Hourly Power Generation of Europe

STM WS 2025 Data Analysis

The Fusion Force

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Content

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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)
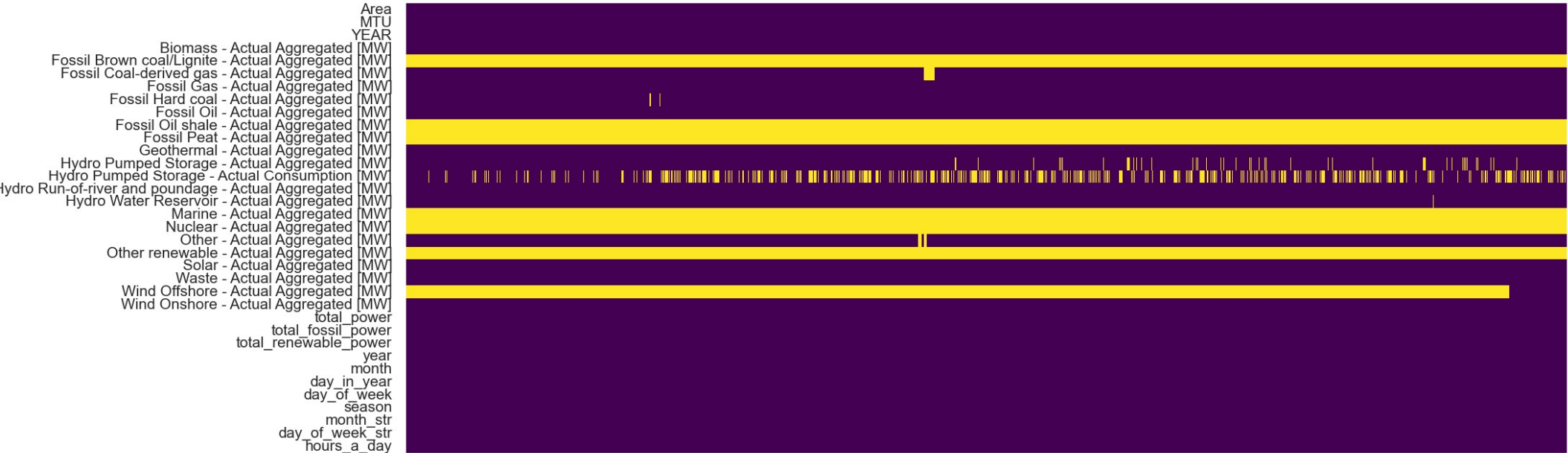 - Differing column names

entsoe
ELECTRIFYING EUROPE

Missingness diagramm

Missing Data Patterns Overview

Italy – Missing Data (Yellow = Missing)

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Original data quality analysis
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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
```
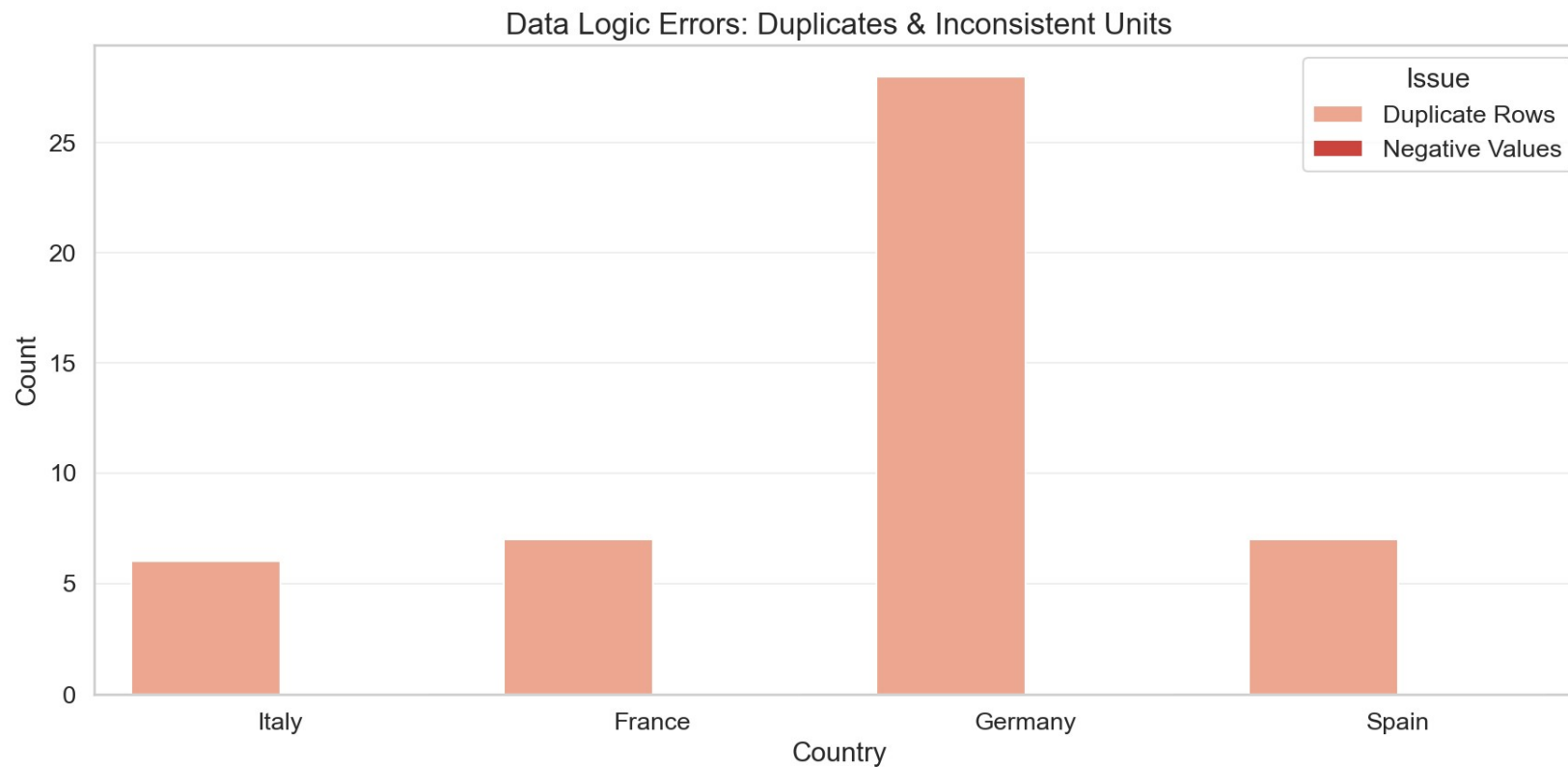
Timeline: 2016-01-01 to 2022-09-26

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About the Dataset

Data Logic Errors: Duplicates & Inconsistent Units

Preprocessing

- **Outlier removal**
  - Fixed upper and lower limits

- Removed values
  - Zero power production
  - Extreme outliers

- About 200 rows removed

- **Challenges:**
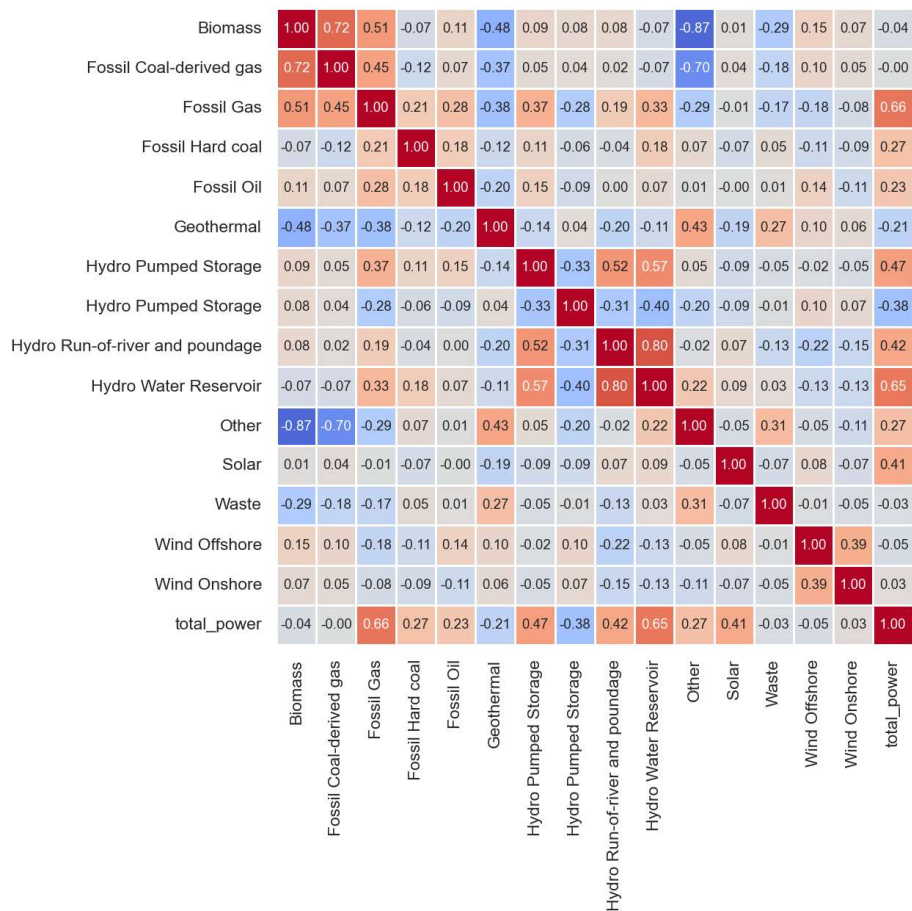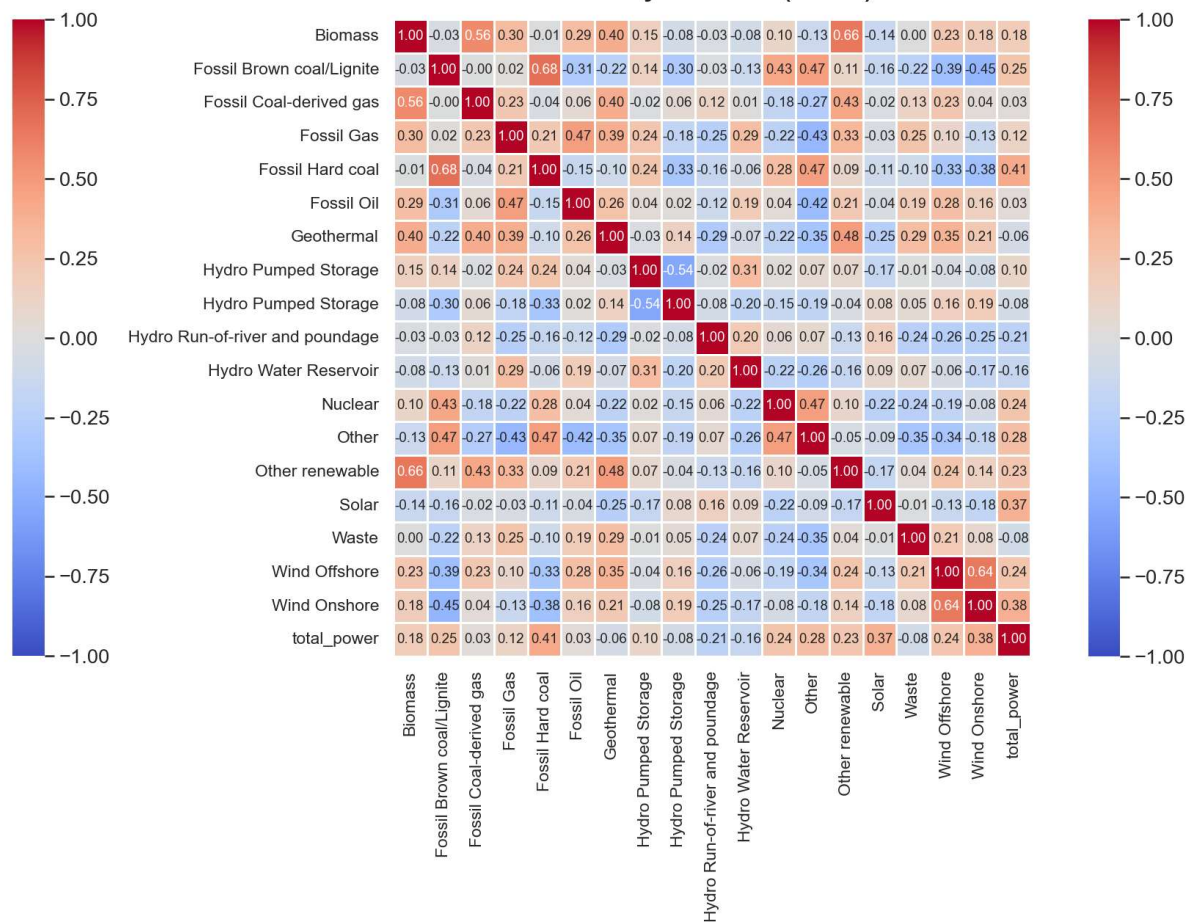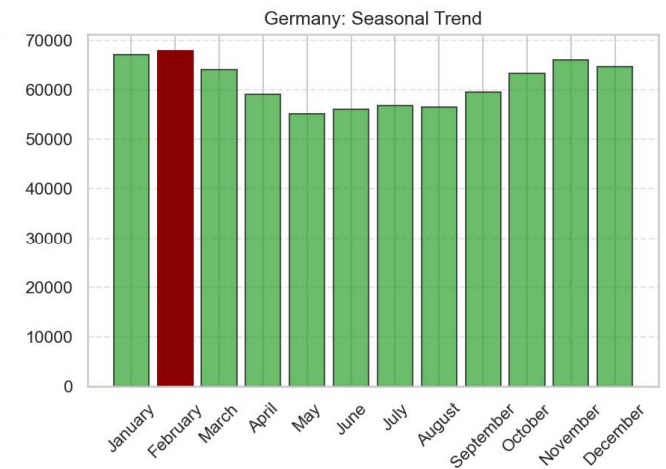 - Daily, weekly, patterns

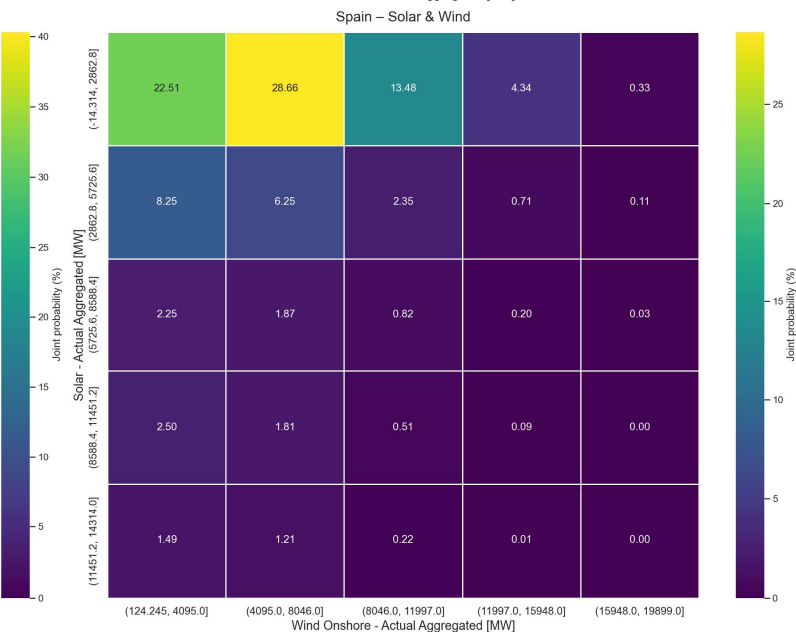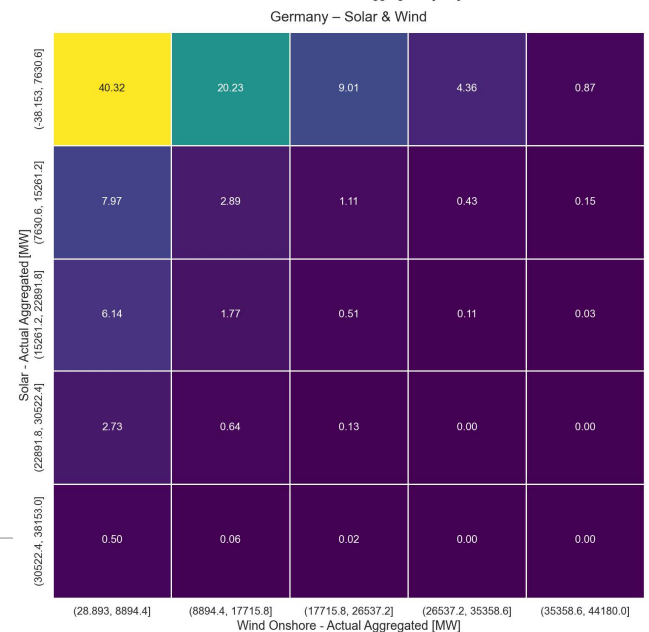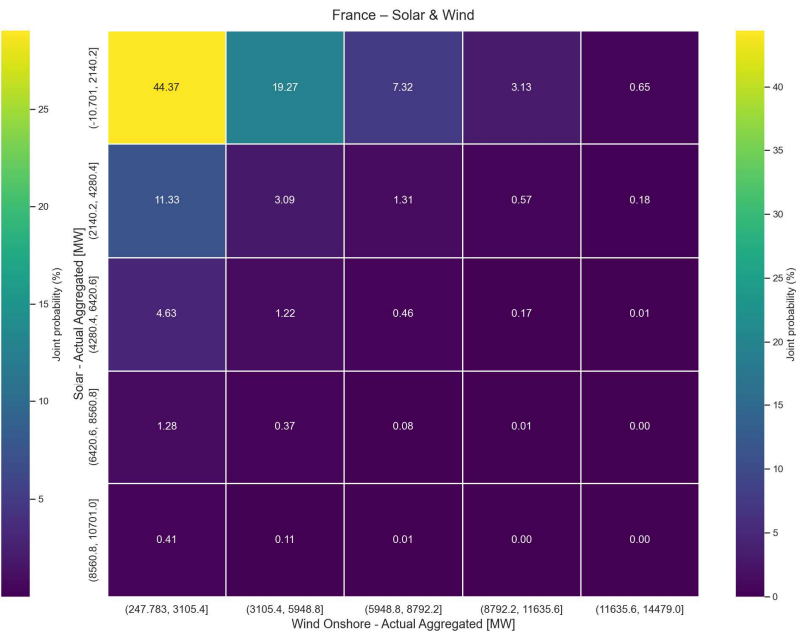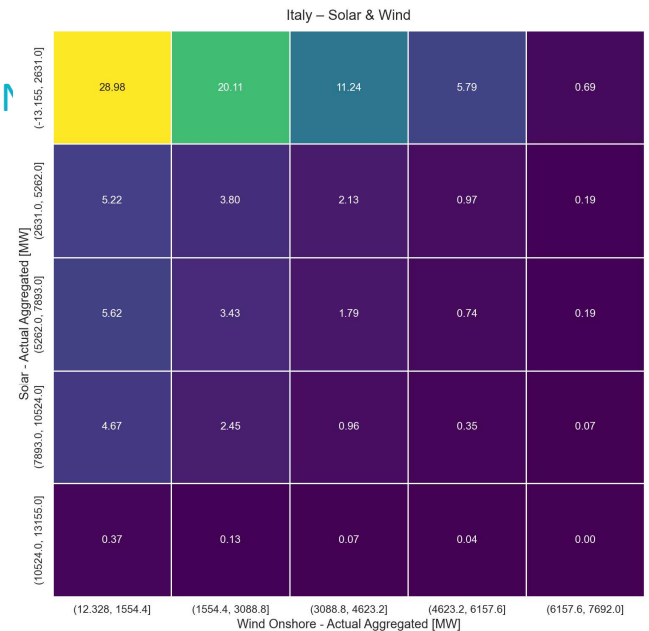Day of the week - Outlier Removal - Spain
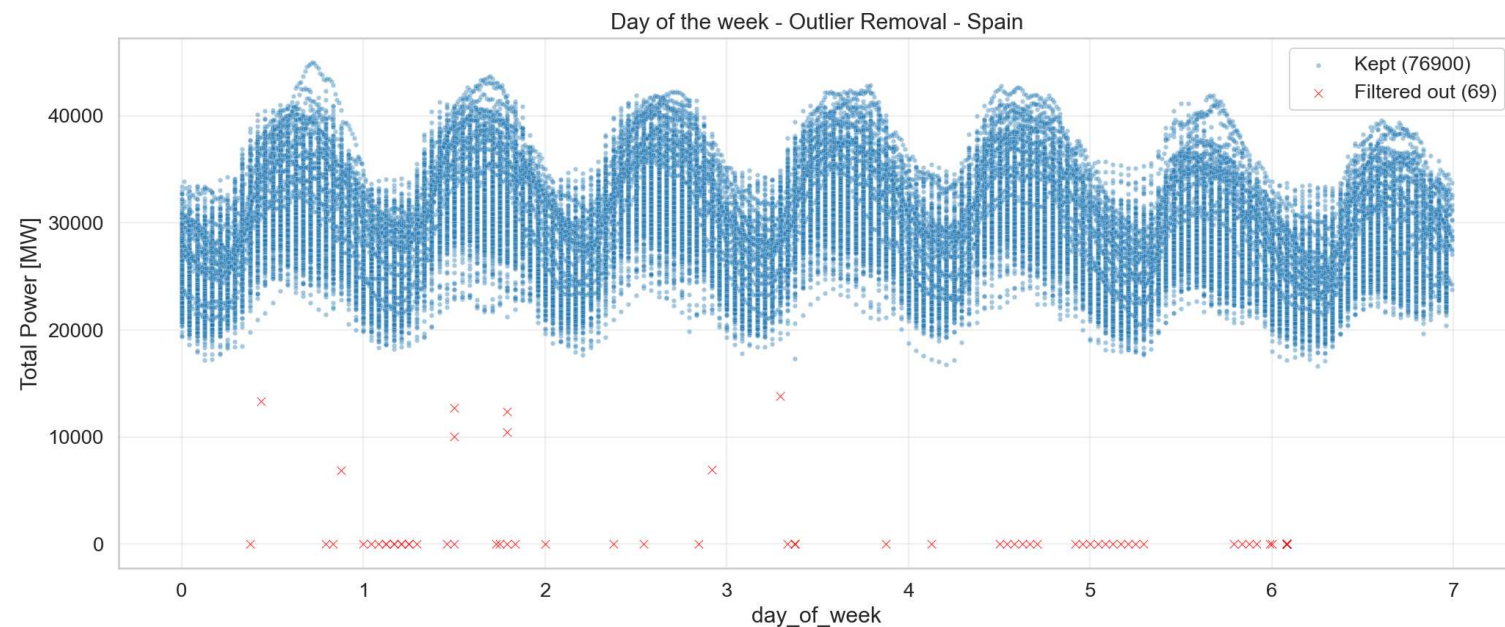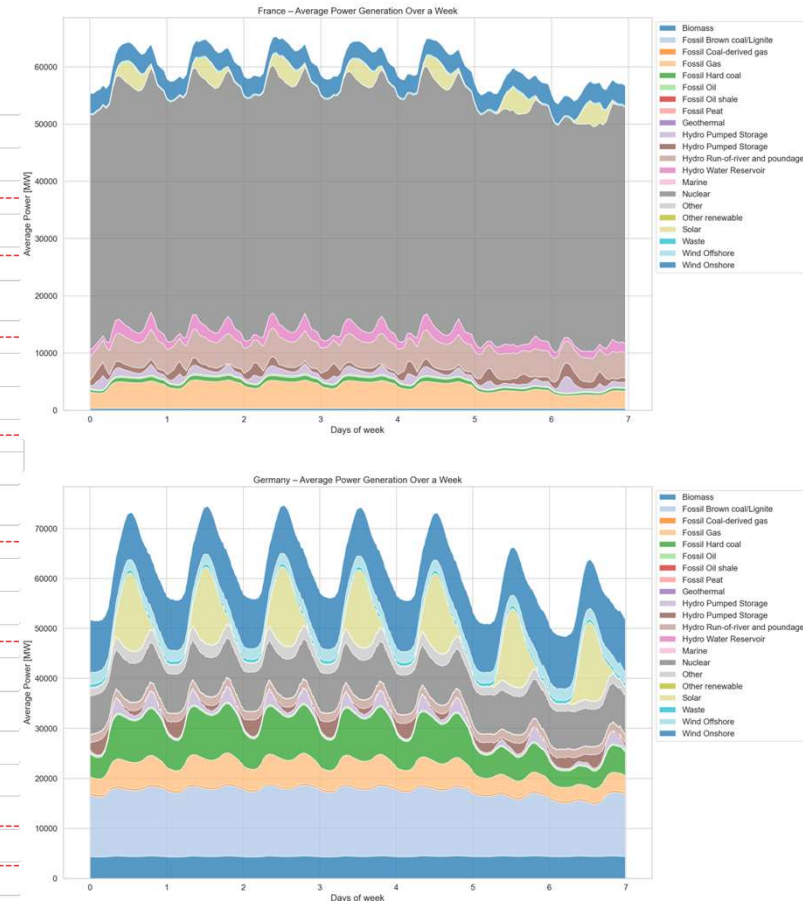
Visualisation

Visualisation

Italy - Pearson (Linear)

Germany - Pearson (Linear)

Visualisation
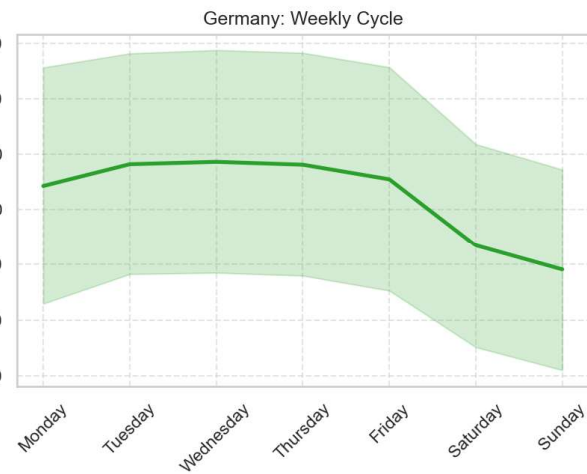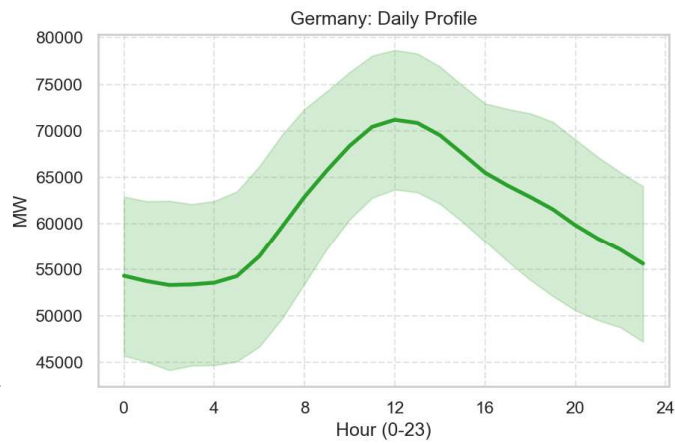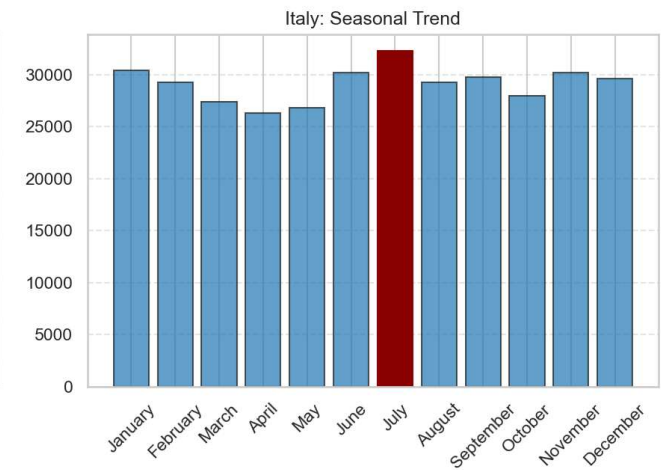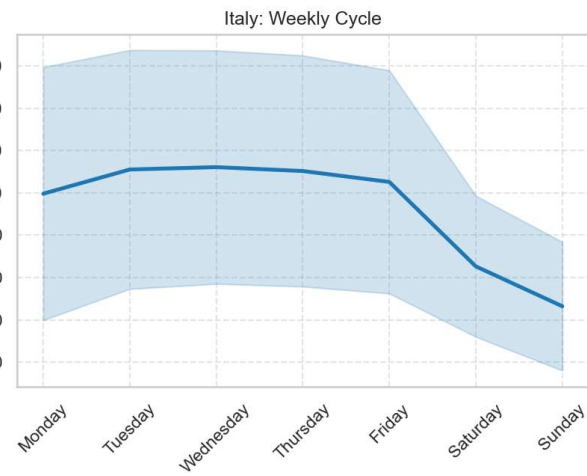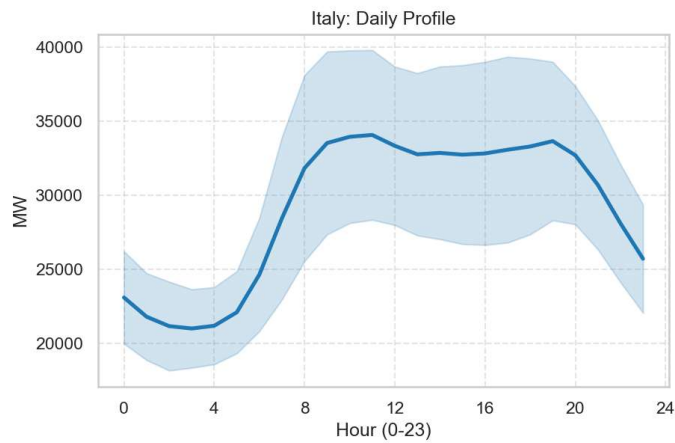
Propability and Event Analysis

Italy – Solar & Wind
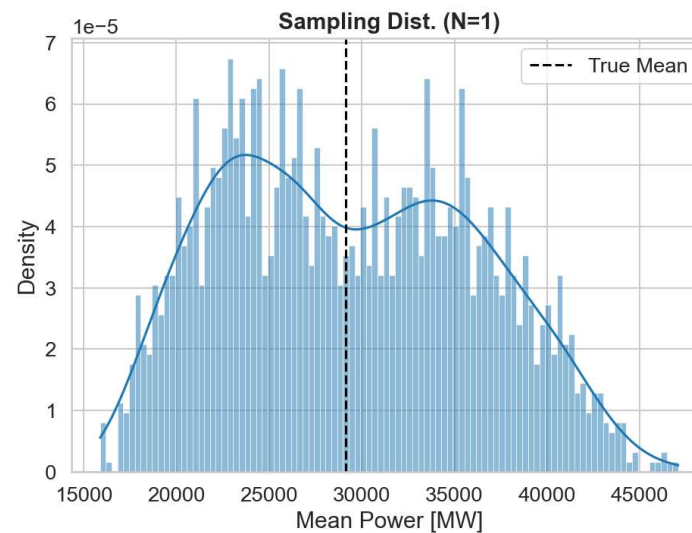
France – Solar & Wind

Germany – Solar & Wind

Spain – Solar & Wind
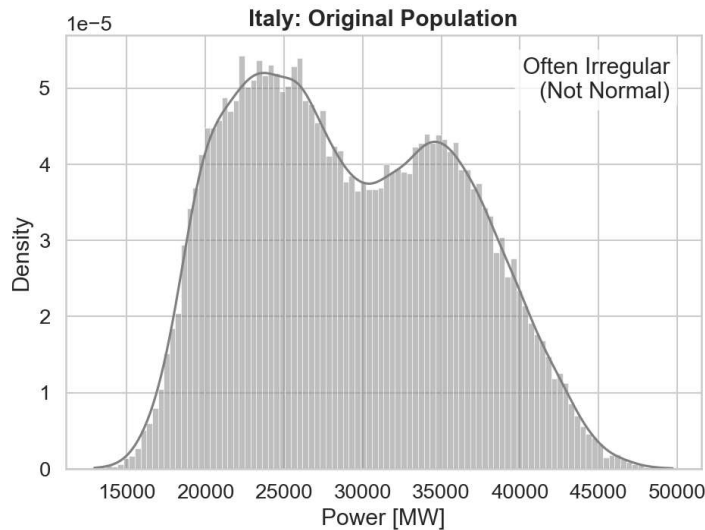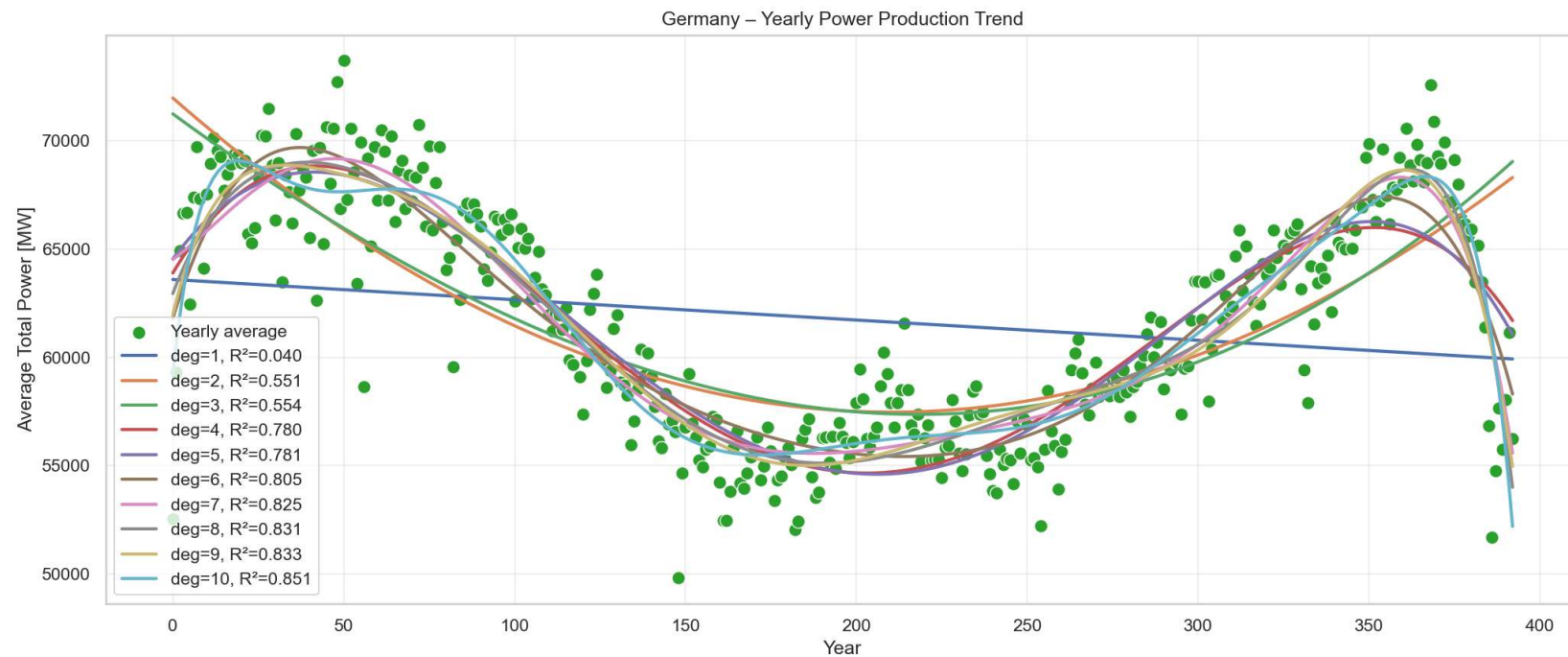
LAW OF LARGE NUMBERS (LLN)
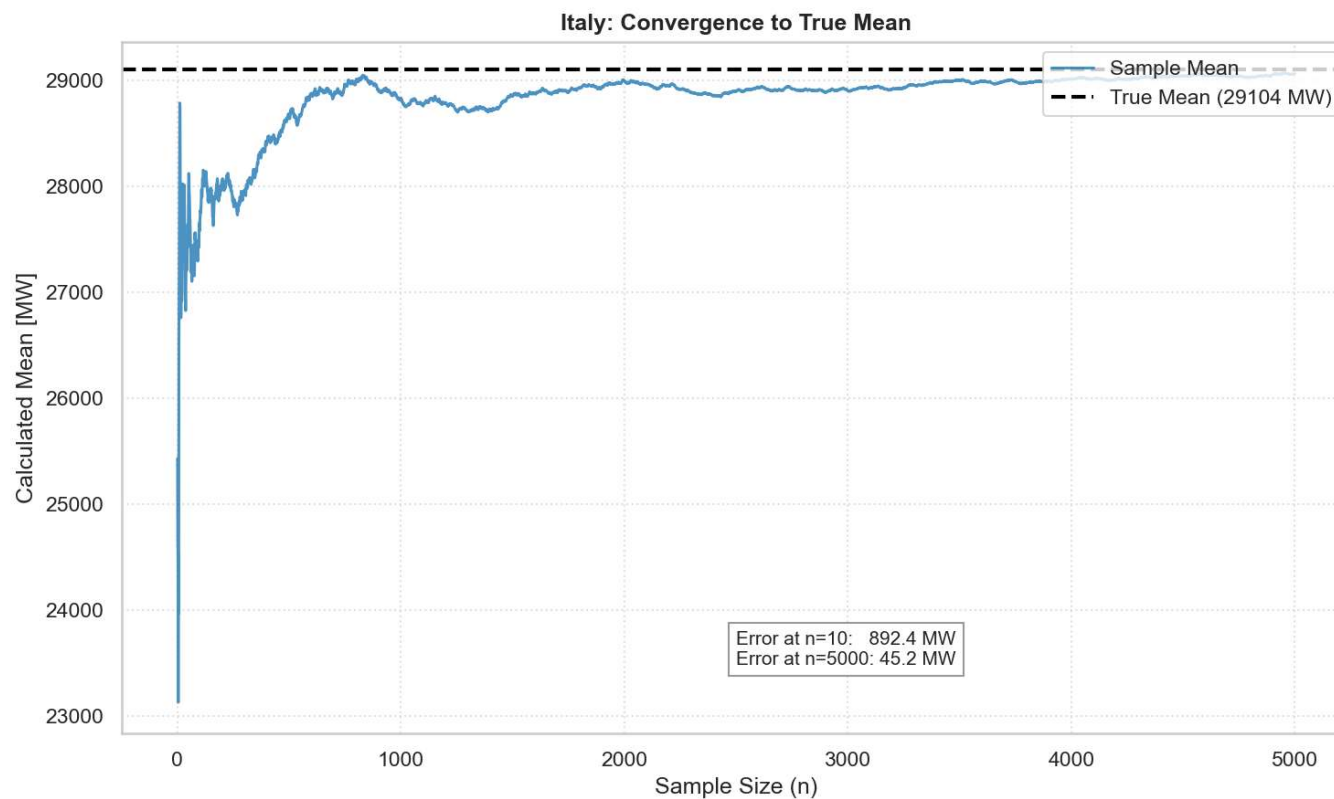
Central Limit Theorem (CLT)
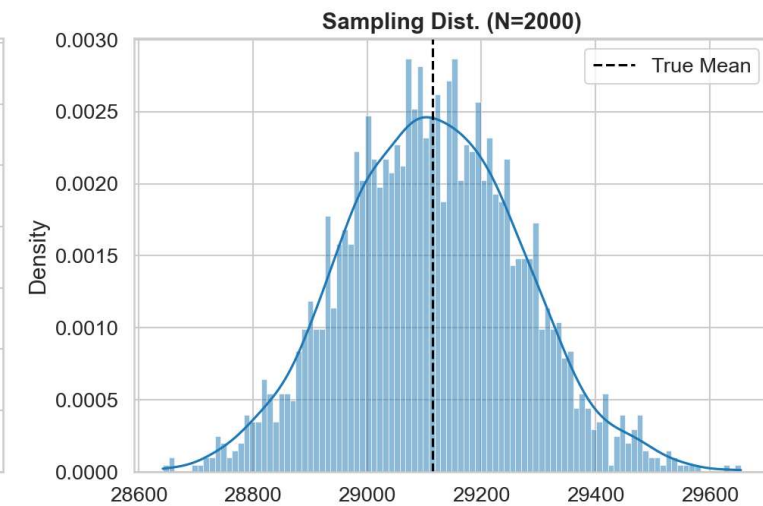
Regression

- Trend forecasting

- Non-Linear Modelling

Germany – Yearly Power Production Trend

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Q&A