

Green AI Final Project :

*AI and energy
consumption*





Actual Issues :

Energy loss during energy transfers in France mainly occurs in the transmission and distribution networks.

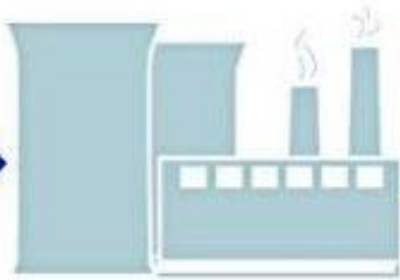
Energy losses are mainly due to the distance electricity travels.

Longer distances from power plants to end consumers result in higher losses.

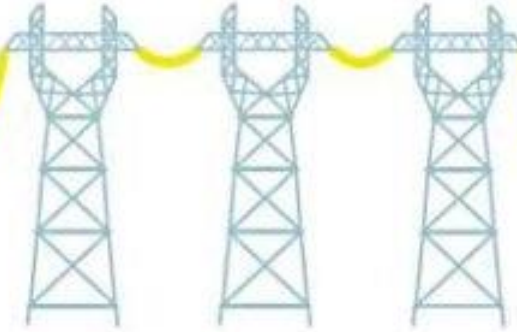
GENERATION

PP Efficiency 35.39%

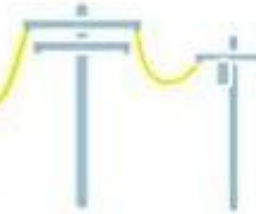
Fuel
100MW



TRANSMISSION



DISTRIBUTION



Gross Power
35.93 MW

Net Power
34.67 MW

T&D Losses
8.00%

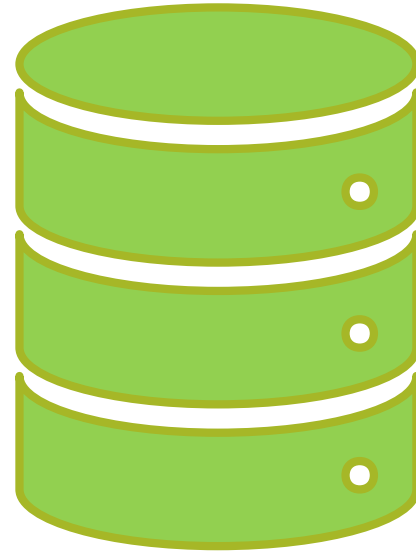
Power Delivered
31.90 MW

HOW IS ENERGY LOST ?



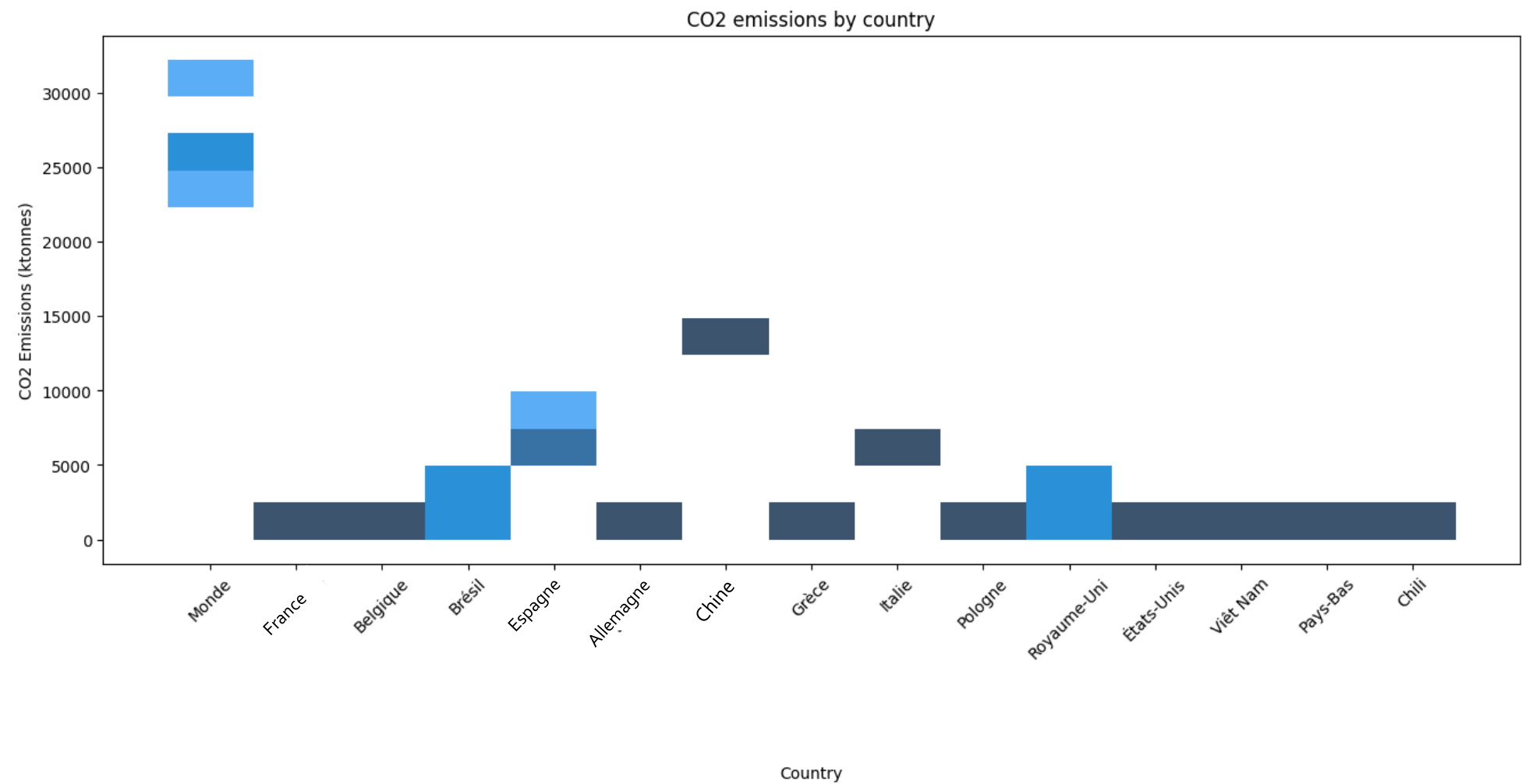
Problematic :

How can artificial intelligence leverage data on energy production, consumption, and the energy network to optimize the reduction of energy loss ?



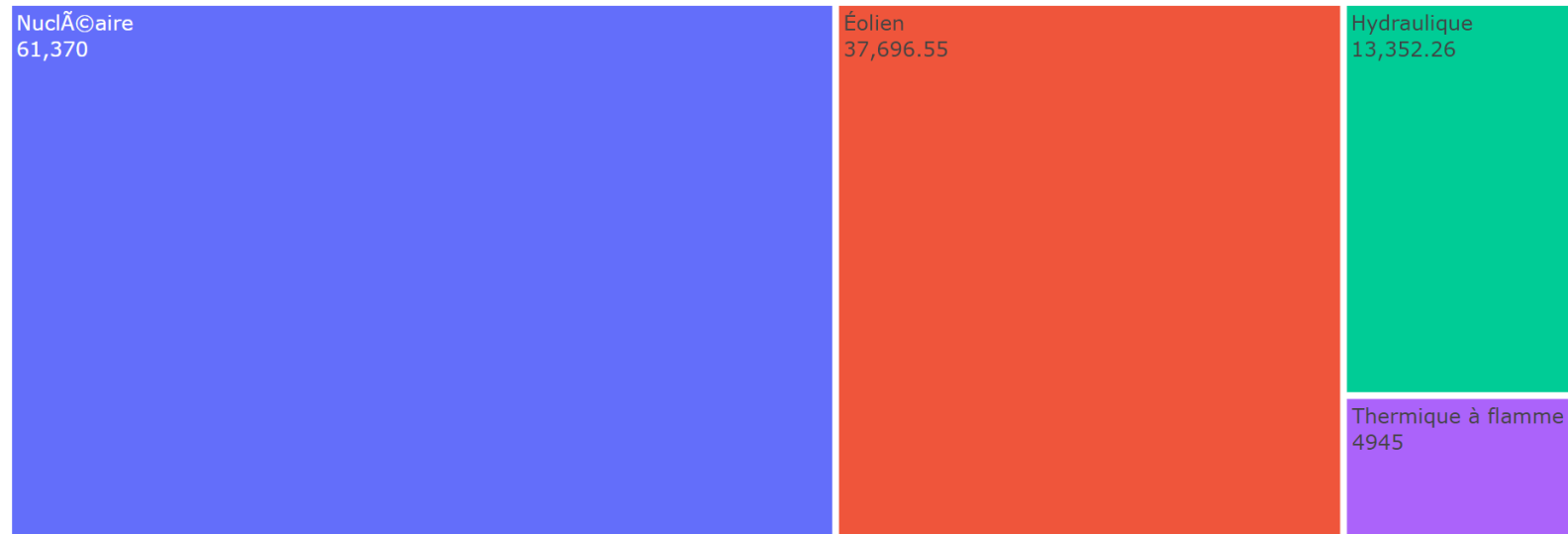
**TO ANSWER THIS QUESTION, WE
WILL USE SEVERAL DATASETS**

Title: Emission of some countries in Europe and the world



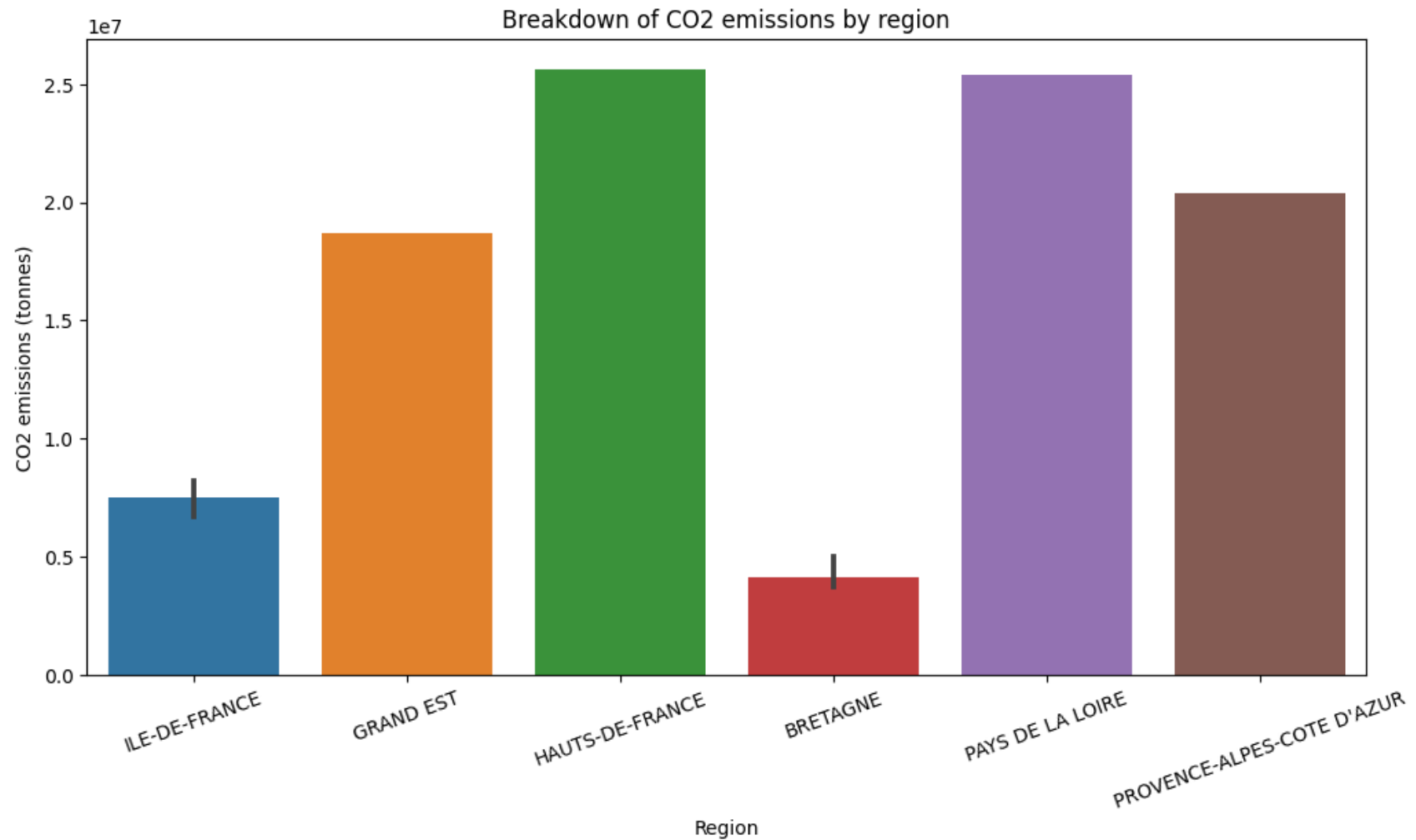
Mapping of the different types of production in France

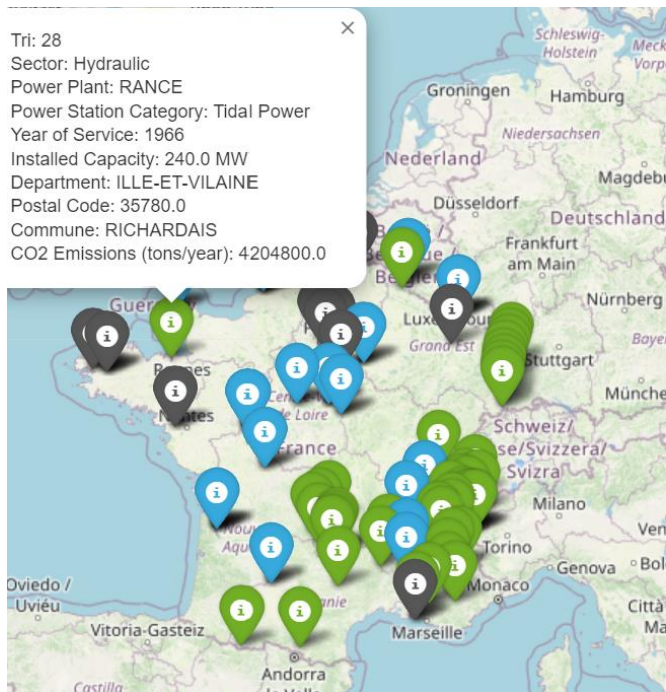
Distribution of power capacity by sector (MW)



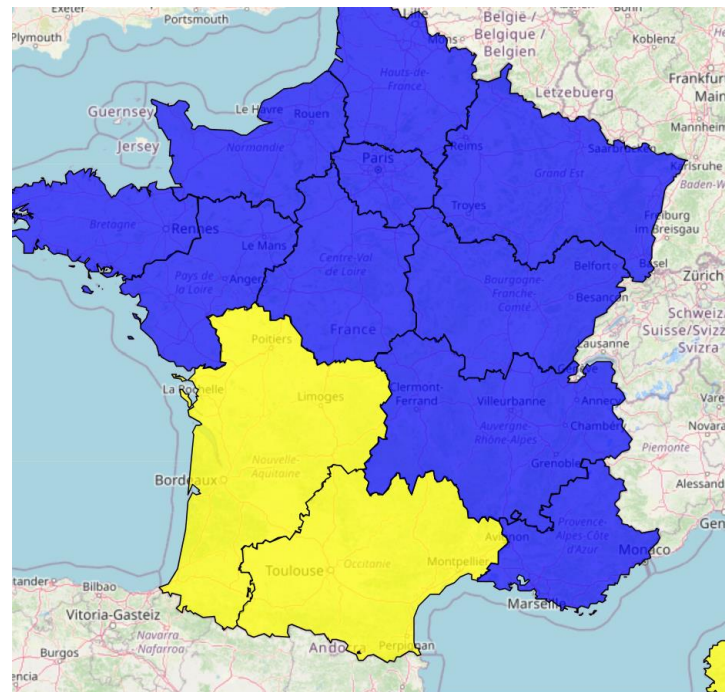
We can see that the main means of electricity production in France is nuclear (which produced very little CO₂), and that renewable energies play an important role.

Wich region produce the most

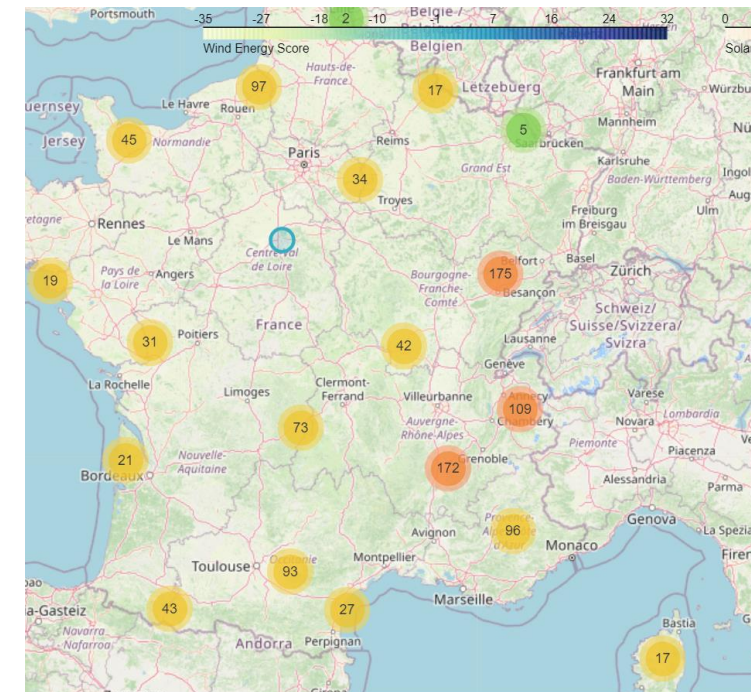




Map of all the central in France with their types and informations



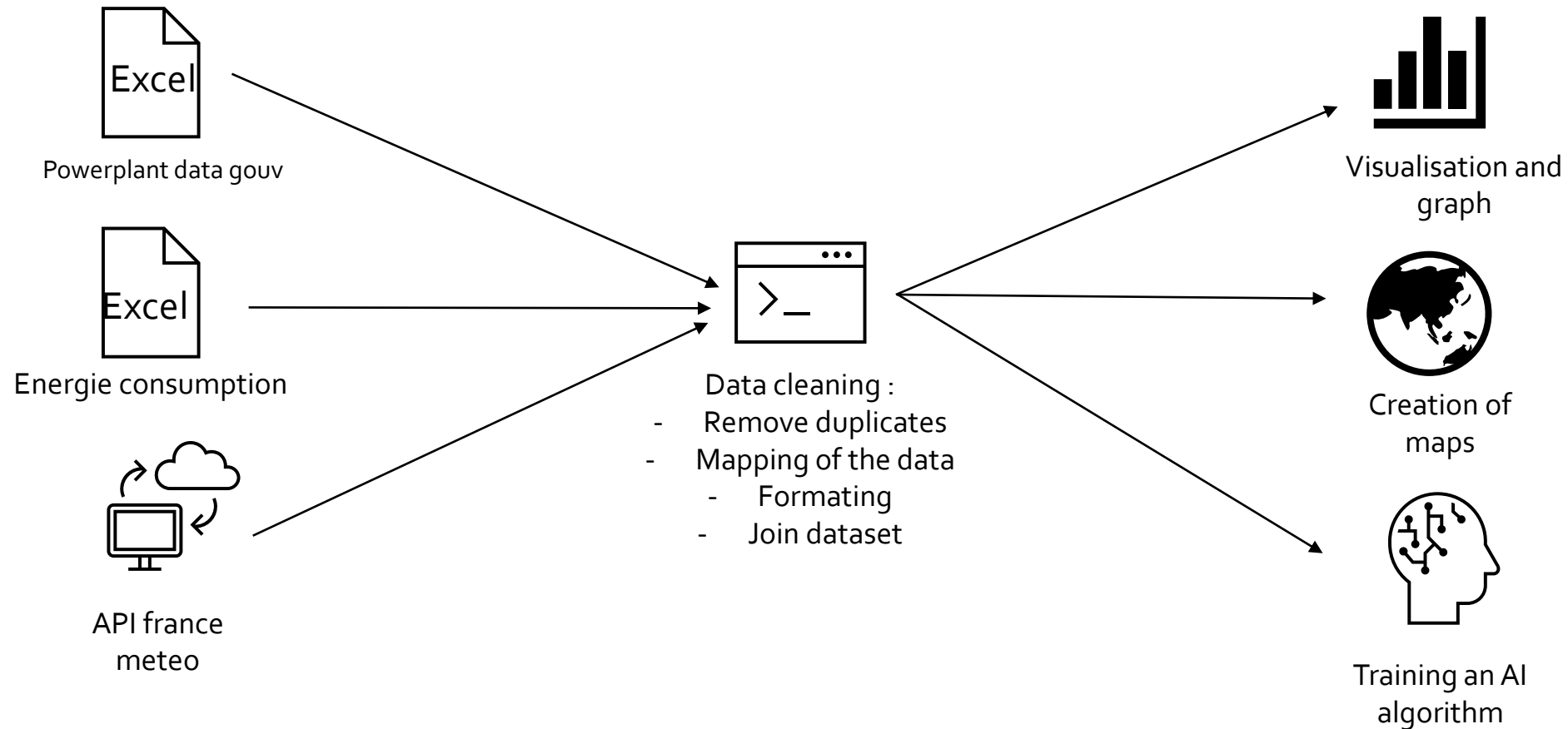
Yellow : The sun will produce more than the wind
 Blue : Wind production



The different energy produce by each central with the wind or the sun

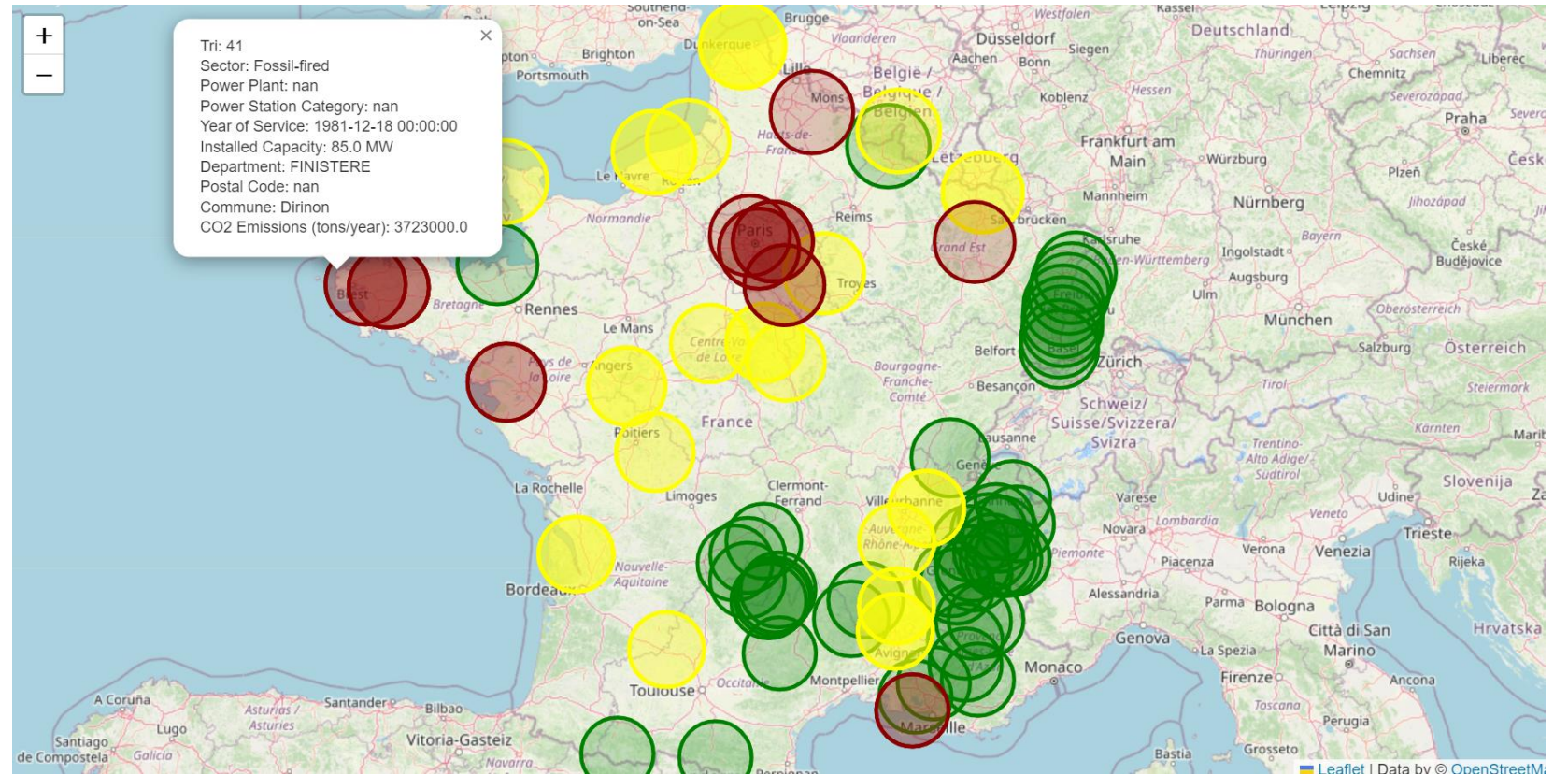
POWER PRODUCTION IN FRANCE

How did we process data



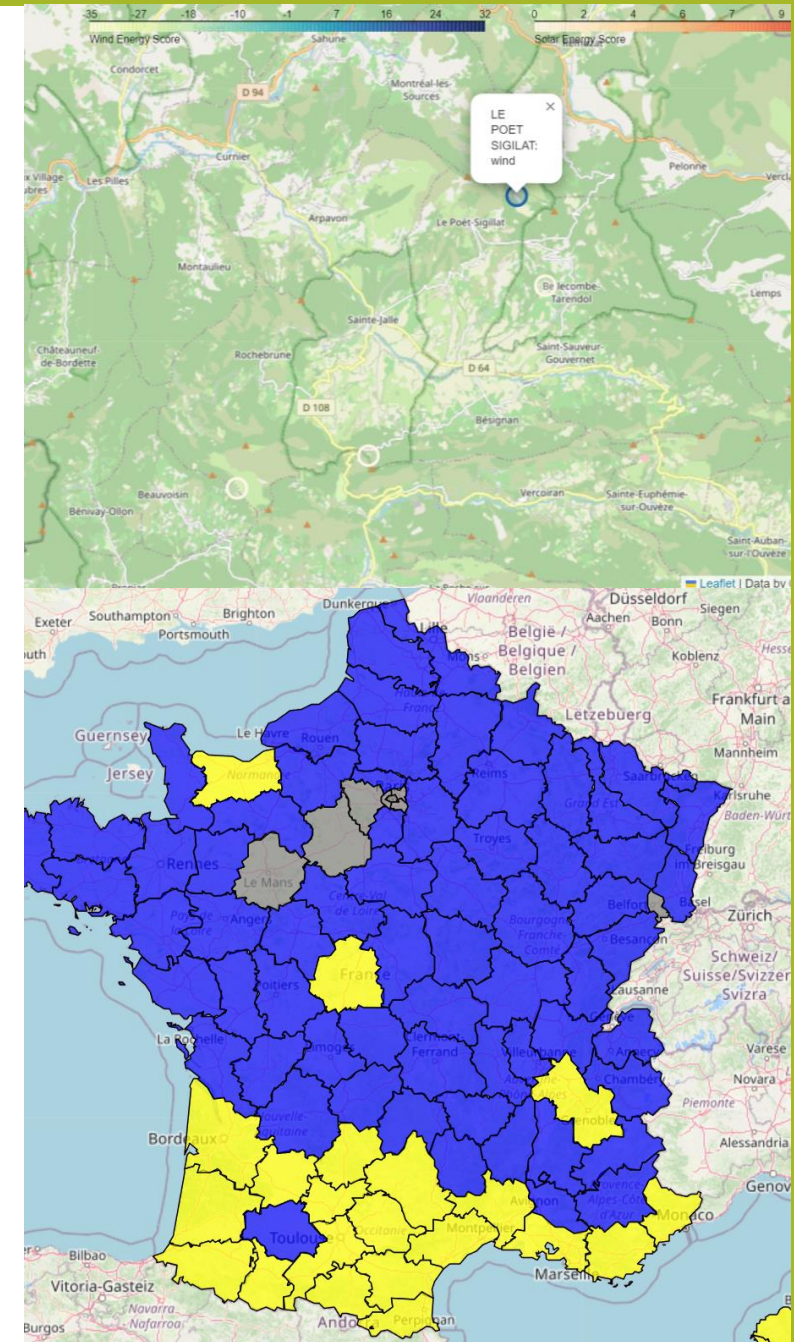
How do we map the different central

- Combine all the different dataset
- Clean and select the different categories that matter to us
- Display on a map exactly each central
- Score each central with a CO₂ emission (tons/year)



What can we predict ?

- Live time meteo from Meteo france
- Deduce in wich city/region will be able to produce more from wind or the sun depending on the weather
- Score each region so we can have a global overview of each part of the France



Our turn around

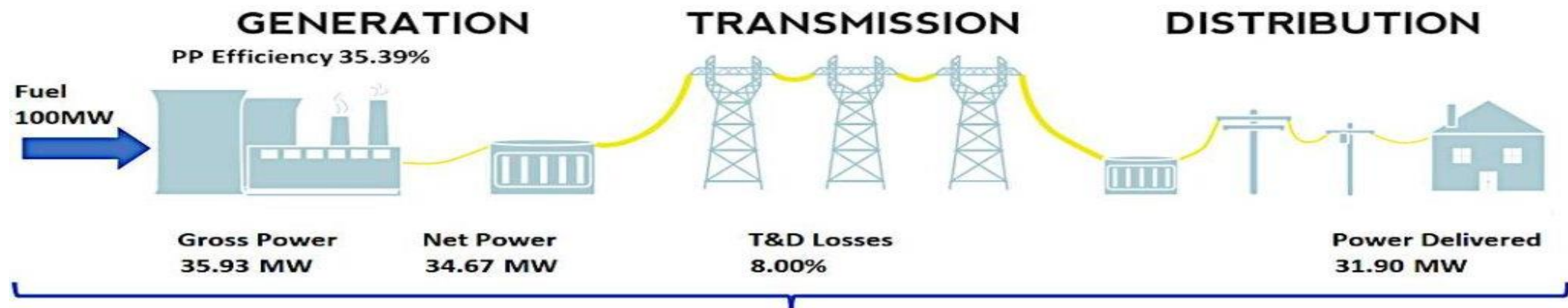
1st study axis

- Better comprehension of energetic mix
- Give the choice to the collectivity
- Limited decision-making power



2nd study axis

- Focus on electricity losses
- City scale model
- Optimisation of the powergrid distribution



Title: eco2mix-Paris.csv

The dataset presents information on **energy consumption and production in Paris**. It covers a diverse range of parameters, including various energy sources, forecasts, and consumption metrics. It is part of a larger dataset that contains information on multiple towns

Dataset Overview:

Metropole Code: unique numerical metropolis identifier (200054781)

Metropole: name of the metropolis we selected (Métropole du Grand Paris)

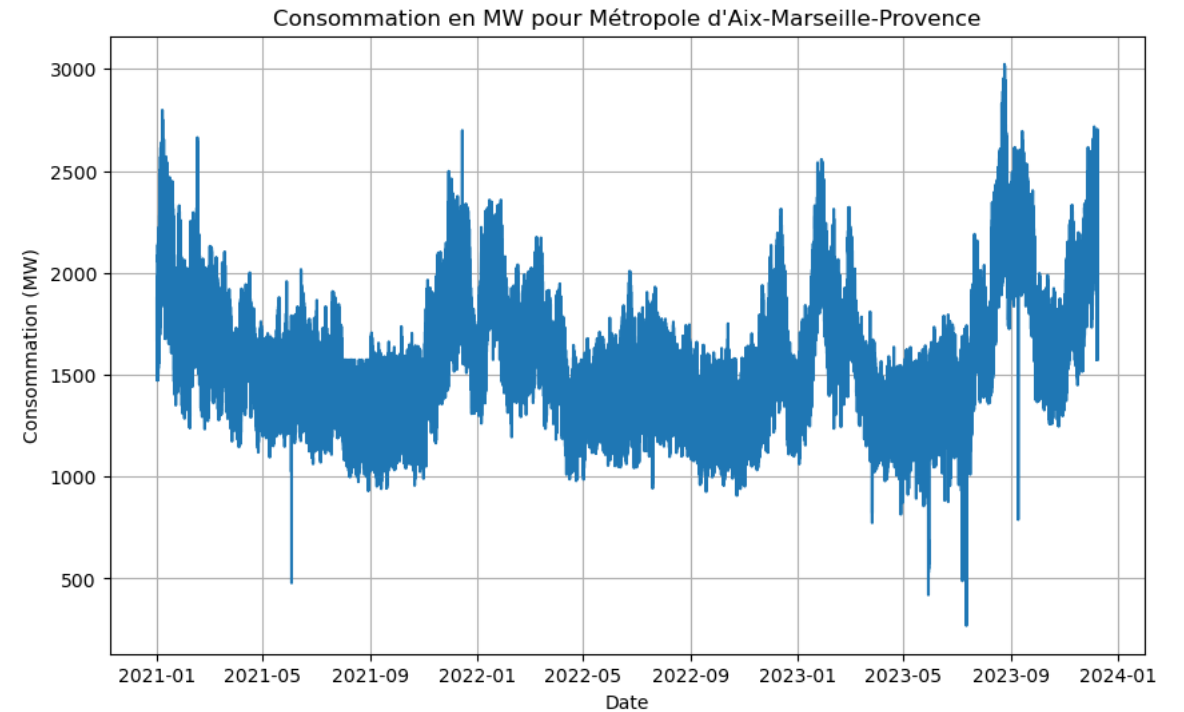
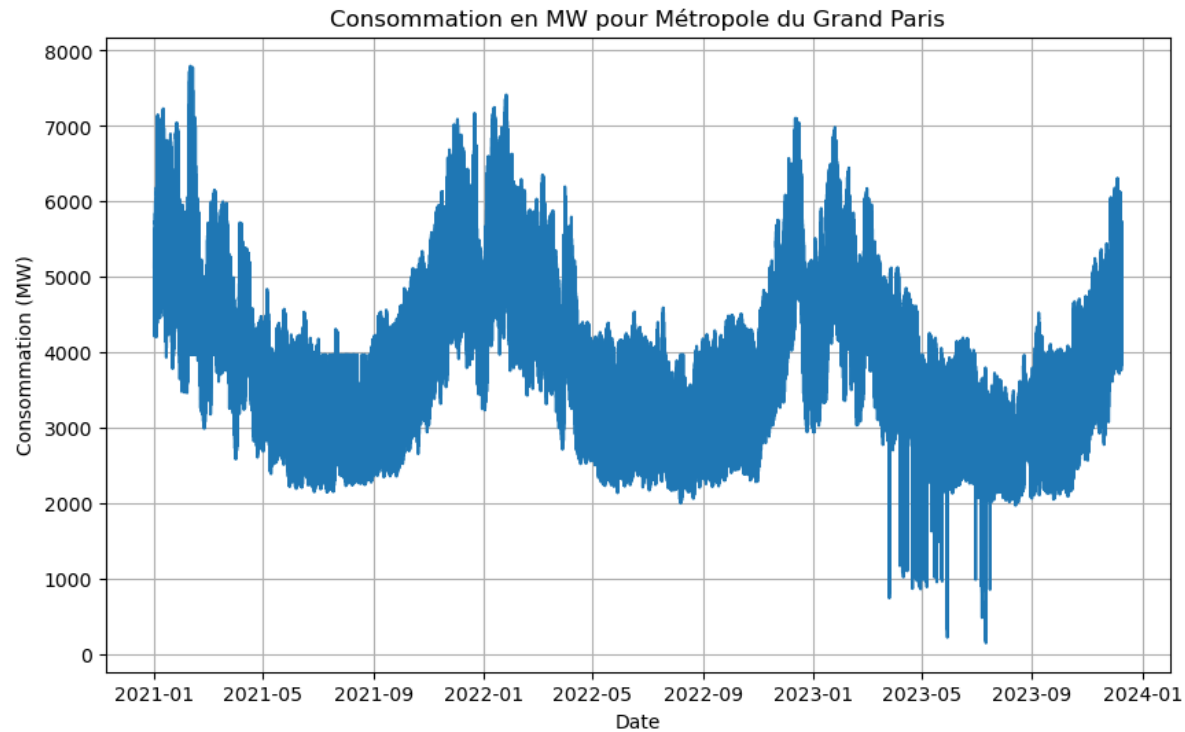
Nature: we selected the "Données temps réel" type of data (real time data)

Date: Day of the measure in format yyyy-mm-dd

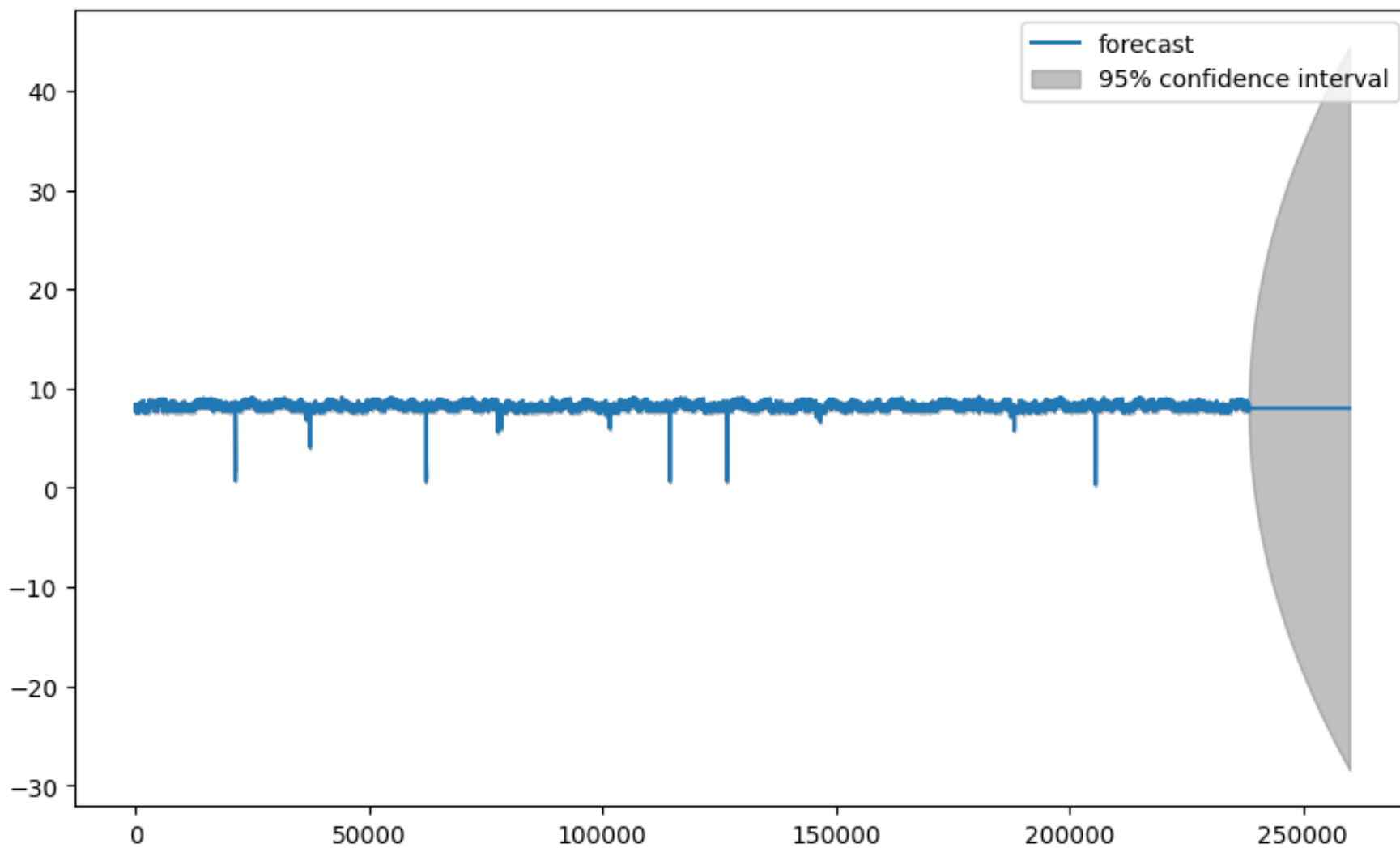
Hours: Hour of the measure in format hh:mm

Consumption (MW): actual consumption of energy in MW for Paris

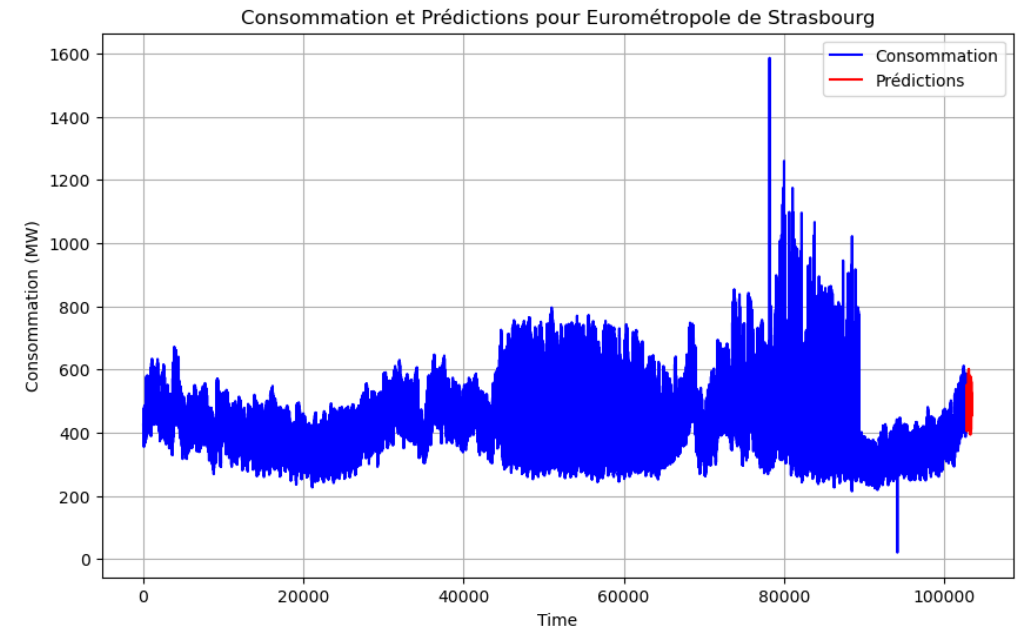
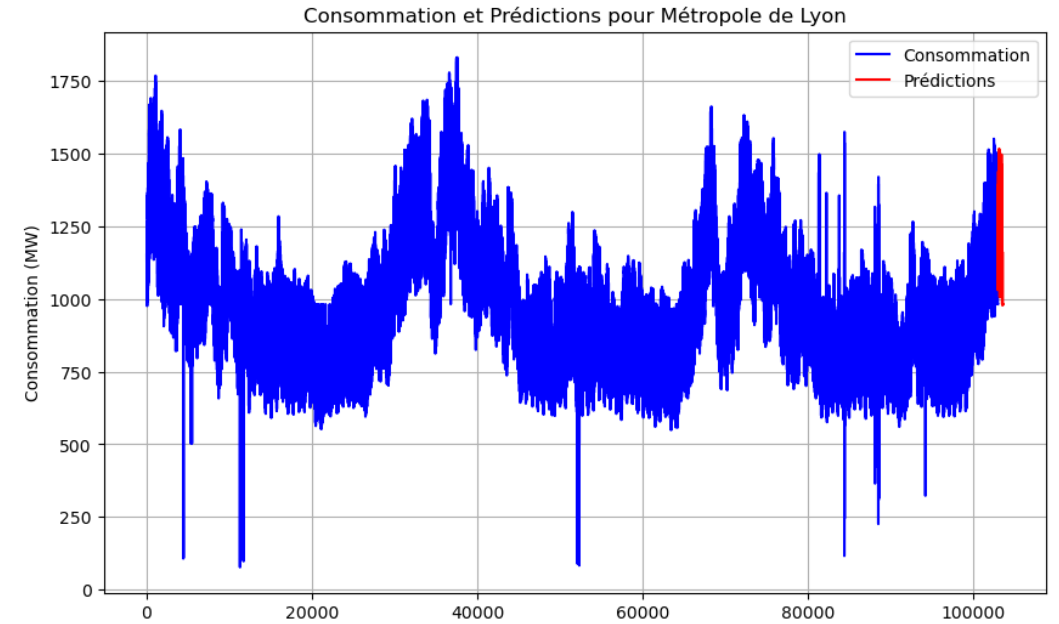
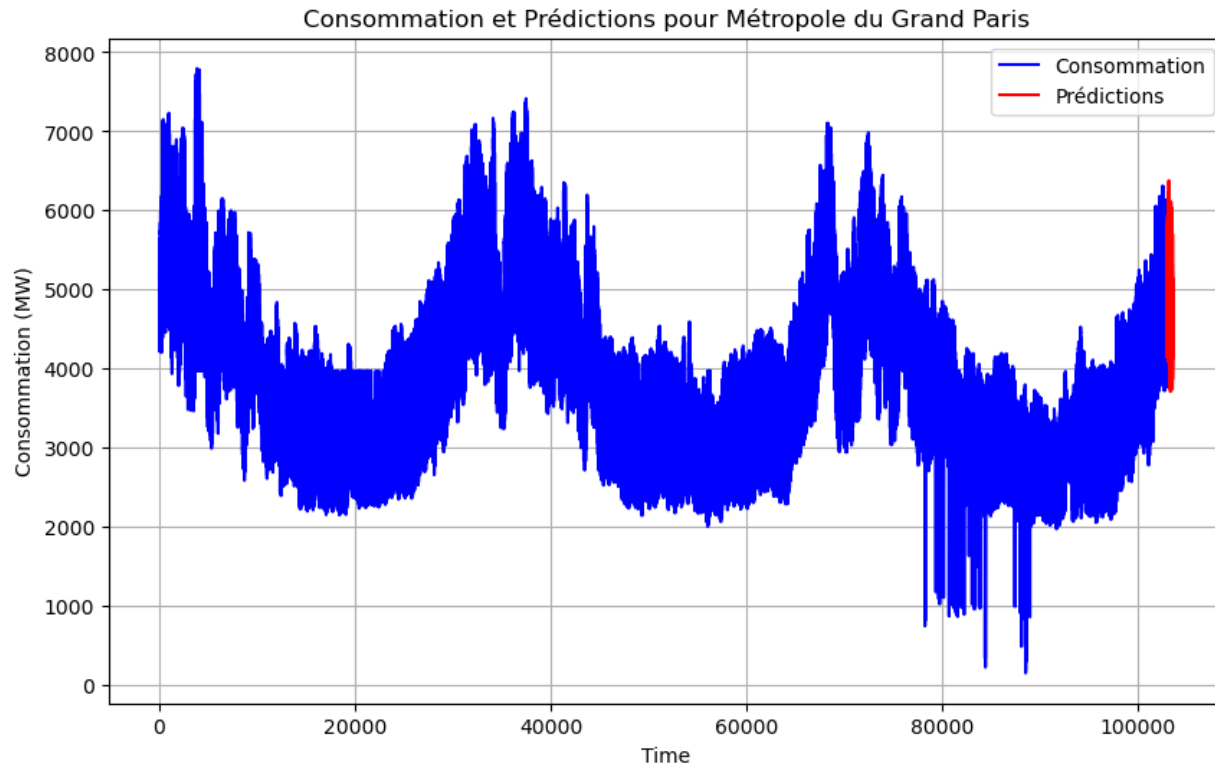
Power consumption over time



Forecasting issue



Predictions



French Power Grid Visualization

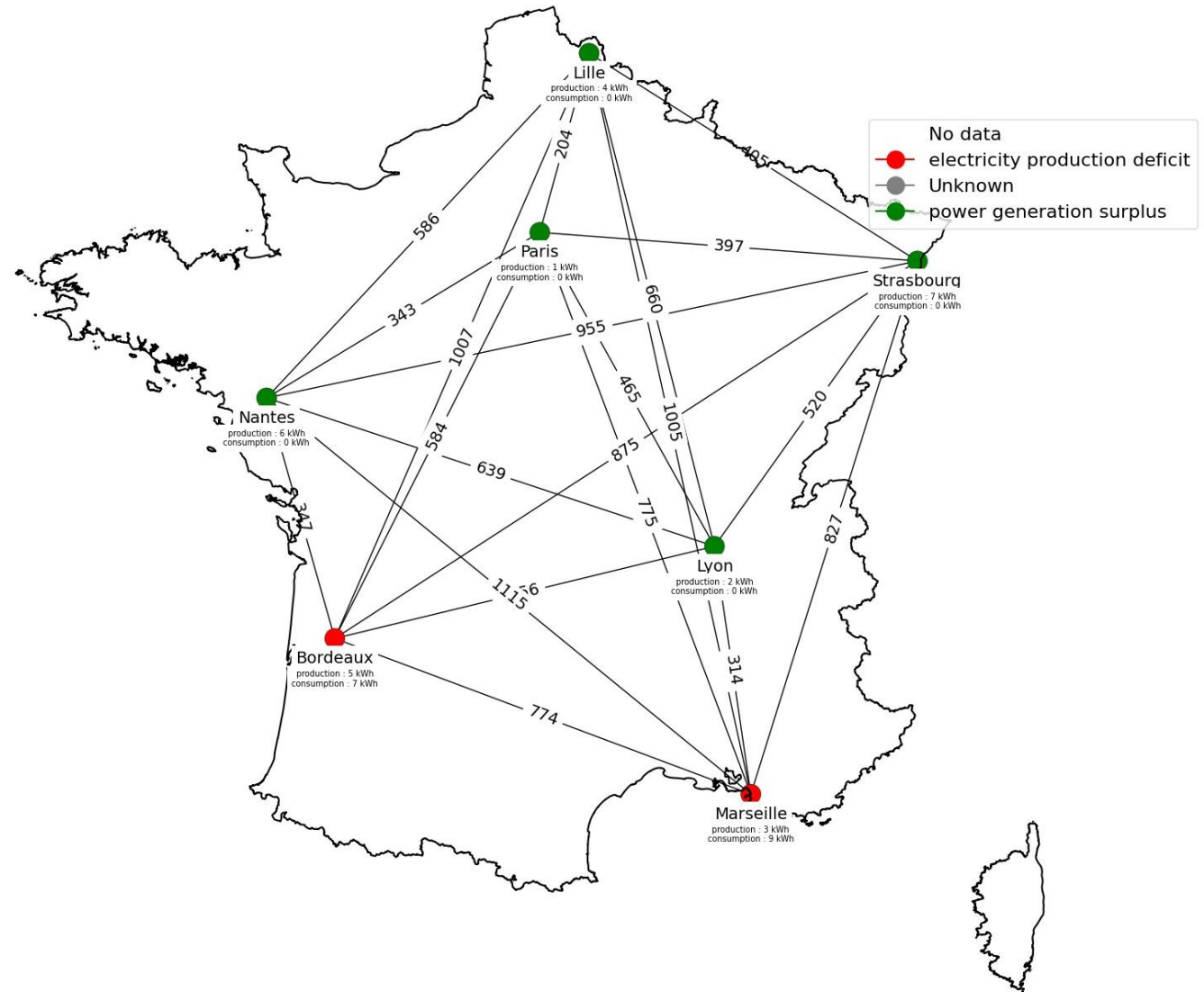
Custom Graph representation of French Power Grid

Data Overview:

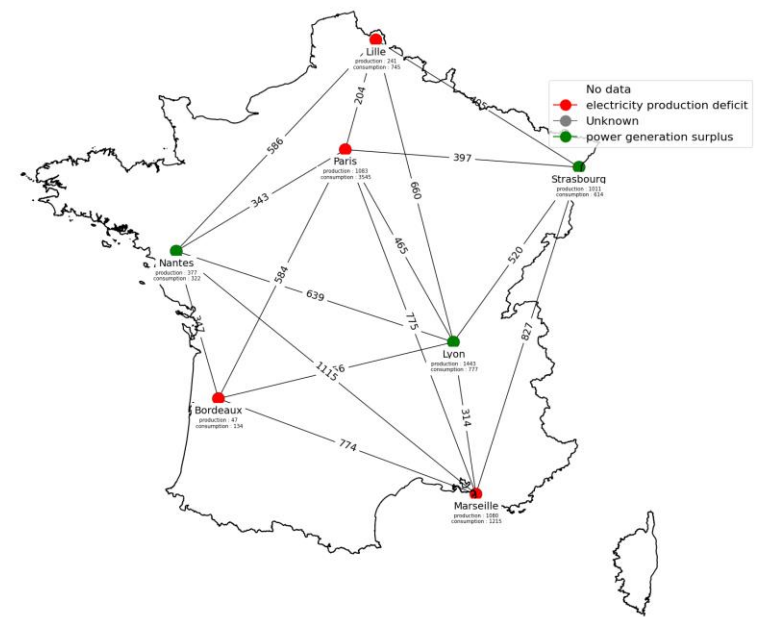
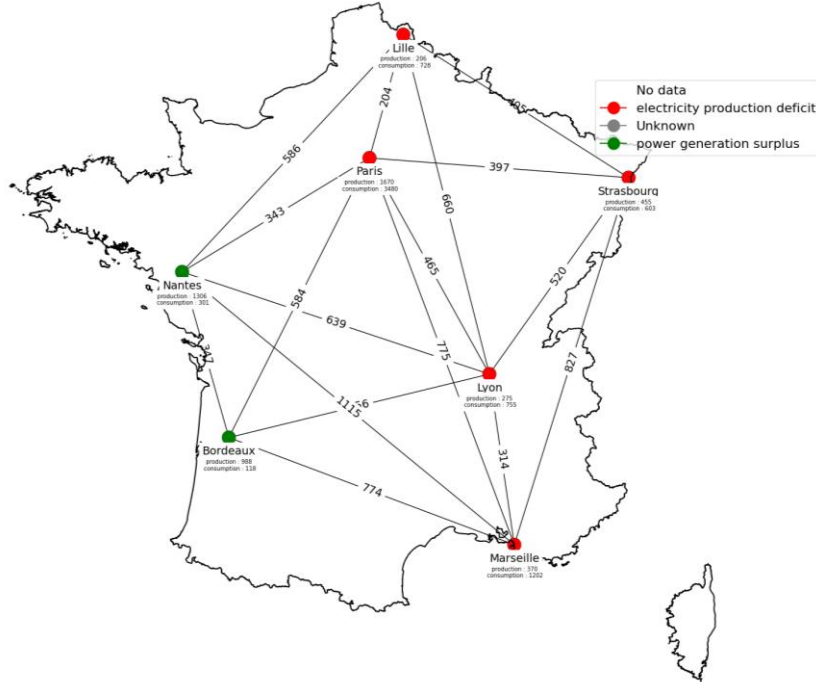
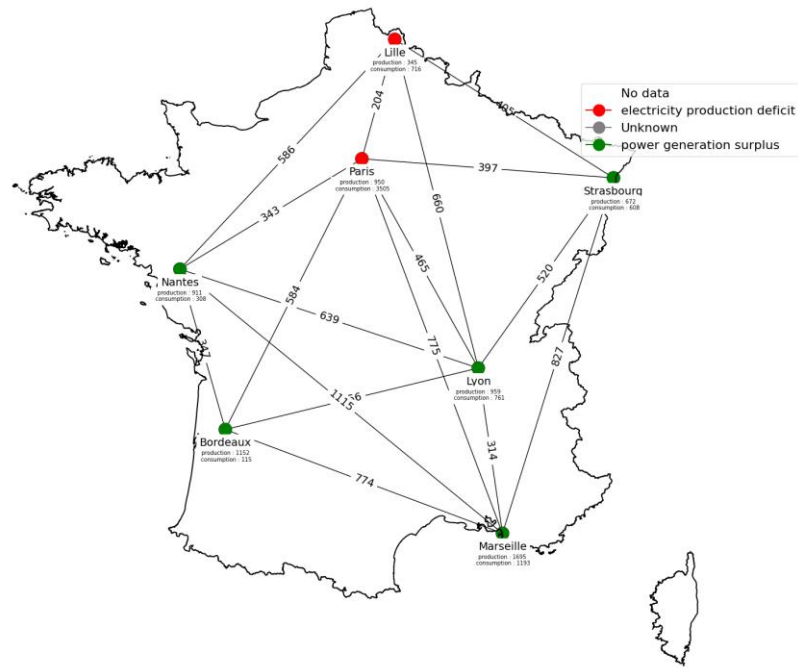
Data type: geographic locations, consumption predictions...

Data source: GEOJson, www.openstreetmap.org, prediction model

Copyright: Data available under ODbL (Open Database License)



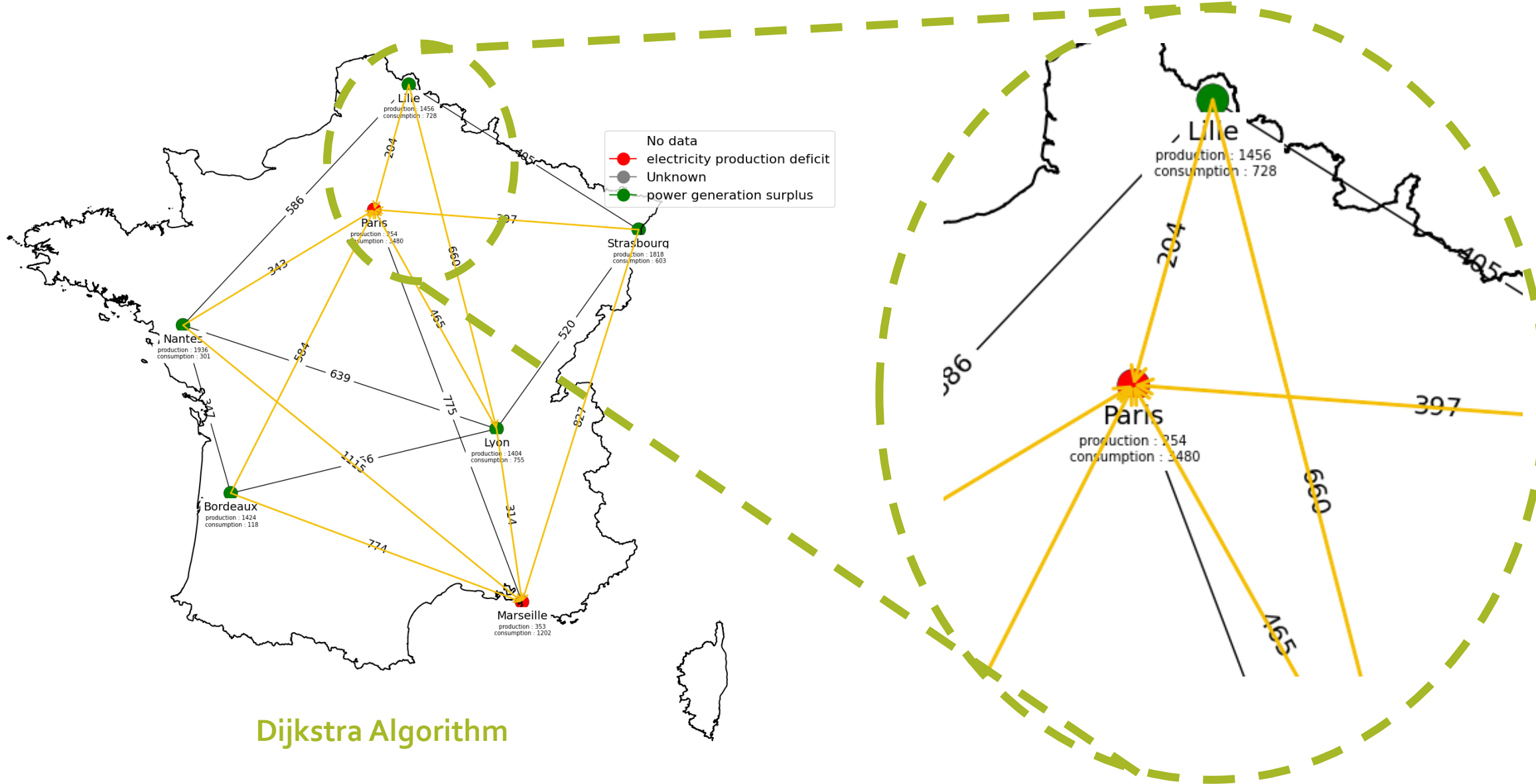
Power Grid Forecast



96 future prediction timesteps = 24h

15 min / timestep

Power Grid Oprimization





Conclusion

- complete project (time series, shortest route, production, mapping, etc.)
- useful forecast to reduce energy losses in power grid
- Areas for improvement:
 - add production prediction
 - separation of production and consumption locations