https://iced.niti.gov.in/*

Train/Test- Linear Trend with Yearly Seasonality (Ordinary Least Square)



Data Source: *https://iced.niti.gov.in/*

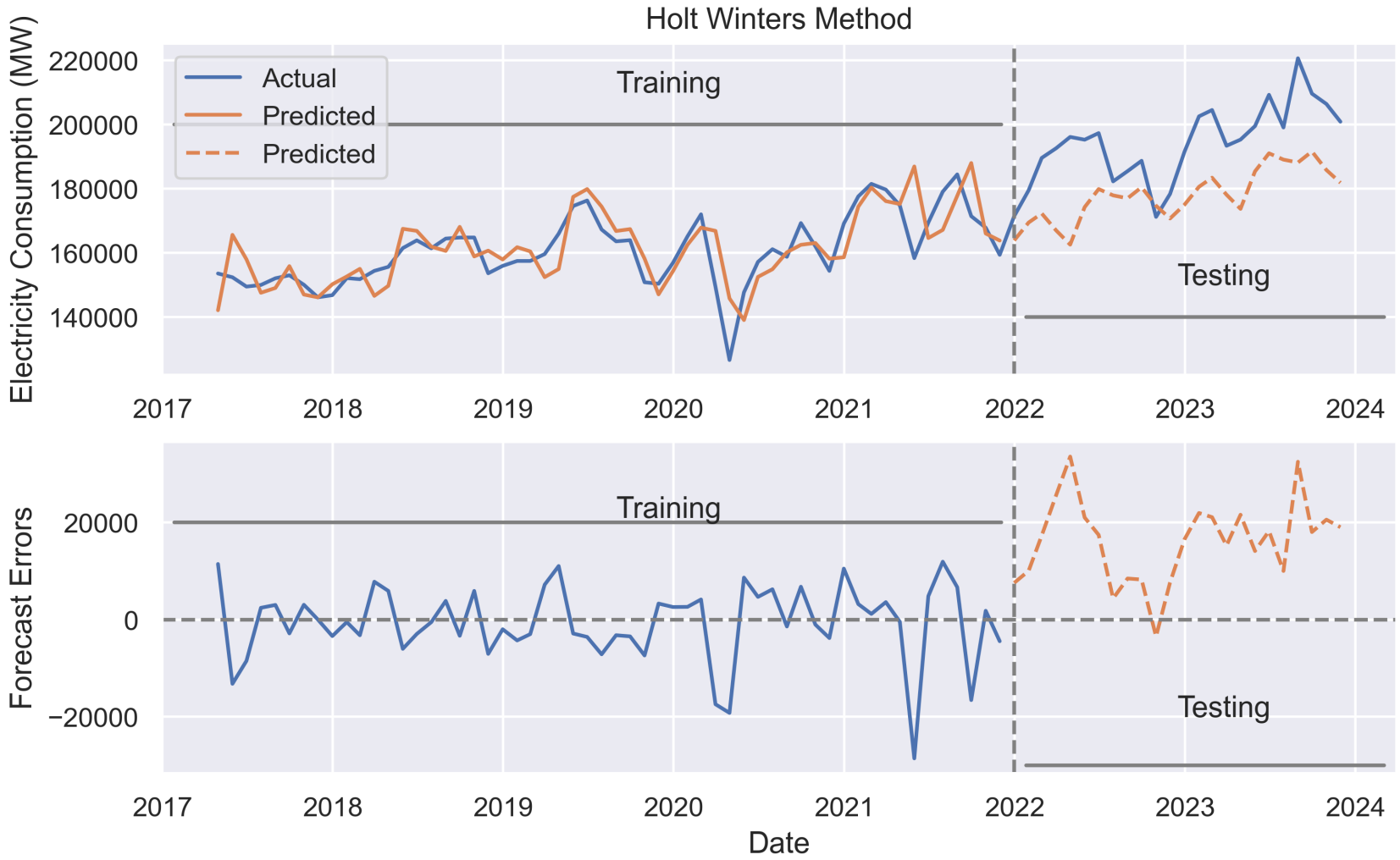
Train/Test- Linear Trend with Yearly Seasonality Error Metrics



Error Metrics

Measure	OLS Test	OLS Train
MAE	7129.32	7576.00
MAPE	0.05	0.04
RMSE	9948.14	8894.58

Holt Winters



Data Source: *https://iced.niti.gov.in/*

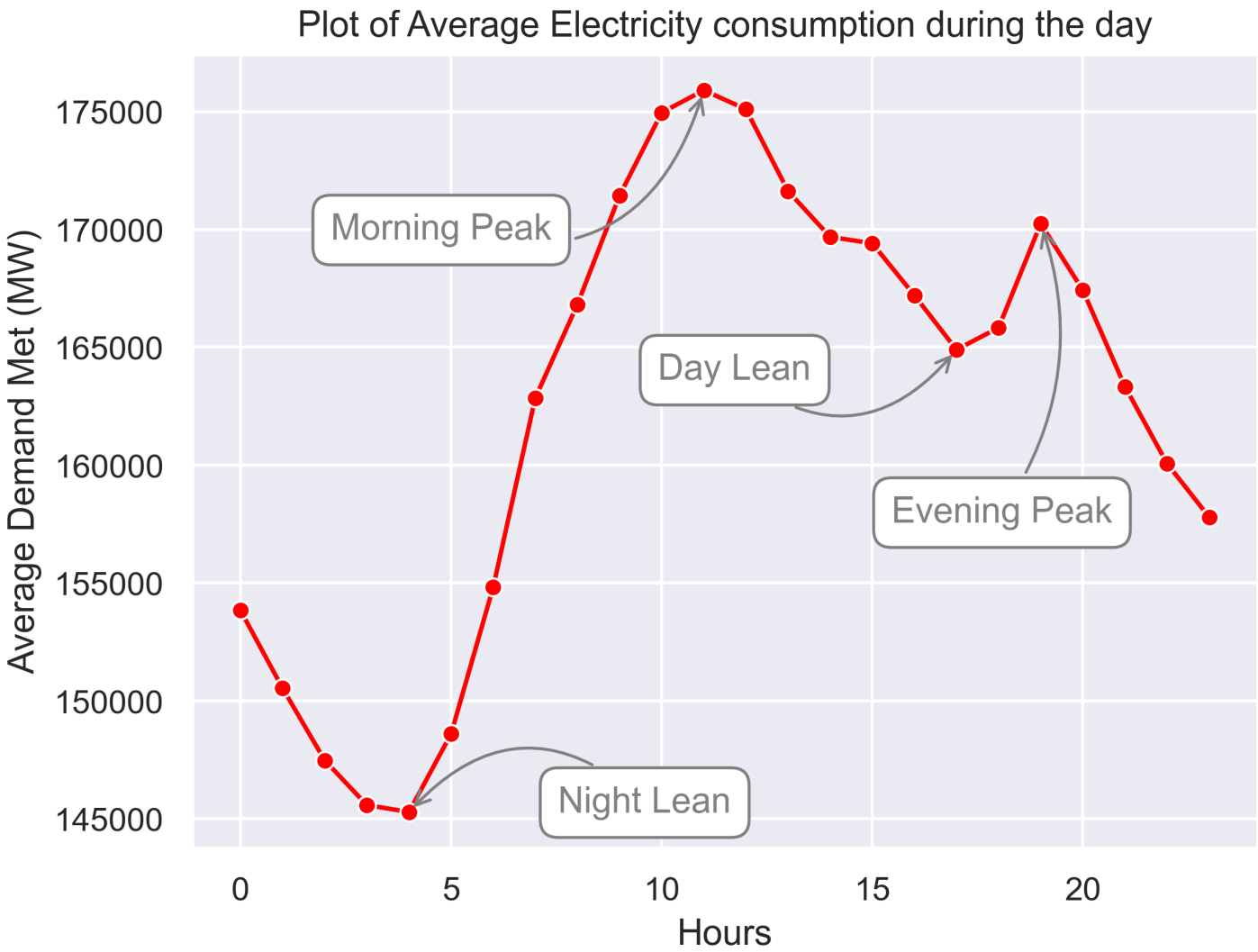
Error Metrics - OLS vs Holt Winters

Error Metrics

Measure	OLS		HW	
	Test	Train	Test	Train
MAE	7129.32	7576.00	5815.48	16401.85
MAPE	0.05	0.04	0.040	0.08
RMSE	9948.14	8894.58	7801.94	18157.35

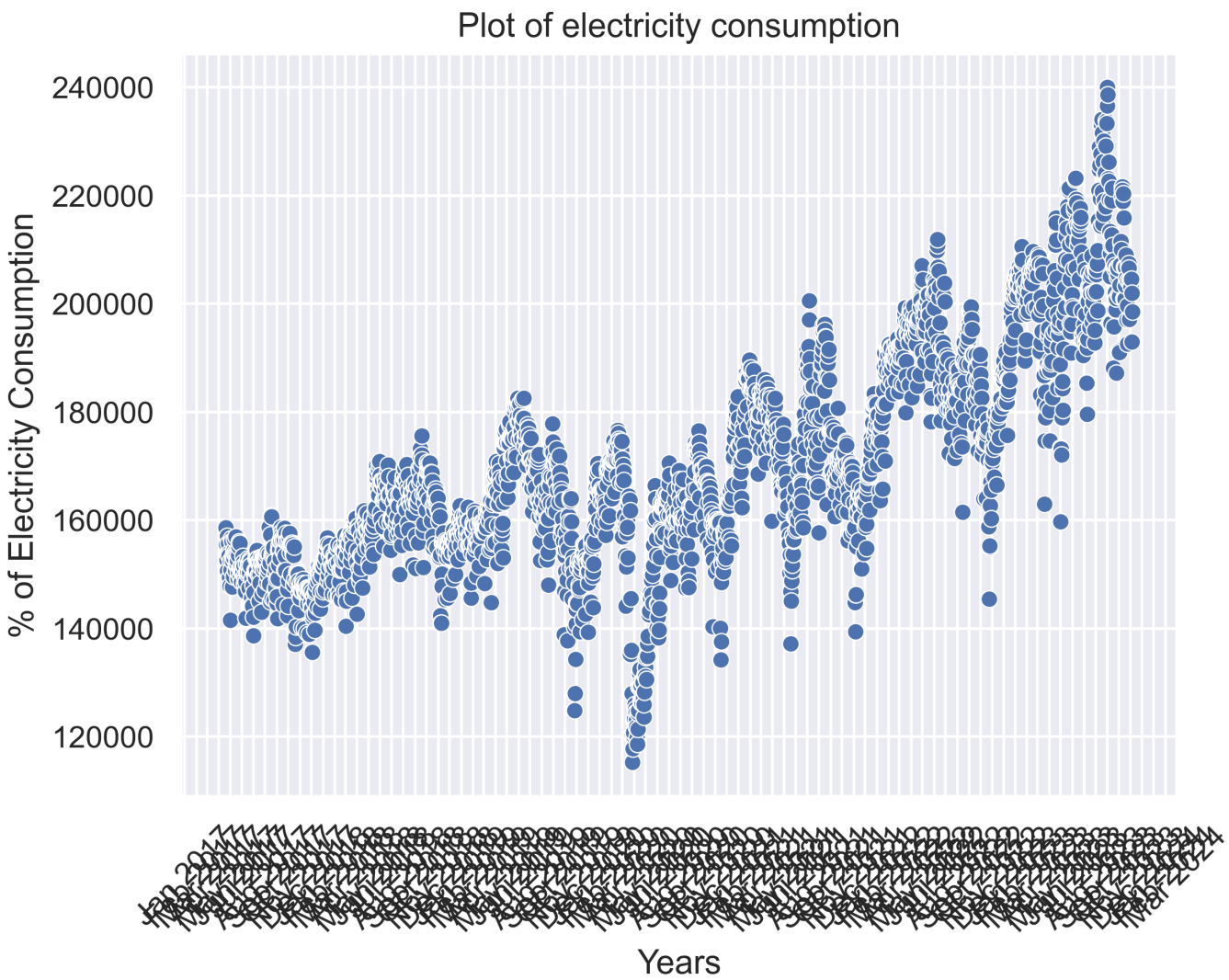
Autocorrelation-PACF of Series and Residual

Daily Load Curve



Data Source: *https://iced.niti.gov.in/*

Consumption - Consumer Wise



Data Source: *https://cea.nic.in/*