# OpenSTEF

Open Short Term Energy Forecasting

Workshop 01-03-2024

# Schedule

- 14:00 – 14:25  Presentation
- 14:30 – 15:50 Workshop
  - 14.30 - 15.00  Workshop part 1 | Train a model
  - 15.00 - 15.25  Workshop part 2 | Make a forecast
  - 15.25 - 15.50  Workshop part 3 | Perform a backtest
- 15:50 – 16:00 Conclusion

Questions → in the chat

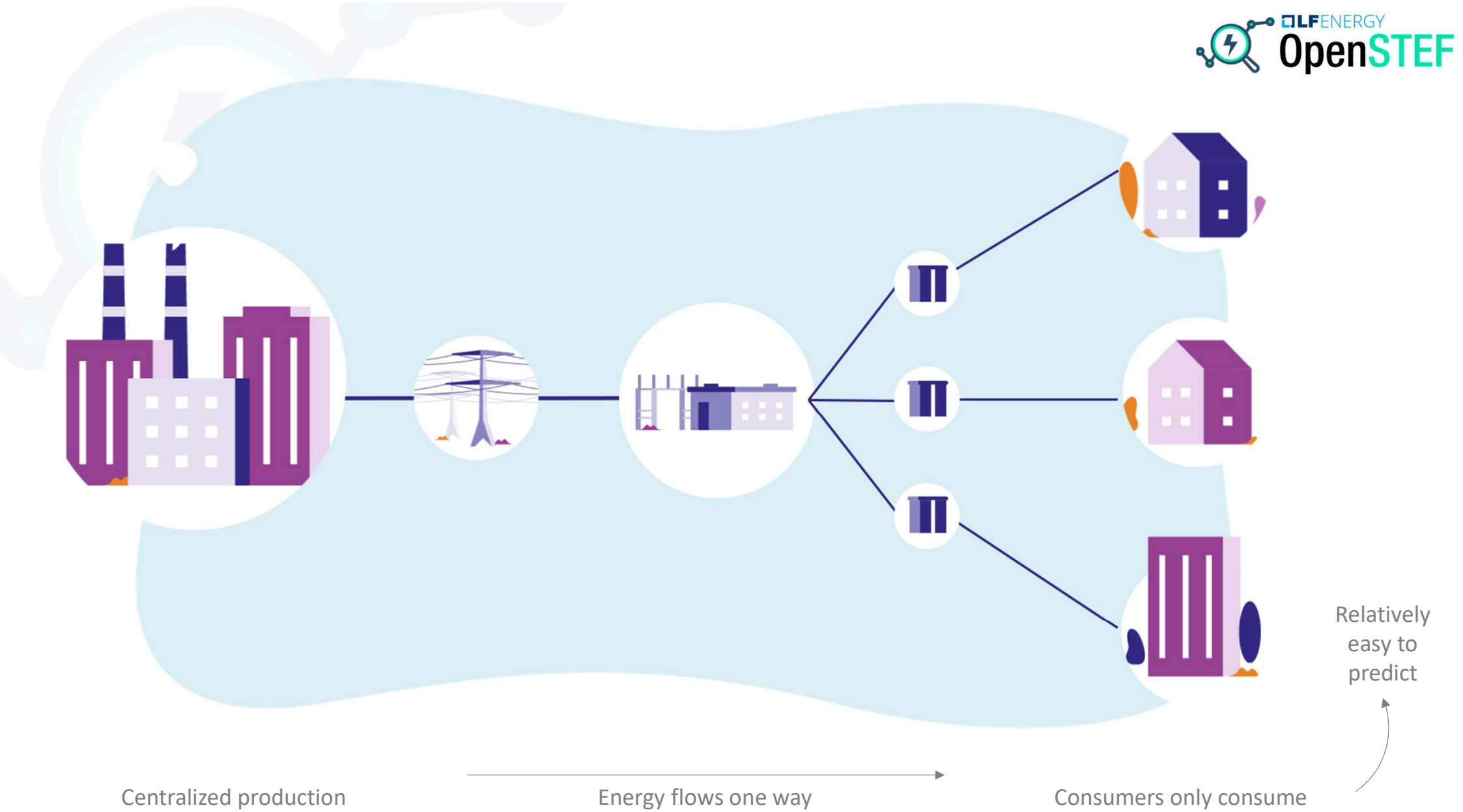

# OpenSTEF

## Open Short Term Energy Forecasting

# Why do we need energy forecasting?

# Challenges on the electricity grid

Write in the chat what you think the biggest challenges are on the electricity grid?


Centralized production
Energy flows one way
Consumers only consume
Relatively easy to predict

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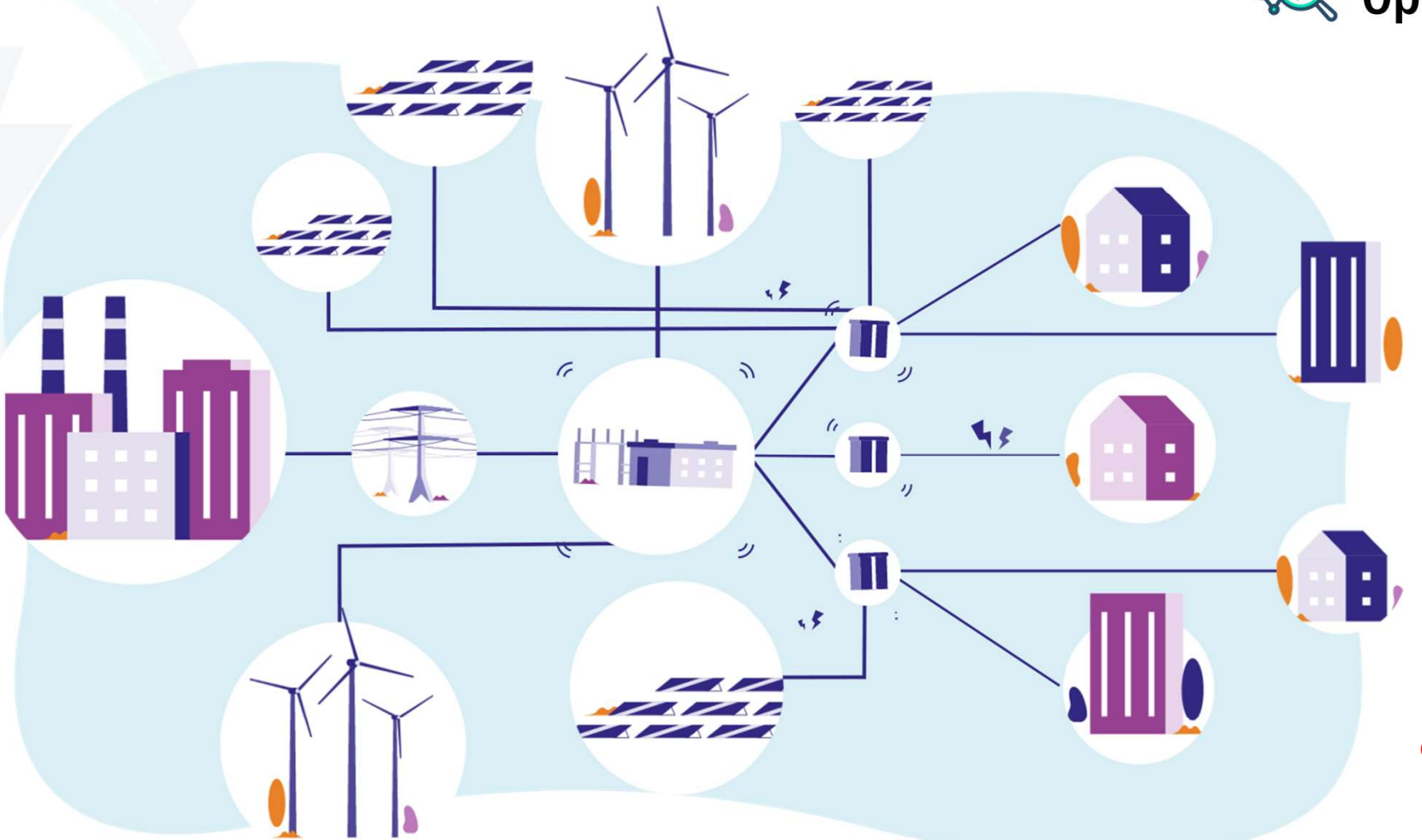


Decentralized production
More irregular profile

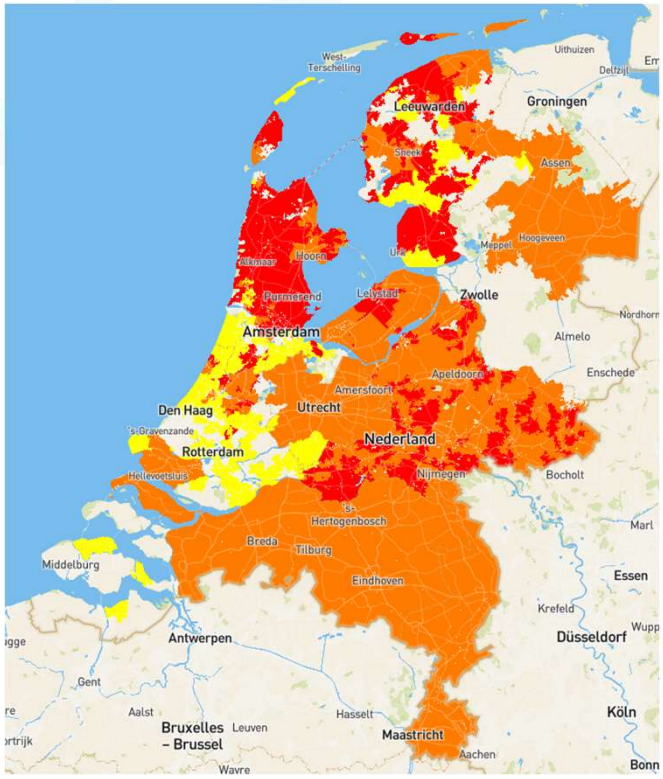
Energy flows both ways

Consumers also produce
Higher energy demand

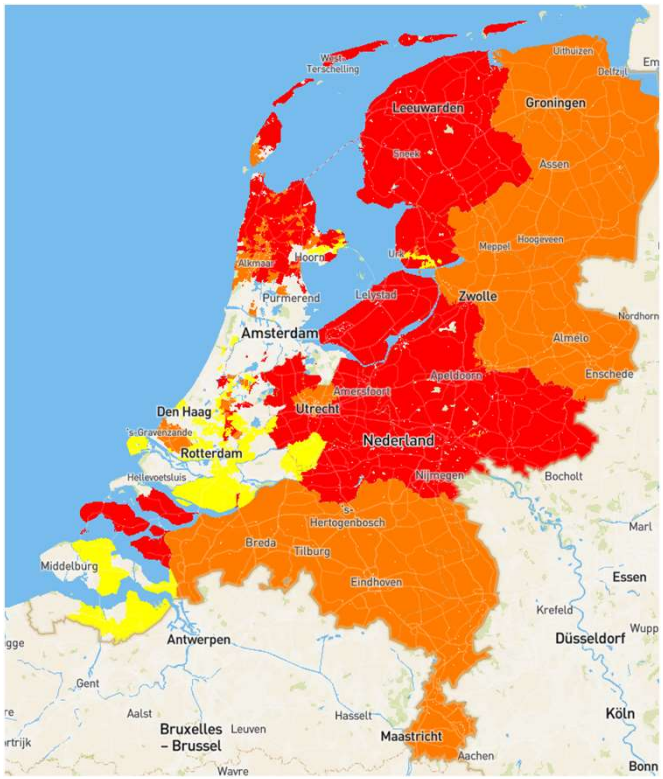
Relatively difficult to predict

# Capacity issues

## Energy consumption




## Energy generation



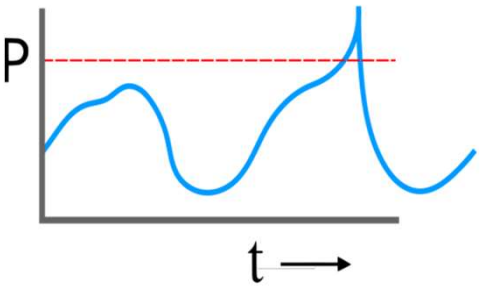

Transmission capacity

- Limited
- Congestion management
- Unavailable

# How can we solve these problems?

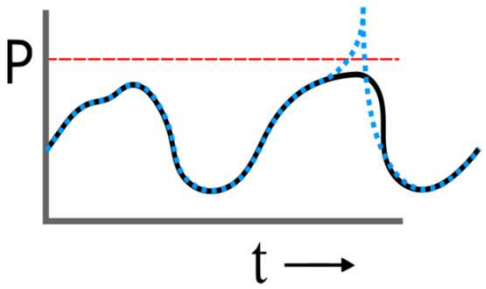
- Reduce consumption or production if an exceedance of grid limitation is expected

Forecast of load has a peak.




Use curtailment to ‘shave the peak’

Realized load has no peak.




Thus, we need accurate forecasts

# What is OpenSTEF?

- Complete software stack to forecast the load on the electricity grid
- Automated machine learning pipelines:
  - Automated step-by-step process (from collecting data, to training, to forecasting) ensuring a systematic approach to making forecasts.

# Machine learning & forecasts

What do you know about machine learning and forecasting?

# What is machine learning?

# OpenSTEF

Open Short Term Energy Forecasting

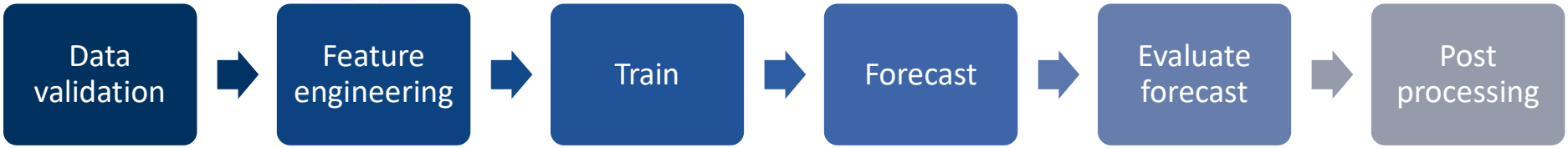
# Prediction job

- Store all relevant information, such as:
  - Location
  - Id
  - Horizon minutes
  - Name of prediction job

Identification number

Minutes you want to predict into the future

# Pipelines

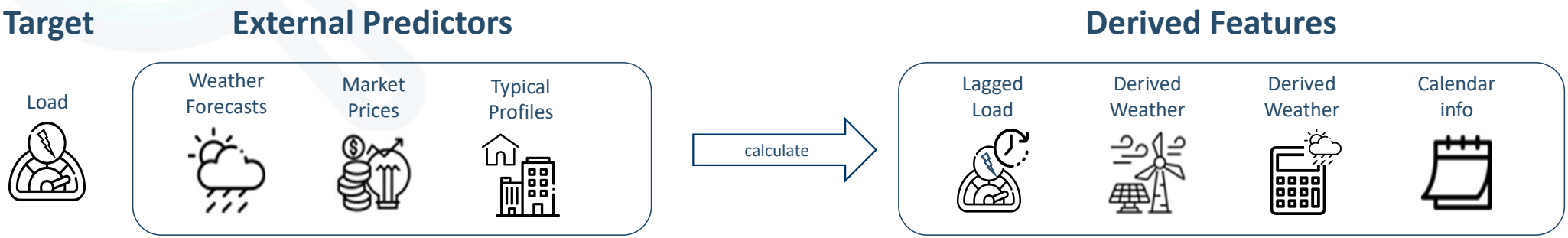

Data validation
Feature engineering
Train
Forecast
Evaluate forecast
Post processing

# Pipelines

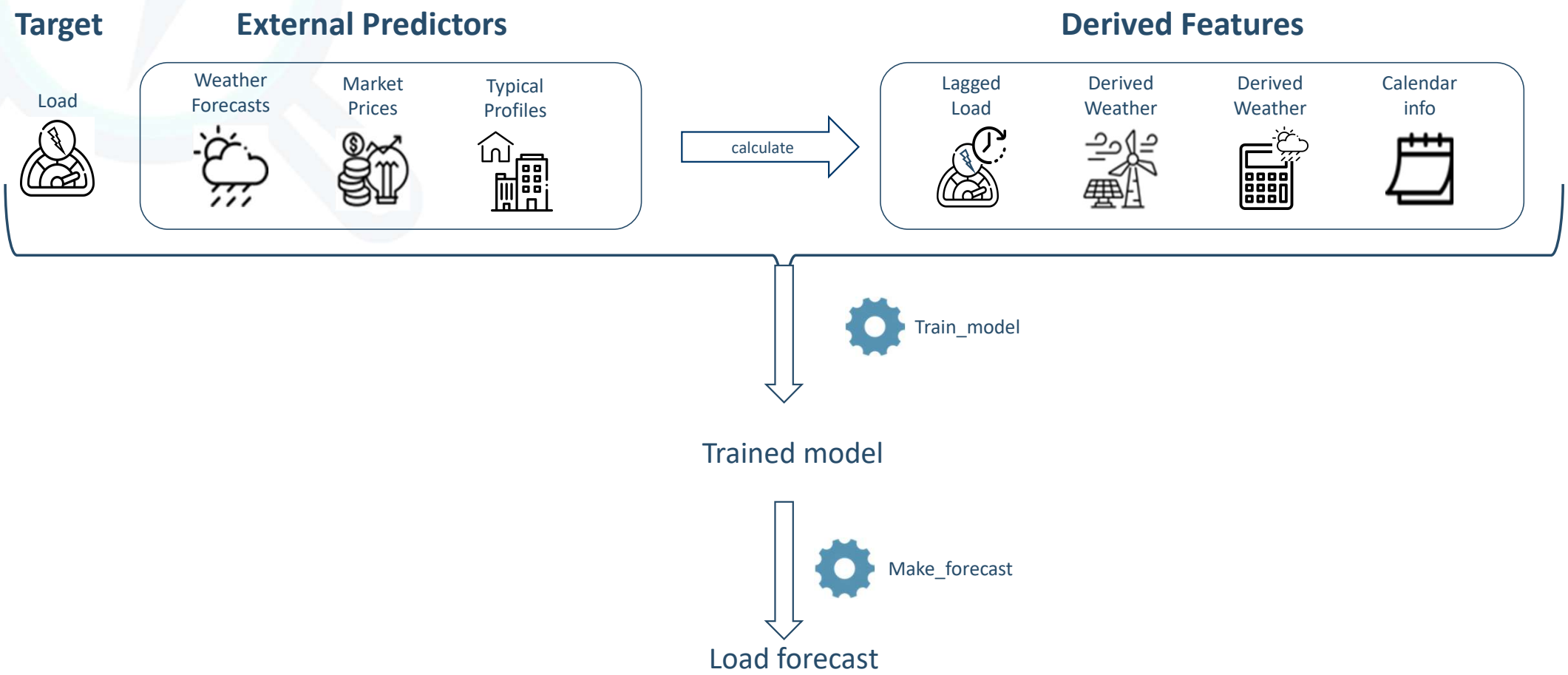
Train_model pipeline


Make_forecast pipeline

# Methodology



# Methodology



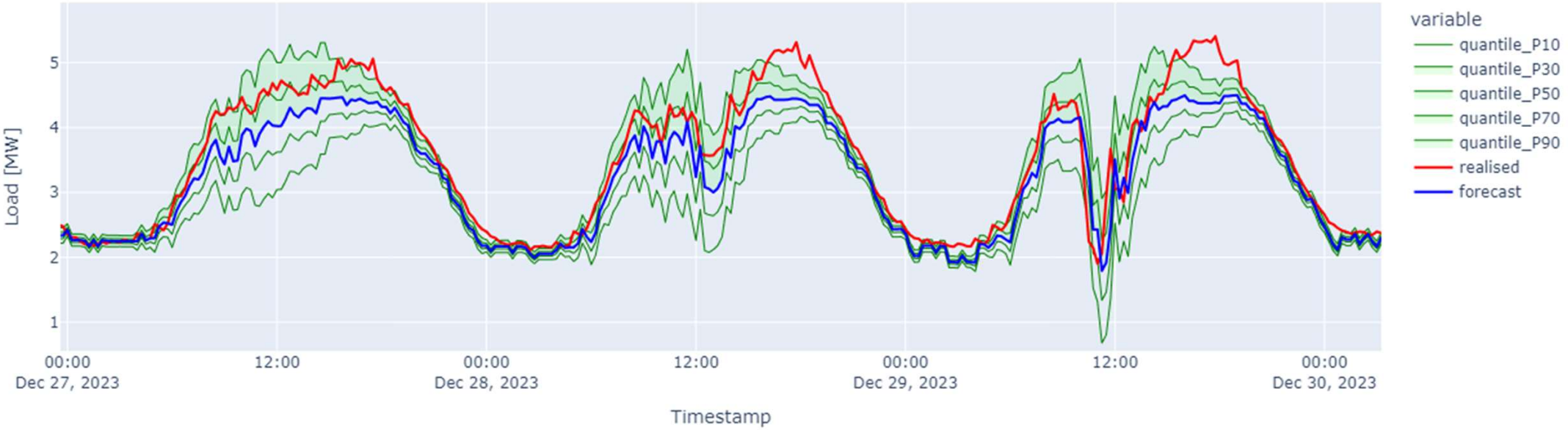
# Features

## Examples

| | Input features | Derived features |
|---|---|---|
| Weather Forecasts  | • Wind speed • Radiation • Temperature • Wind direction | • Global tilted radiation • Vapour pressure • Humidity |
| Market Prices  | • APX: Dutch Day-ahead energy market price | |
| Typical Profiles  | • Profiles of typical large connections | |
| Calendar info  | • Date | • Holiday • Week- or weekend day |
| Load  | • Historical load | • Lagged load |

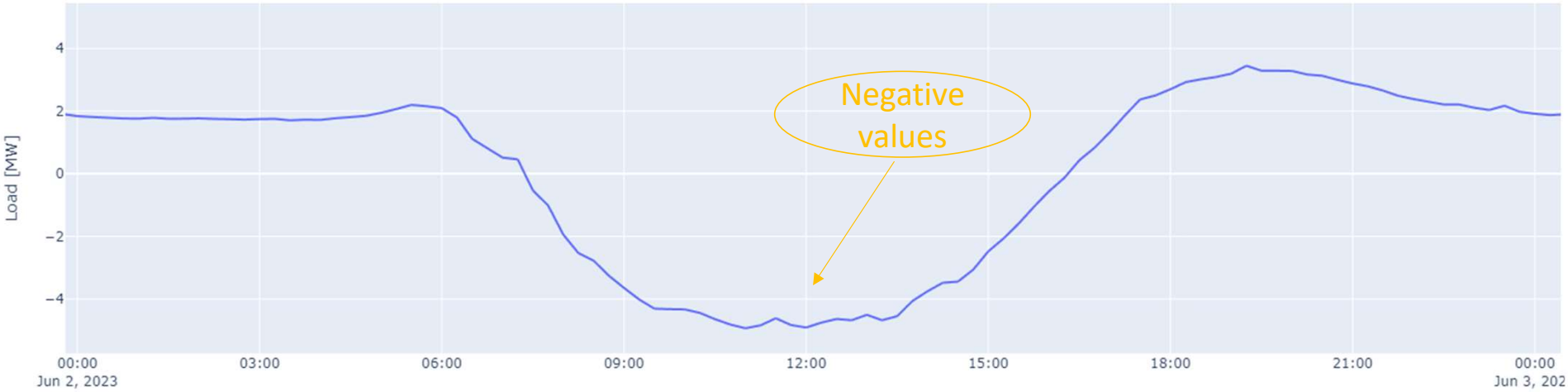
# Feature importance plot

# Quantiles

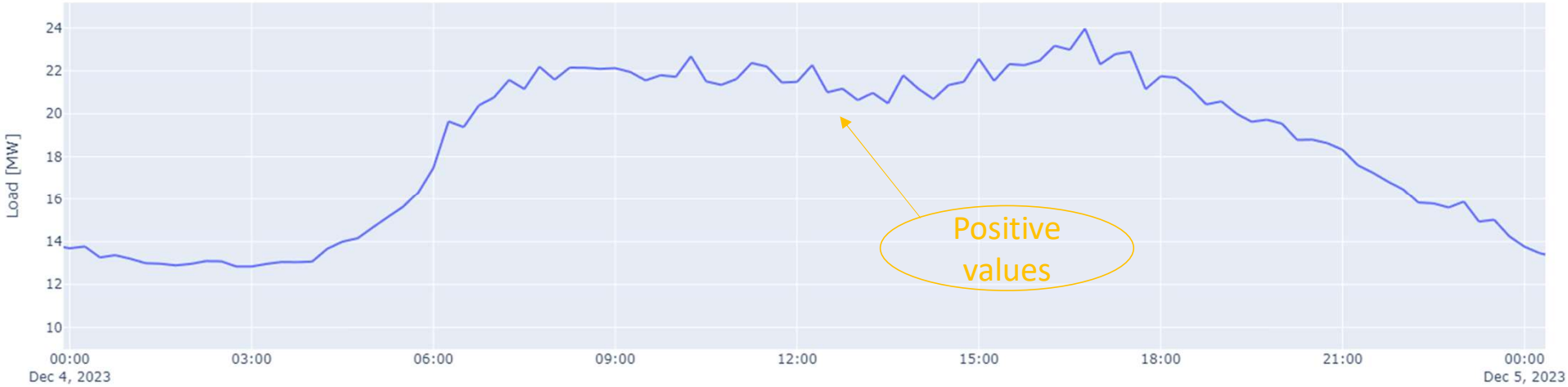

variable
quantile_P10
quantile_P30
quantile_P50
quantile_P70
quantile_P90
realised
forecast
Load [MW]
5
4
3
2
1
00:00
Dec 27, 2023
12:00
00:00
Dec 28, 2023
12:00
00:00
Dec 29, 2023
12:00
00:00
Dec 30, 2023
Timestamp

# Production vs. consumption

Production




Consumption



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# Community






# To the workshop!

# Reflection

- What did you learn?
- Did you learn what you expected?
- Are you able to explain what OpenSTEF does now?

- Please fill in our survey!

# Want to continue with OpenSTEF

## Here is what you can do next!

- Github
- Website
- Example notebooks
- Join a community meeting
- Contact us: Korte.termijn.prognoses@alliander.com

# Thanks for joining!

- Reach us here:

Korte.termijn.prognoses@alliander.com

- Find OpenSTEF here:

Github.com/openstef

Survey OpenSTEF workshop