

RECRUITING AI TO ADDRESS THE CHALLENGES OF SHORT-TERM TRADING

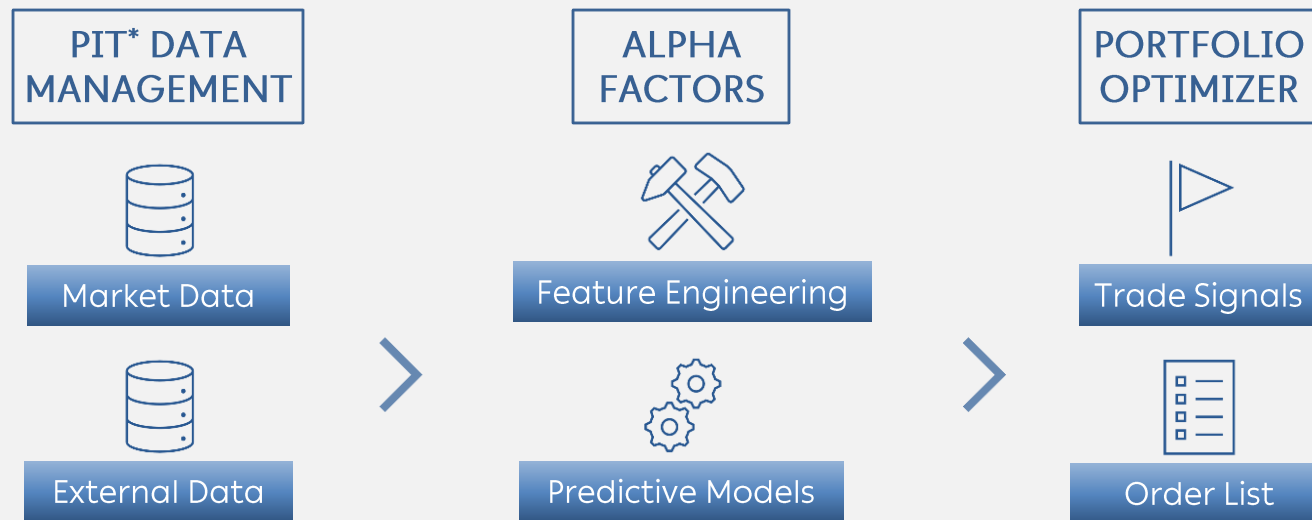
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INTRODUCTION

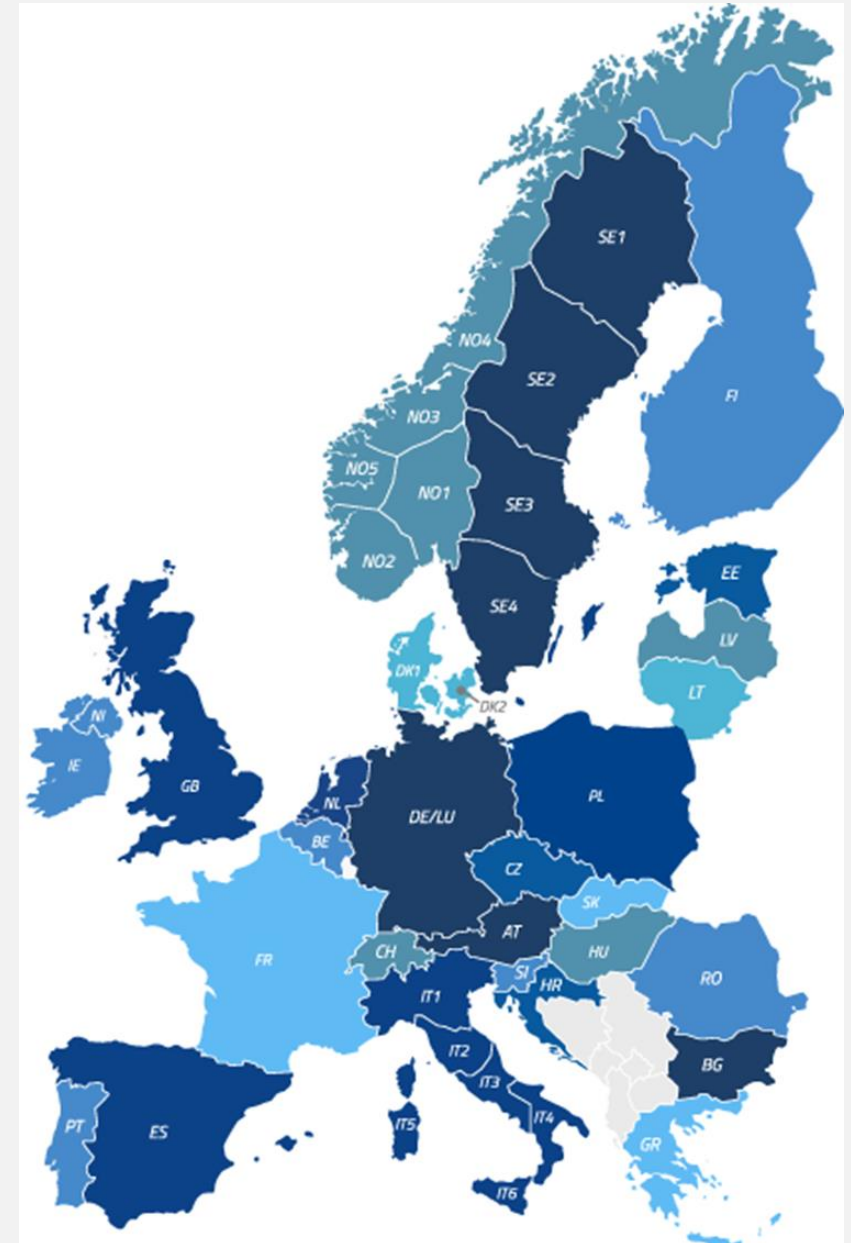
- Greek Energy Market
- Modernization of the Energy Market
- How can AI offer solutions in the energy sector?
- Machine Learning (ML) applications in daily trading procedures
- PPC's current projects
- Outlook



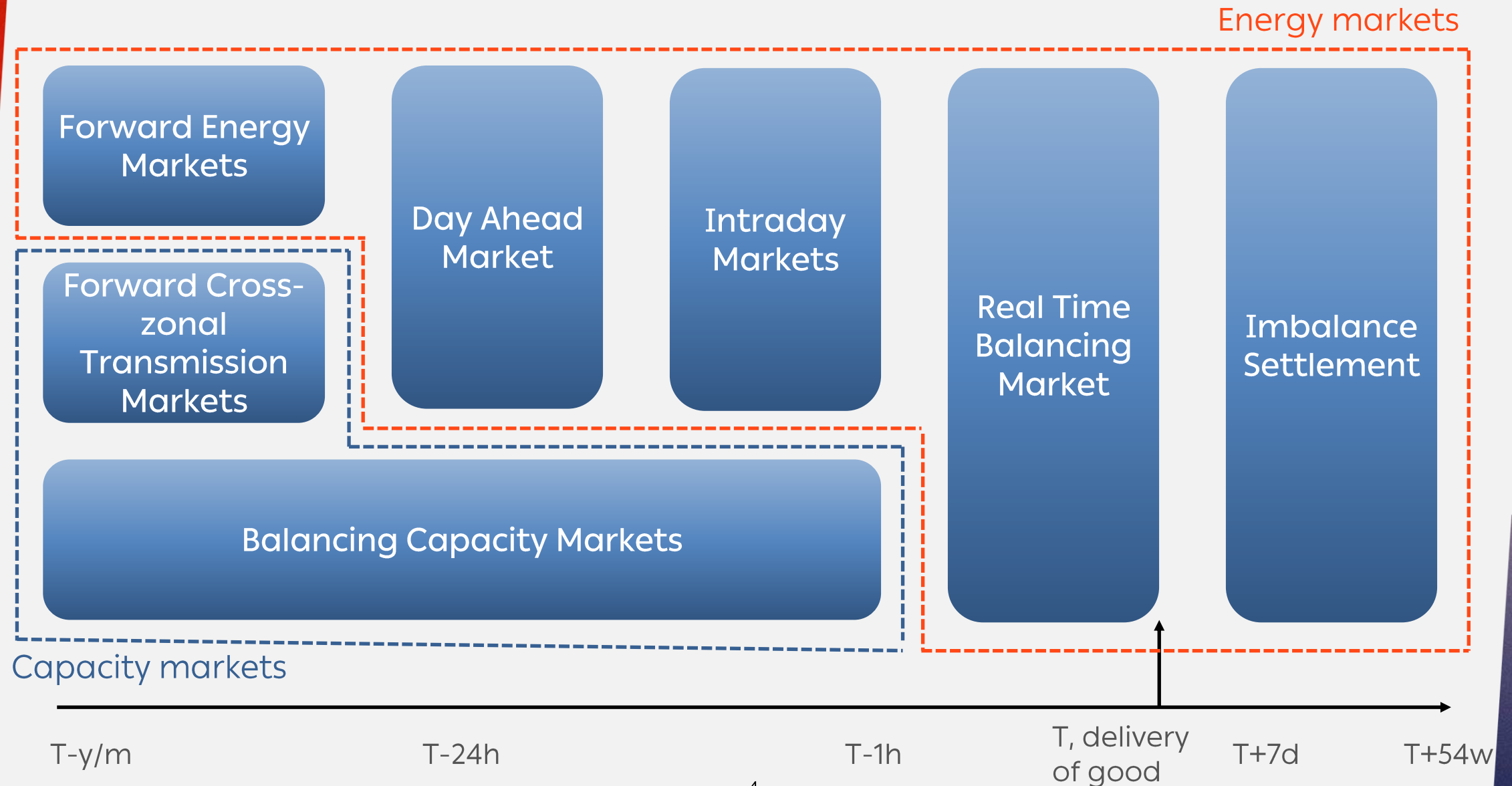
* PIT: Point-in-time

EUROPEAN WHOLESALE ELECTRICITY MARKET

- Bidding Zones acting as the smallest market cells
- Single Price per market time unit per Bidding Zone, for each product, for each relevant market
- Transmission capacity between adjacent bidding zones is calculated by TSOs according to common methodologies and is allocated either:
 - directly to participants (as capacity products, in order to schedule commercial flows), or
 - indirectly during the market coupling processes of relevant markets.

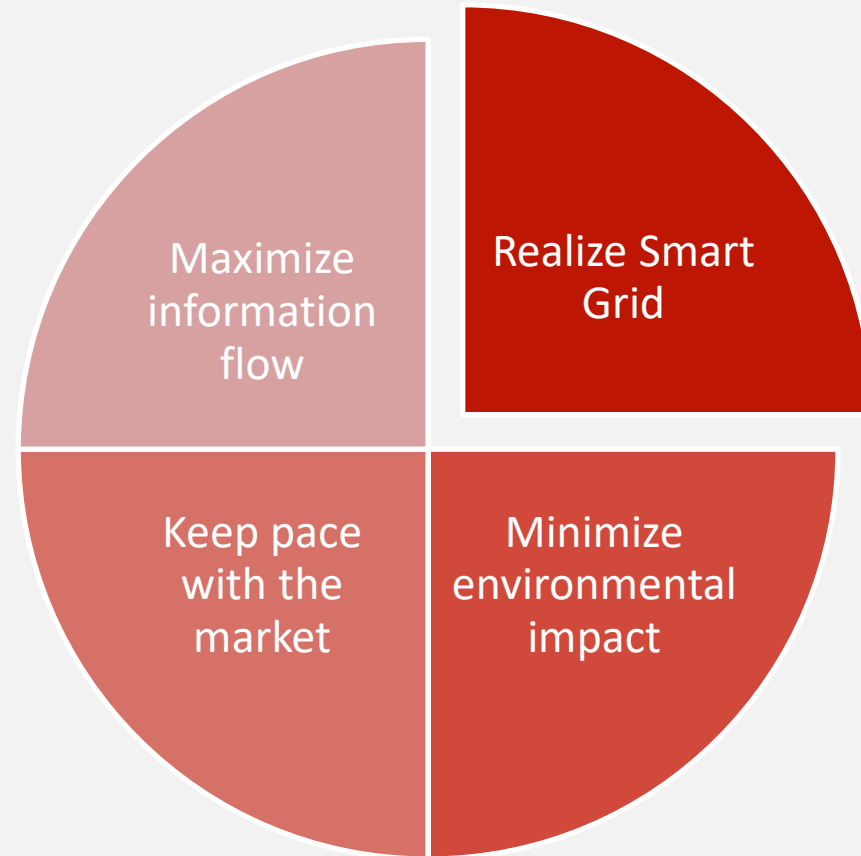


ELECTRICITY MARKETS TIMEFRAME



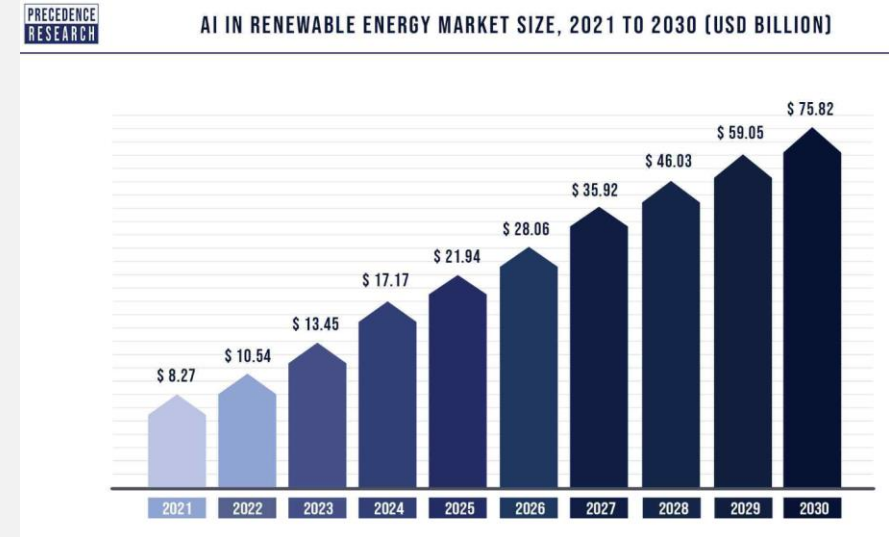
MODERNIZATION OF ENERGY MARKET

- Data digitalization
- Analysis development
- Renewable energy management
- AI forecasting
- Algo-trading



How AI?

- Efficient handling of voluminous and multidimensional data
- Need for quick adaptation to changing real-world circumstances
- Advanced analytics and insights
- Capitalization on various energy sources
- Time and cost efficiency

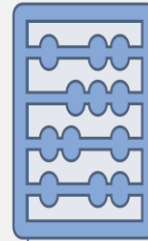


The global artificial intelligence (AI) in renewable energy market size was valued at US\$ 8.24 billion in 2021 and it is expected to surpass around US\$ 75.82 billion by 2030 with a noteworthy CAGR of 27.9% from 2021 to 2030.

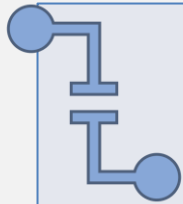
ML CONTRIBUTION IN THE ENERGY SECTOR



Forecasting of
renewable energy



Prediction of
complicated scenarios'
outcomes



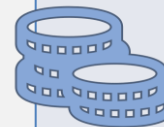
Prediction of system
events



System performance
improvement



Coordination of
distributed energy
assets



Trading enhancement

PPC SHORT-TERM ENERGY PORTFOLIOS

Generation Portfolio

17,7 TWh 62% of conventional generation, 35% local demand

- 2,6 GW Lignite
- 3,2 GW Hydro
- 2,6 GW NG

Electricity Demand Portfolio

30,6 TWh, 60% of total demand for 2022

RES Aggregation Portfolio

currently 75 MW, expected 350 MW end of 2023

NG portfolio

19 TWh_{th} in 2022

Demand
Response
Portfolio

ST Cross Border
Portfolio

Energy Services

PPC PROJECTS



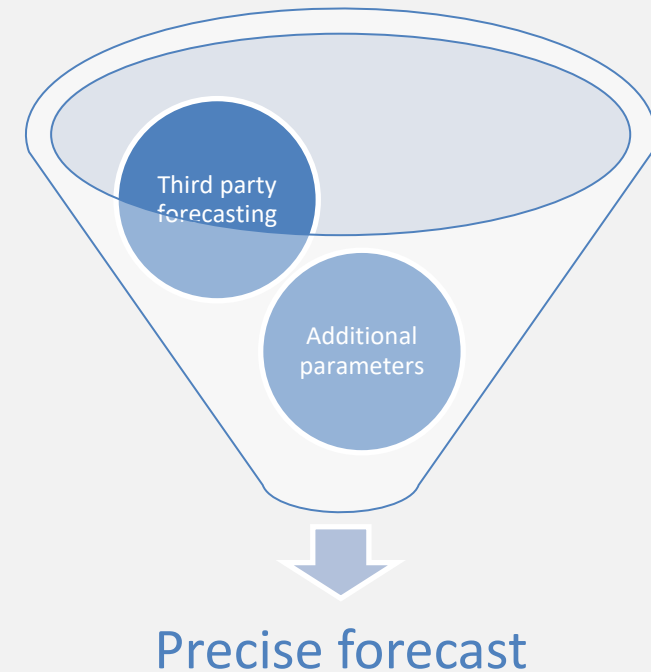
LOAD AND RES FORECASTING – ALL MARKETS & PPC PORTFOLIOS

GOAL

- Forecast the energy volumes needed to meet the demand and supply energy equilibrium
- Forecast energy volumes of PPC supply
- Forecast generation of RES (all markets & PPC portfolio)

PROCESS

- Evaluation of the external providers' forecasts
- Produce additional parameters
- Combination of forecasts and parameters
- More accurate forecast



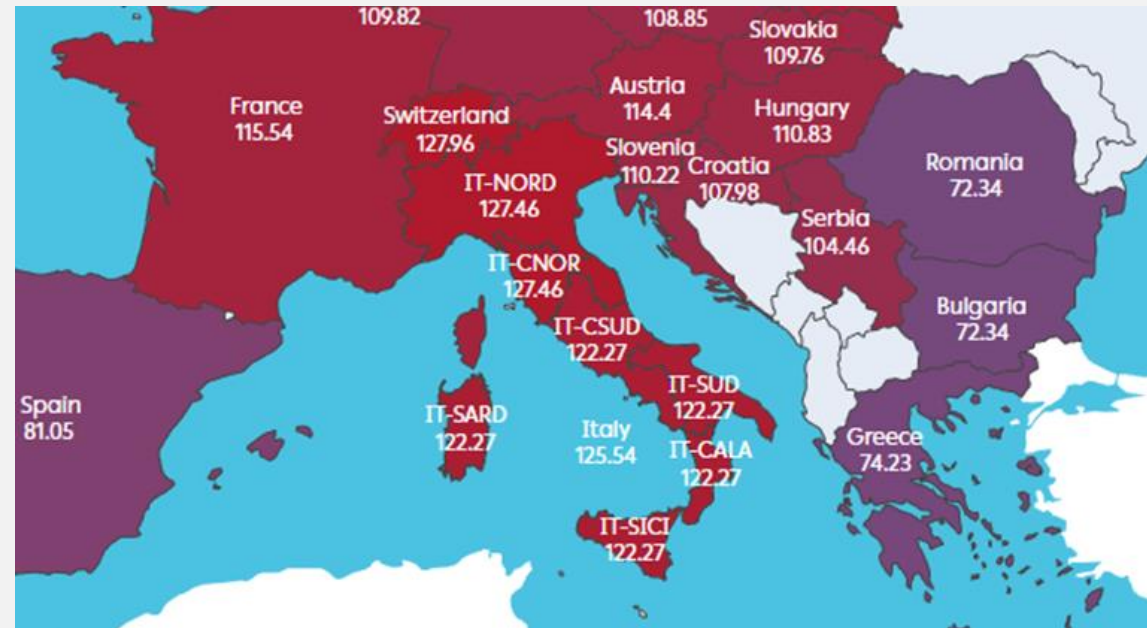
PRICE FORECASTING

GOAL

- Forecast spot and balancing markets' prices

PROCESS

- RES forecasting
- Load forecasting
- Generation units' outages
- Fuel prices
- Cross-Border Capacities availability



GERMANY (DE BZ) PRICE FORECASTING

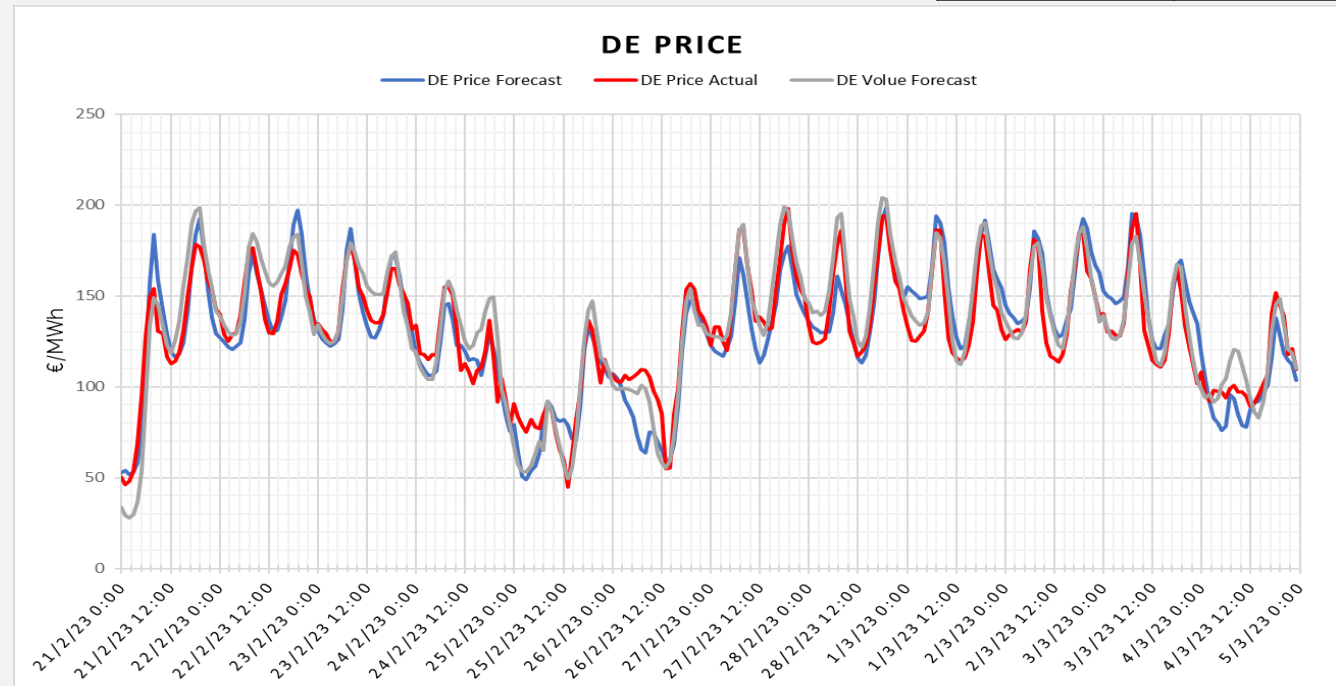
GOAL

- Forecast of Germany's day ahead energy price from 2023-02-21 to 2023-3-04

PROCESS

- Training data (from 2022-06-09 to 2023-02-20)
- MultiLayer Perceptron (MLP NN)
- Sample parameters
 - RES forecasts
 - Nuclear forecasted production
 - Hydro forecasted production
 - NG and EUA Prices

Forecast	MAPE
DE Value	8,75%
DE PPC	8,95%



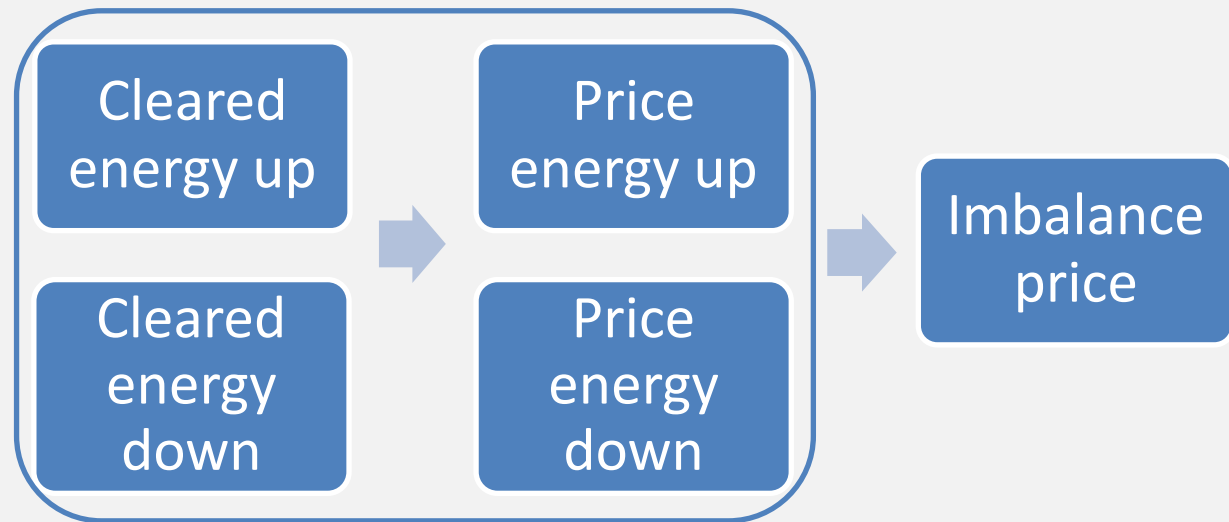
DIRECTION OF THE SYSTEM

GOAL

- Prediction of the direction of the system (short or long)
- Prediction of balancing market prices

PROCESS

- Near real-time:
 - data from TSO
 - weather prediction
 - load prediction



ALGO-TRADING



OUTLOOK

Forecasting & optimization:

- Prediction of energy demand/supply & prices
- Identify market trends
- Reduce risk

Portfolio Management:

- Seize near real time opportunities
- Maximize asset performance
- Respond to market changes



Thank you for your attention