

Hourly Power Generation of Europe

STM WS 2025 Data Analysis

The Fusion Force

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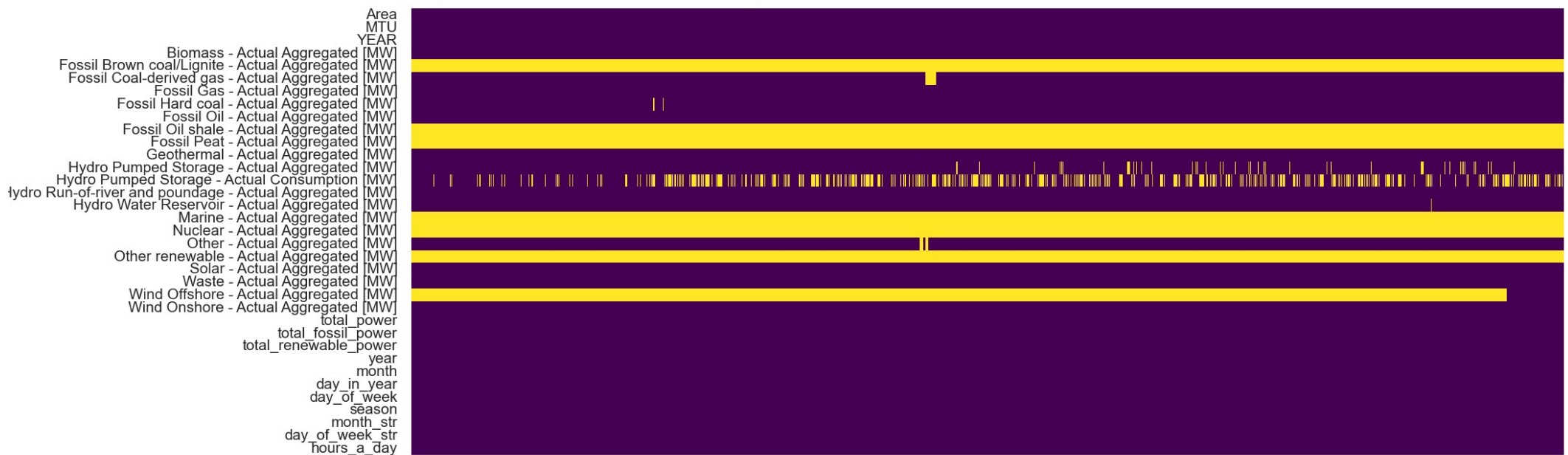
About the Dataset

- **Hourly power generation of European countries**
 - Germany
 - France
 - Spain
 - Italy
- **Start:** 01.01.2015
- **End:** 26.09.2022
- **Sampling:**
 - Germany: every 15 min
 - France, Spain, Italy: every 60 min
- **Data from ENTSO-E**
 - (European Network of Transmission System Operators) Transparency Platform
- **Challenges:**
 - Different sampling rates
 - Huge data files (59064 – 271296 values)
 - Differing column names

Missingness diagramm

Missing Data Patterns Overview

Italy – Missing Data (Yellow = Missing)

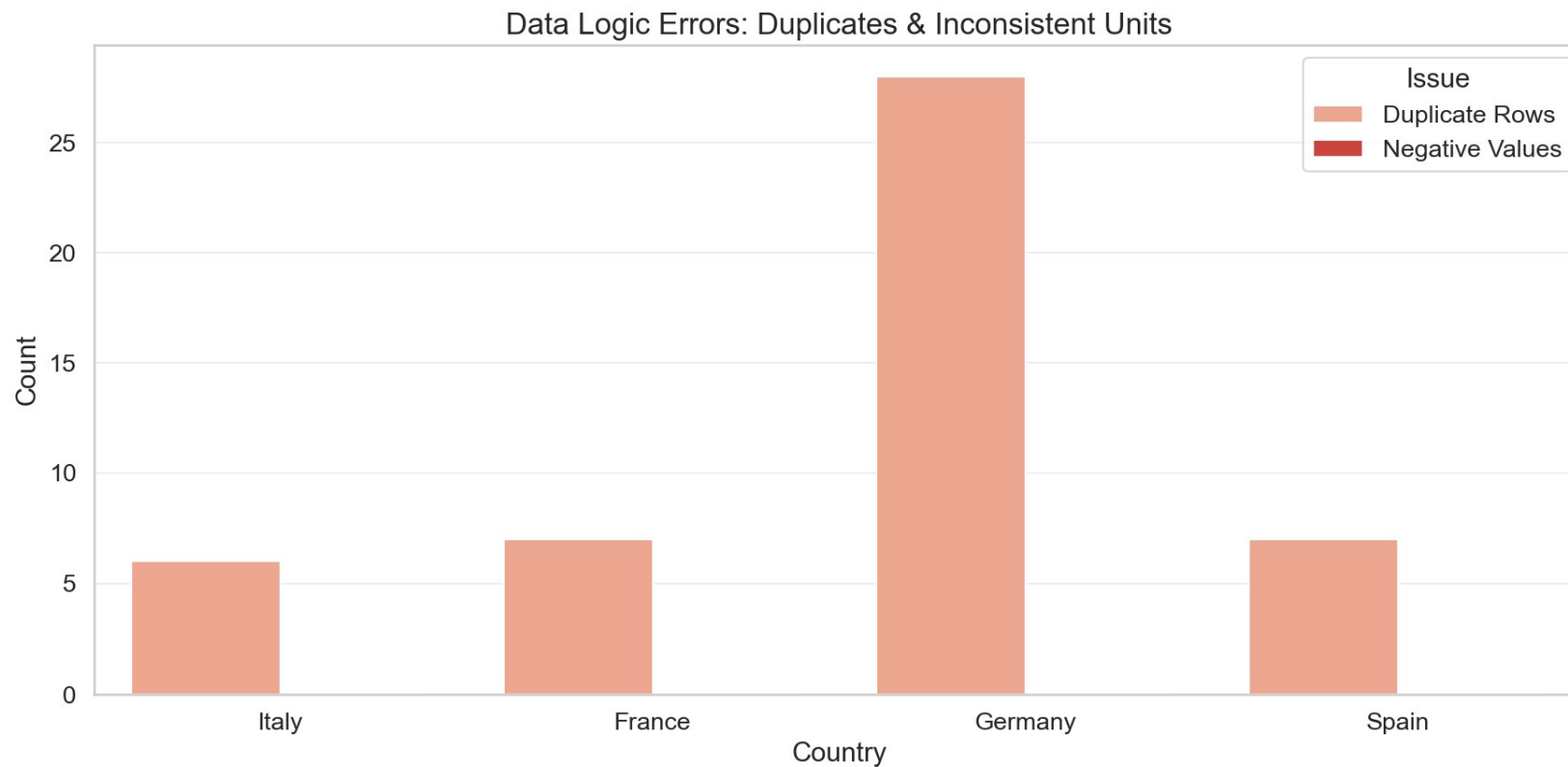


Timeline: 2016-01-01 to 2022-09-26

Original data quality analysis

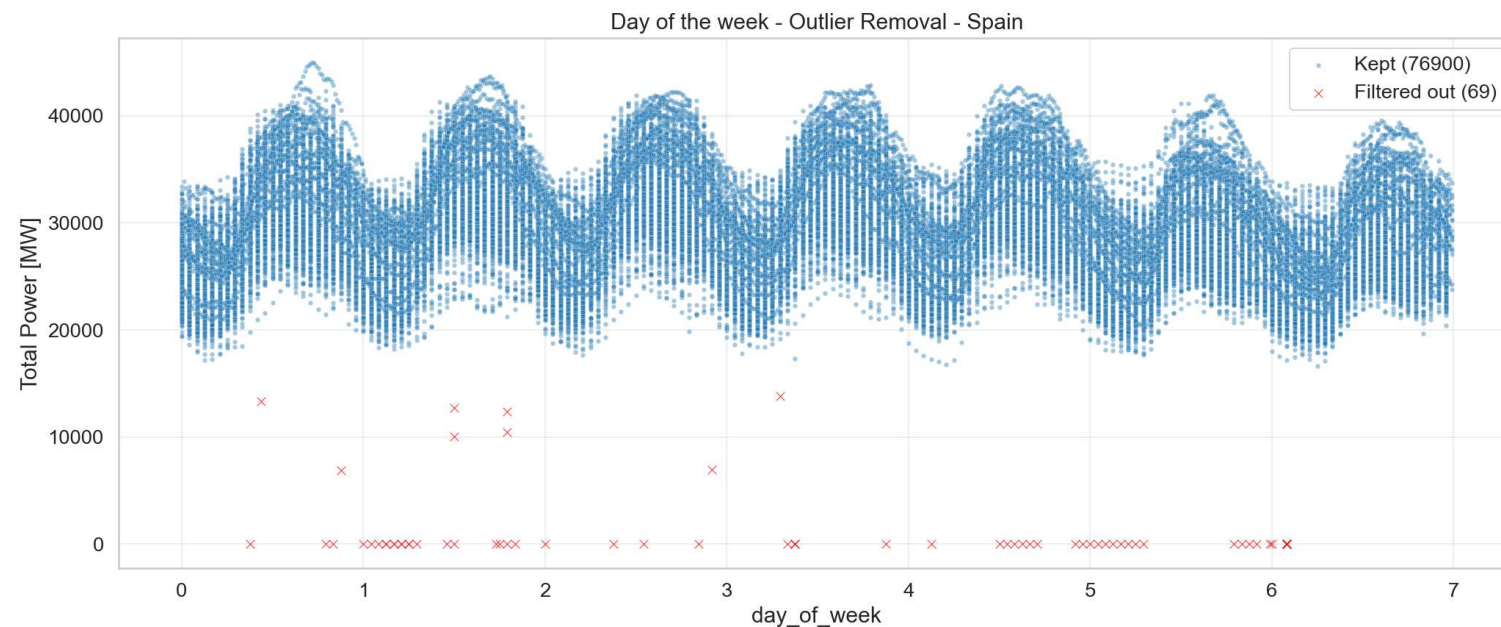
check time range				
	Start Date	End Date	Total Days	
Country				
Italy	2016-01-01	2022-09-26 23:00:00	2460	
France	2015-01-01	2022-09-26 23:00:00	2825	
Germany	2015-01-01	2022-09-26 23:45:00	2825	
Spain	2015-01-01	2022-09-26 23:45:00	2825	

About the Dataset



Preprocessing

- **Outlier removal**
 - Fixed upper and lower limits
- Removed values
 - Zero power production
 - Extreme outliers
- About 200 rows removed
- **Challenges:**
 - Daily, weekly, patterns

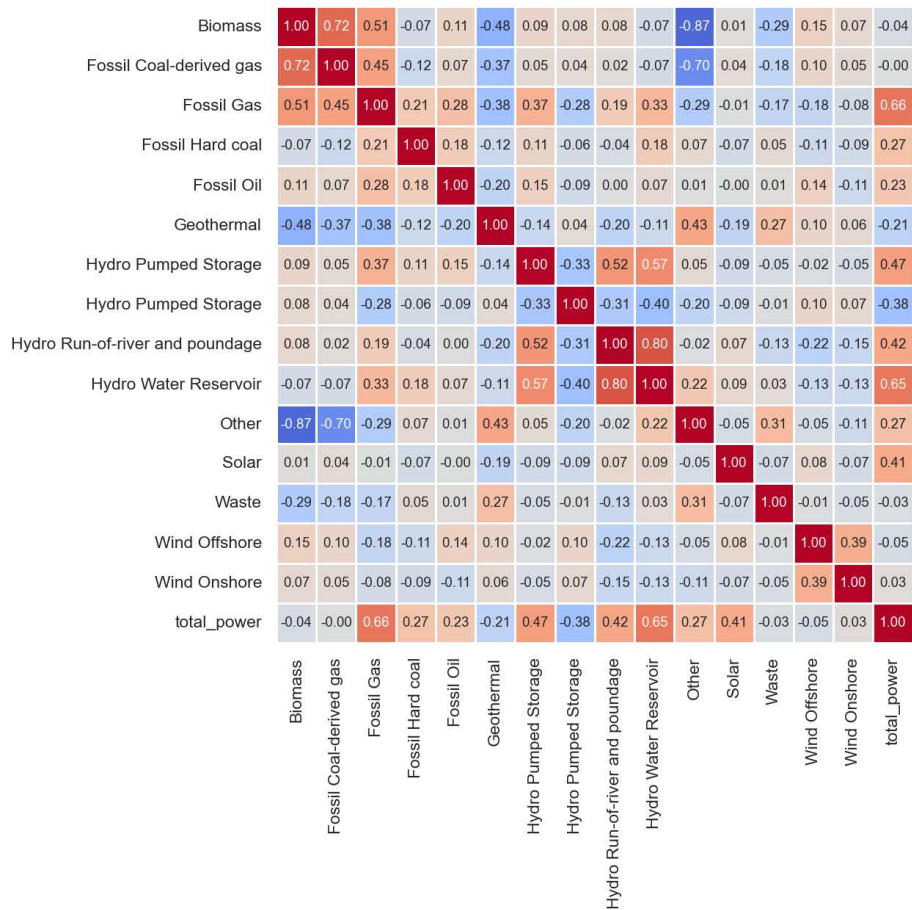


Visualisation

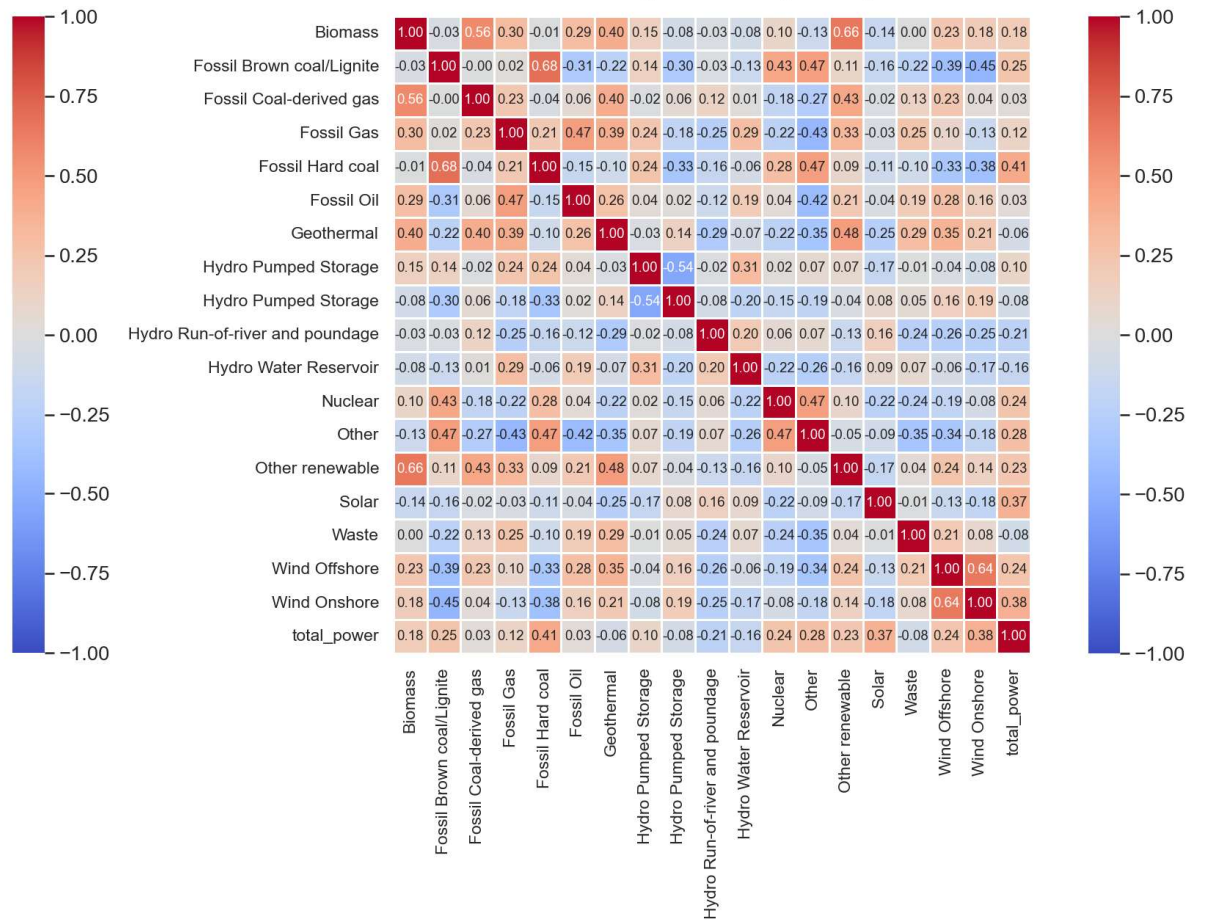


Visualisation

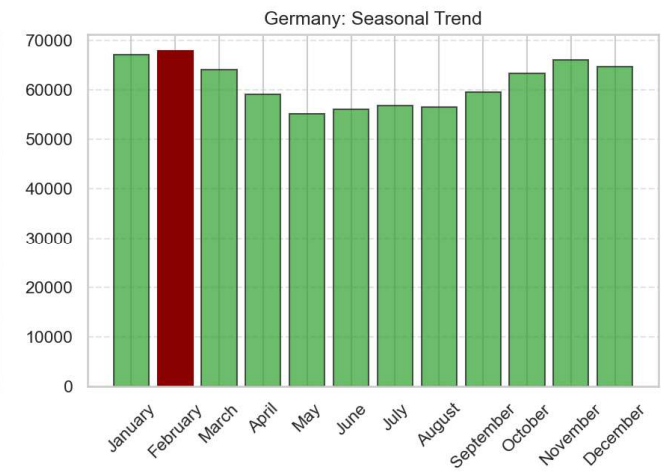
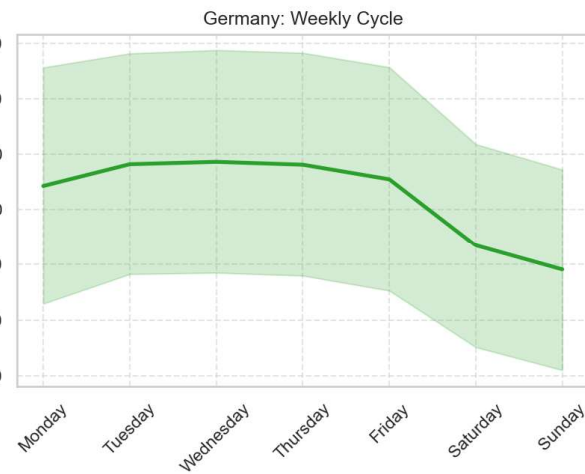
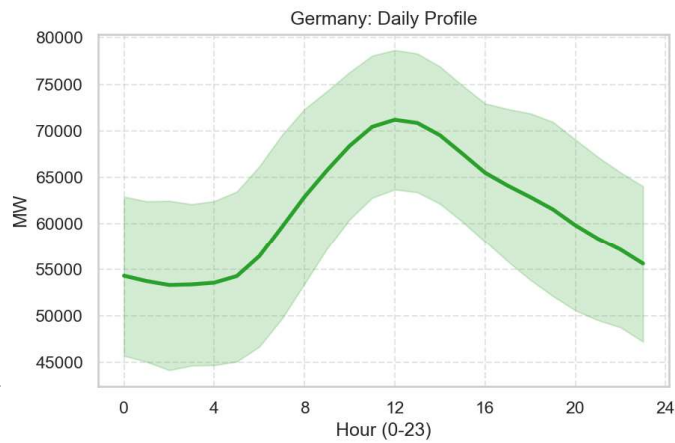
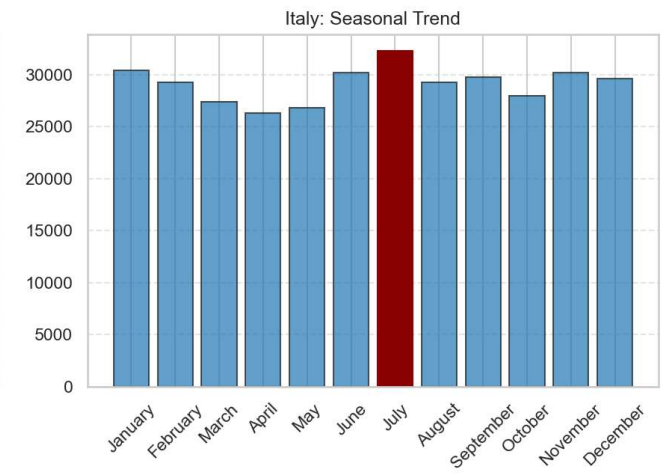
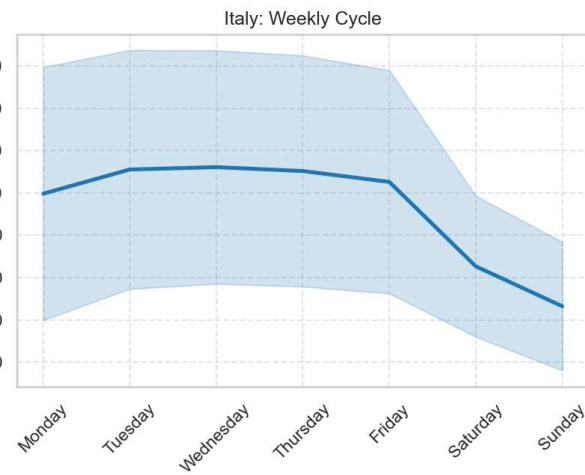
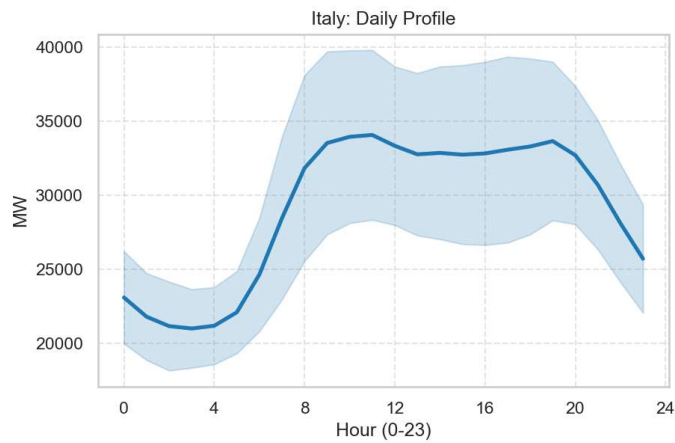
Italy - Pearson (Linear)



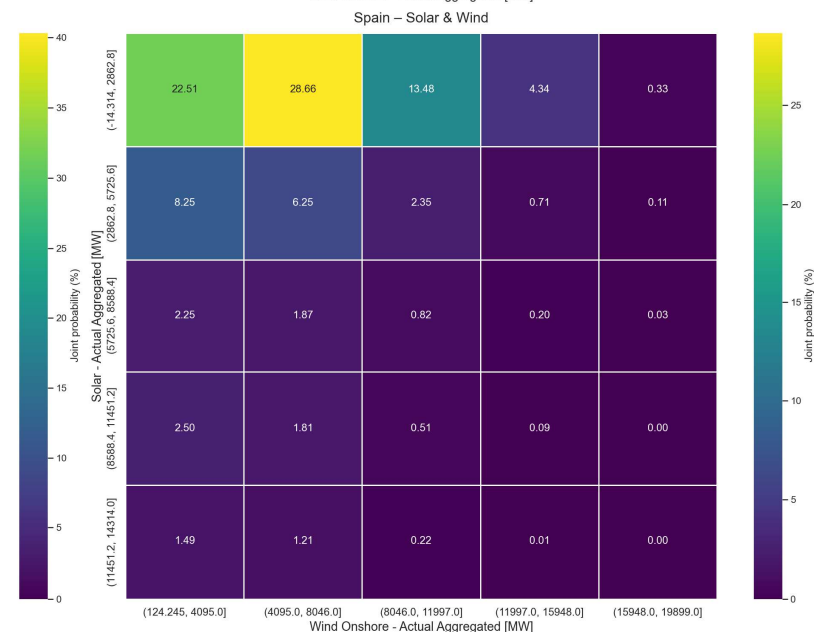
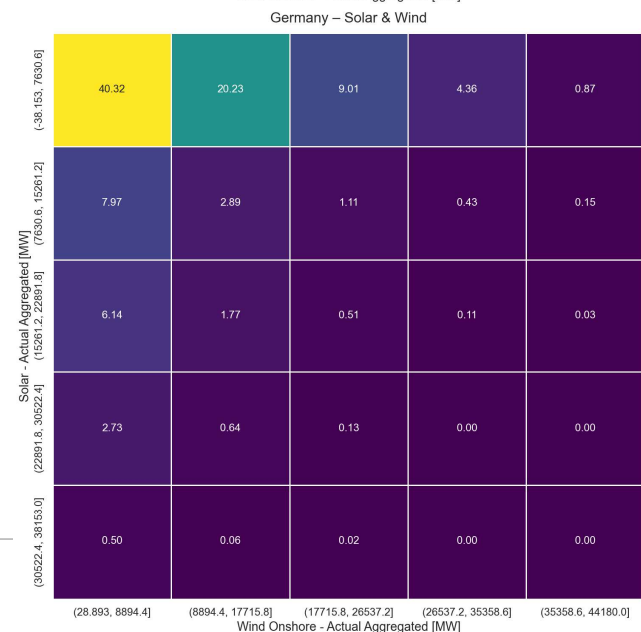
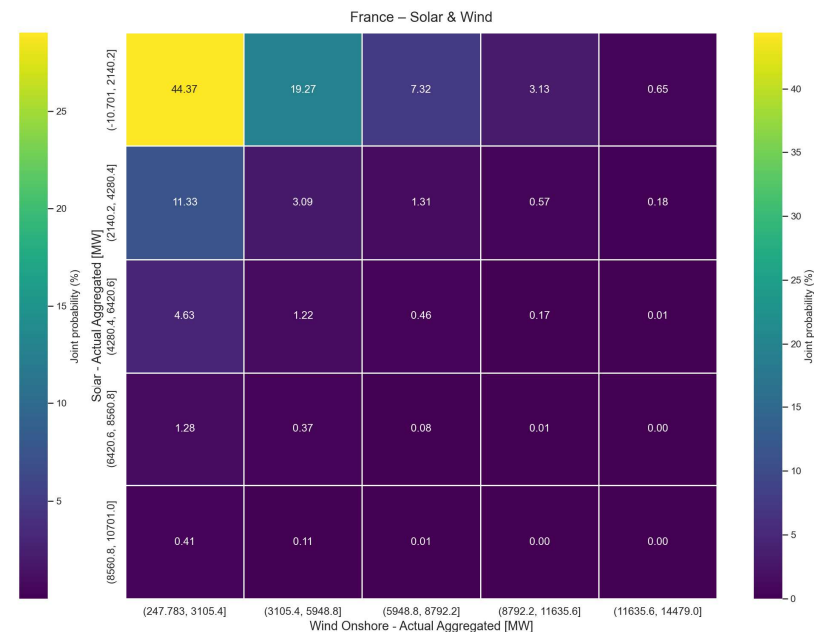
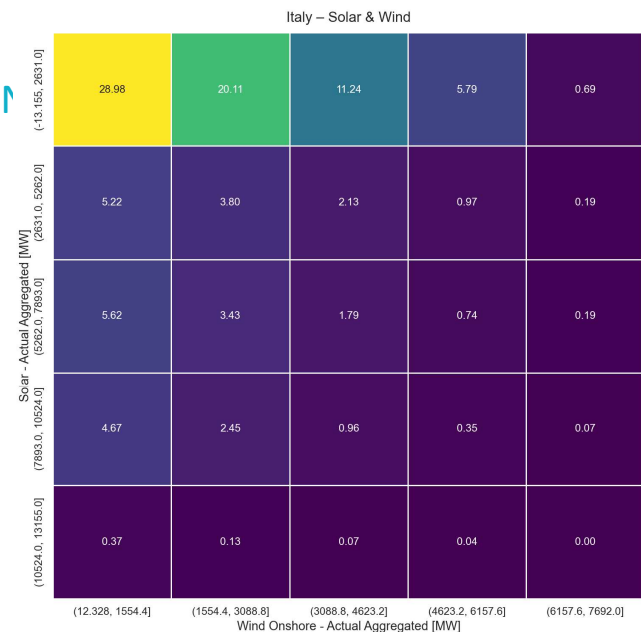
Germany - Pearson (Linear)



Visualisation

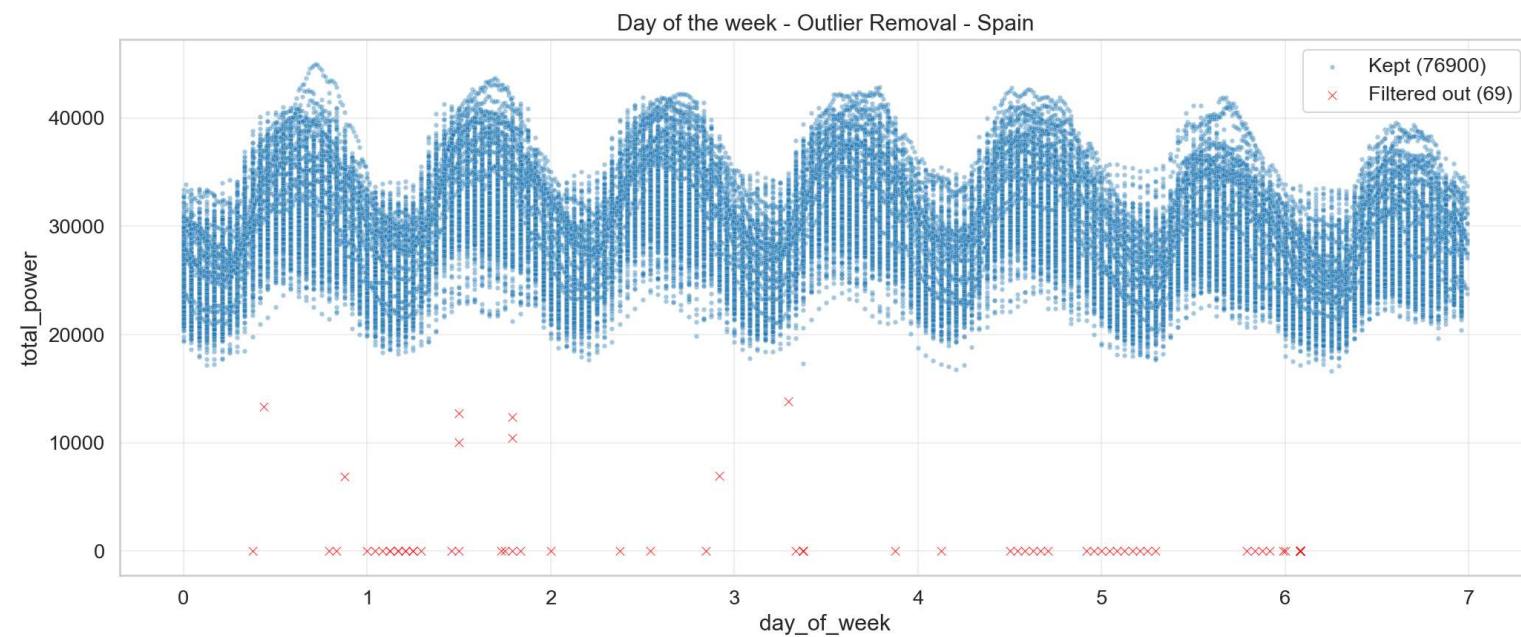


Propability and Event Analysis

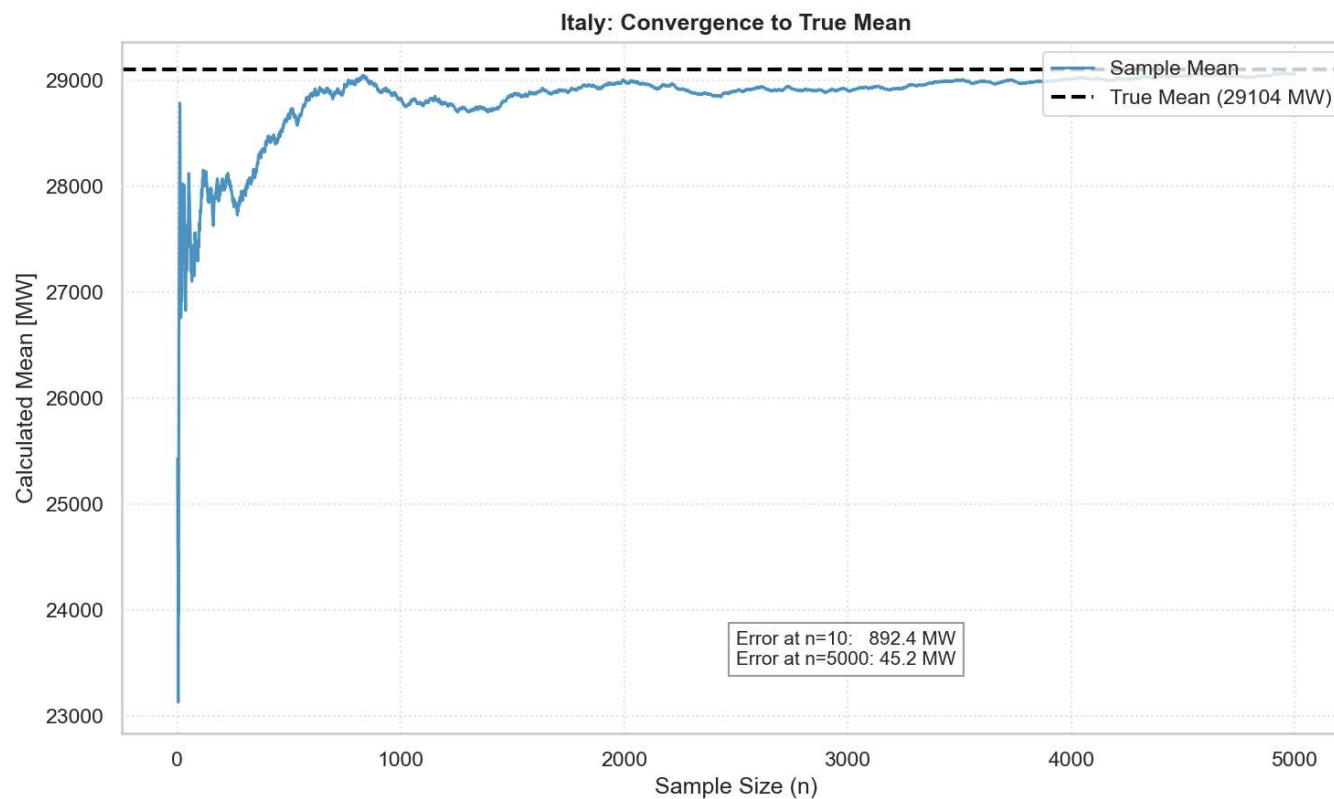


Preprocessing

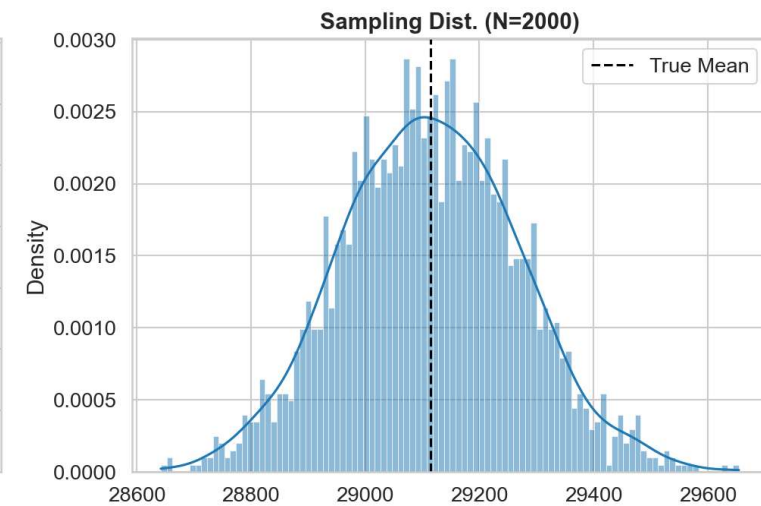
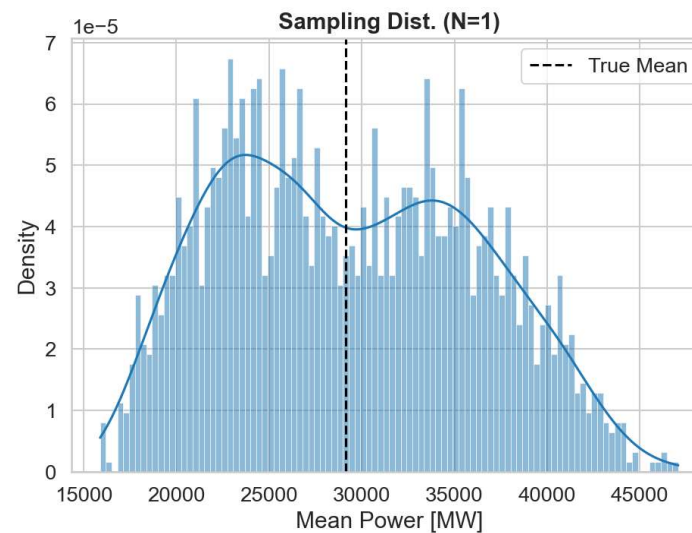
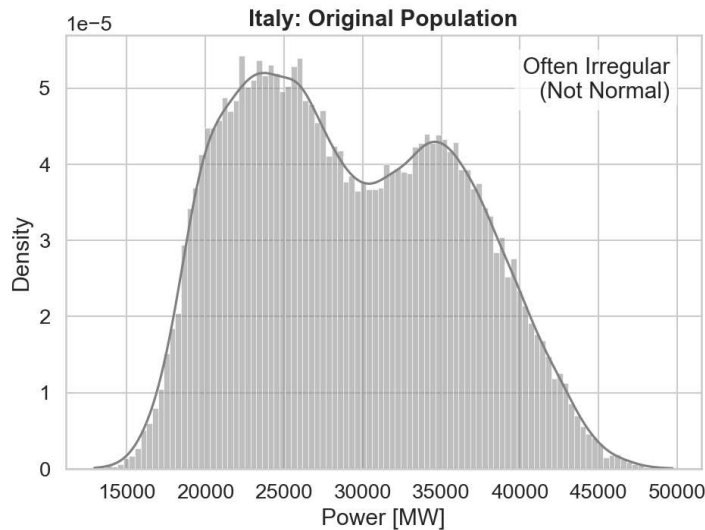
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LAW OF LARGE NUMBERS (LLN)

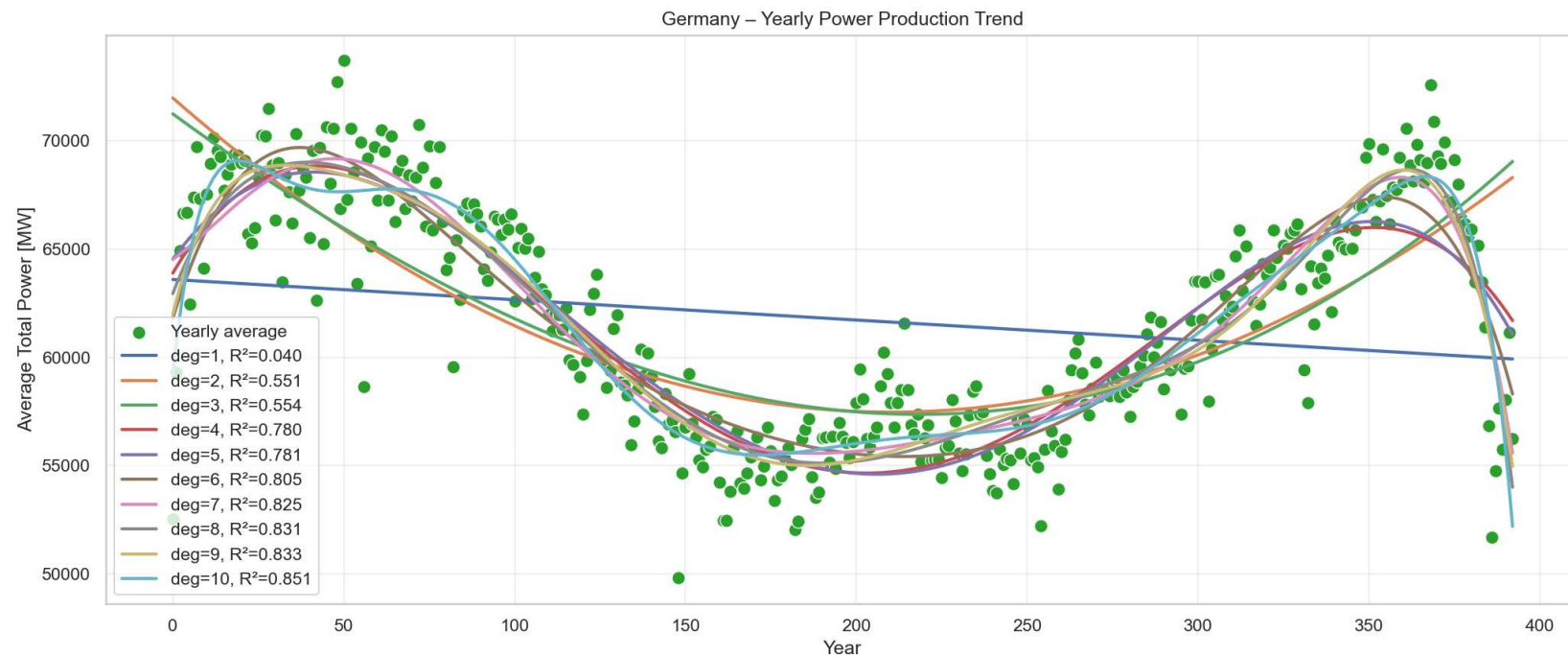


Central Limit Theorem (CLT)



Regression

- Trend forecasting
- Non-Linear Modelling



Q&A