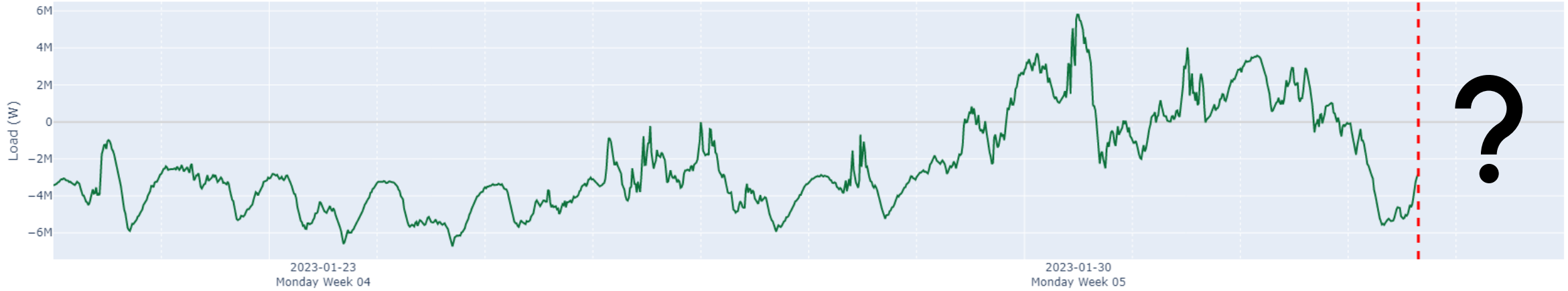




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# OpenSTEF

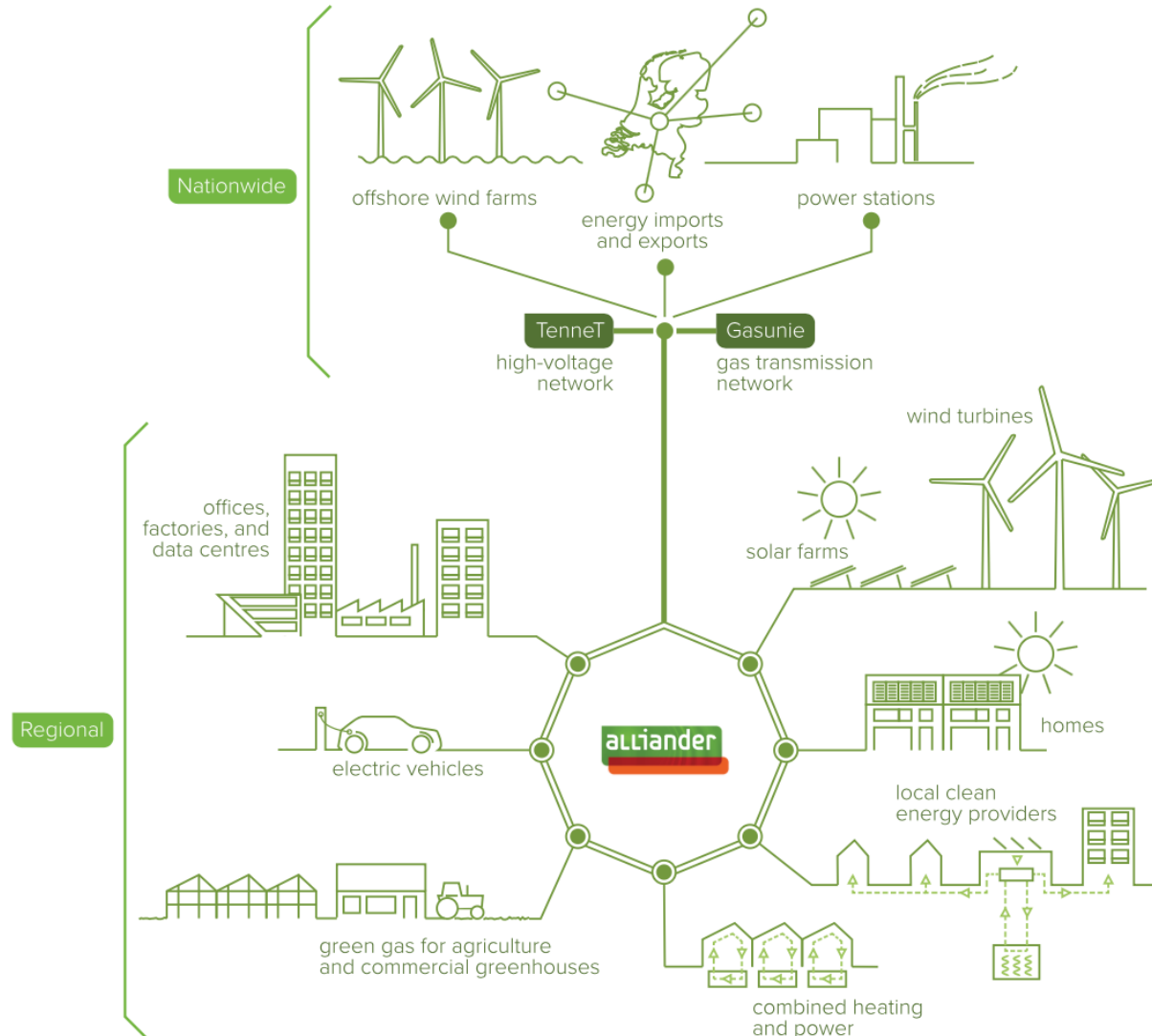
## Short Term Energy Forecasting

# Why is this relevant?



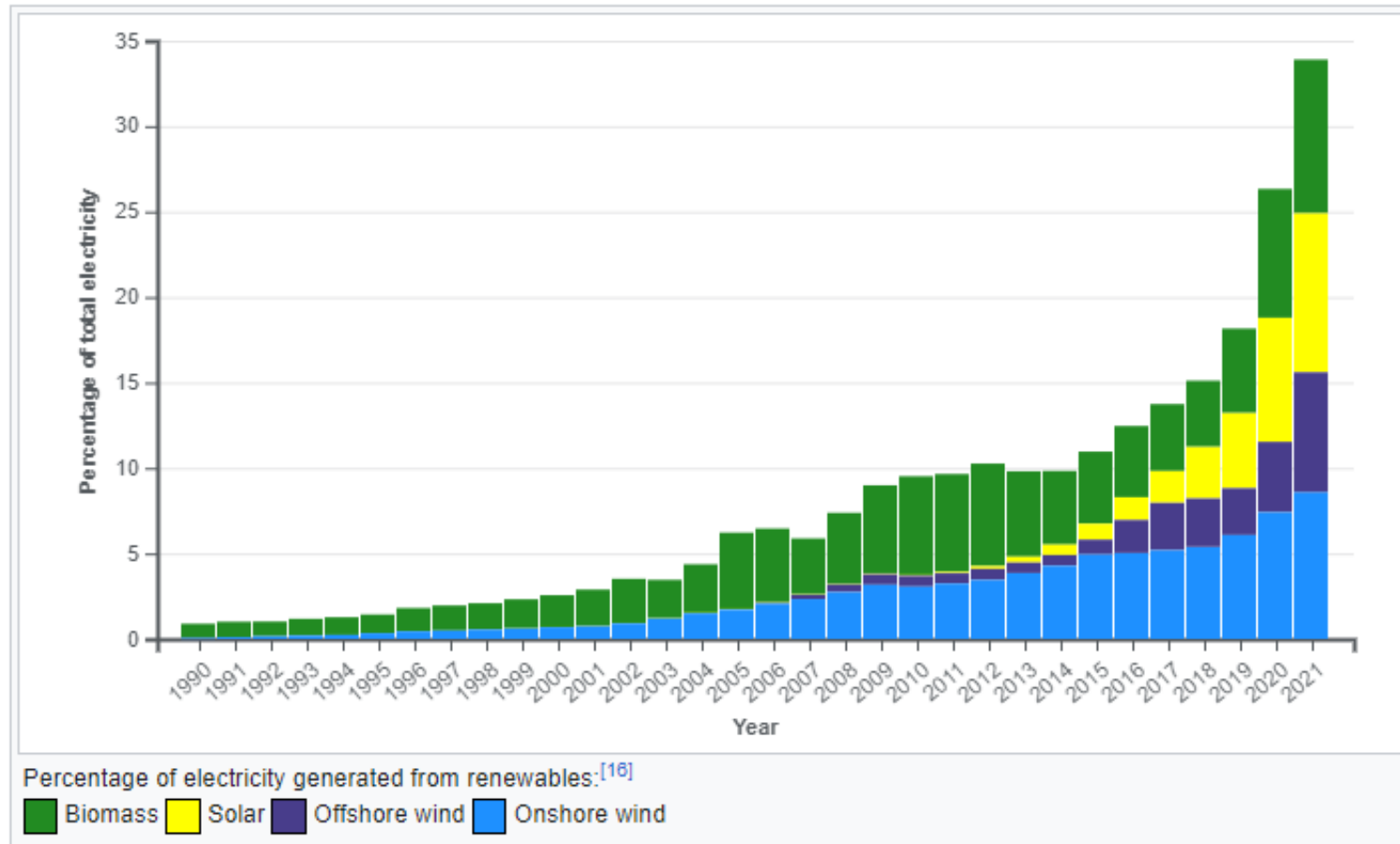
# Challenges in the energy transition

## Grid balance



# Challenges in the energy transition

## Grid balance



[https://en.wikipedia.org/wiki/Renewable\\_energy\\_in\\_the\\_Netherlands](https://en.wikipedia.org/wiki/Renewable_energy_in_the_Netherlands)

# Challenges in the energy transition

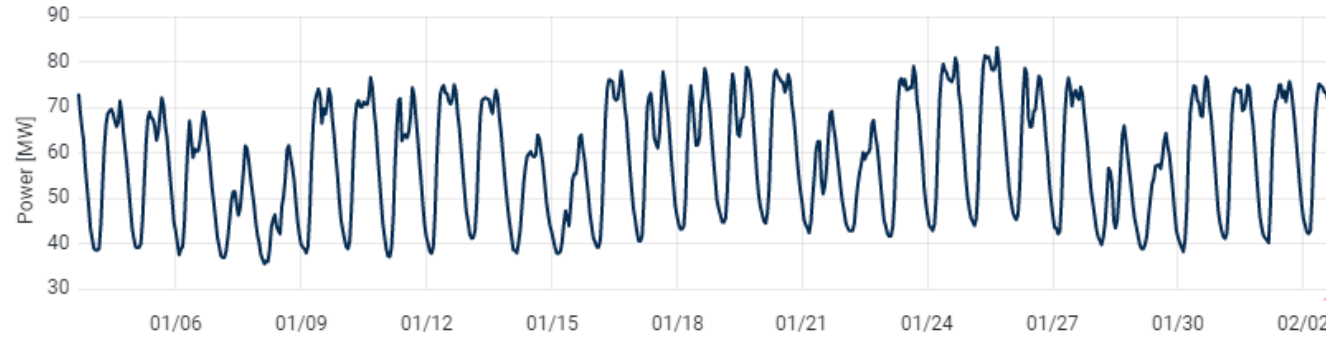
## Renewable energy



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Consumption profile

# Challenges in the energy transition

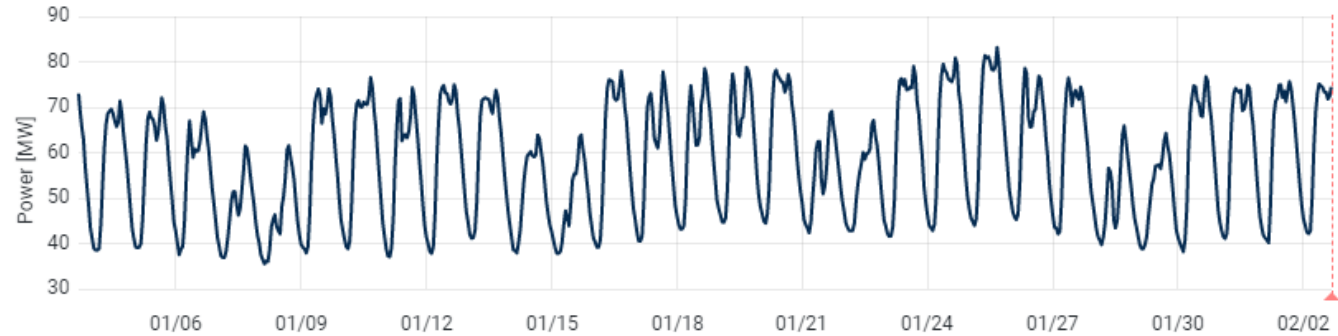
## Renewable energy



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Consumption profile



Solar production profile



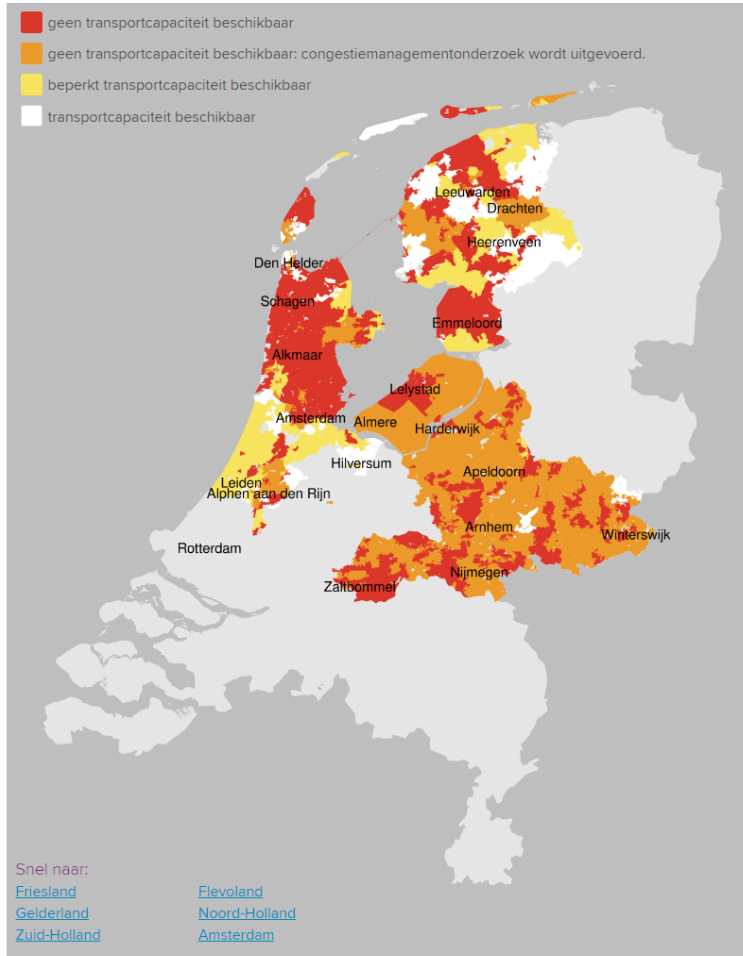
Wind on shore production profile



# Challenges in the energy transition

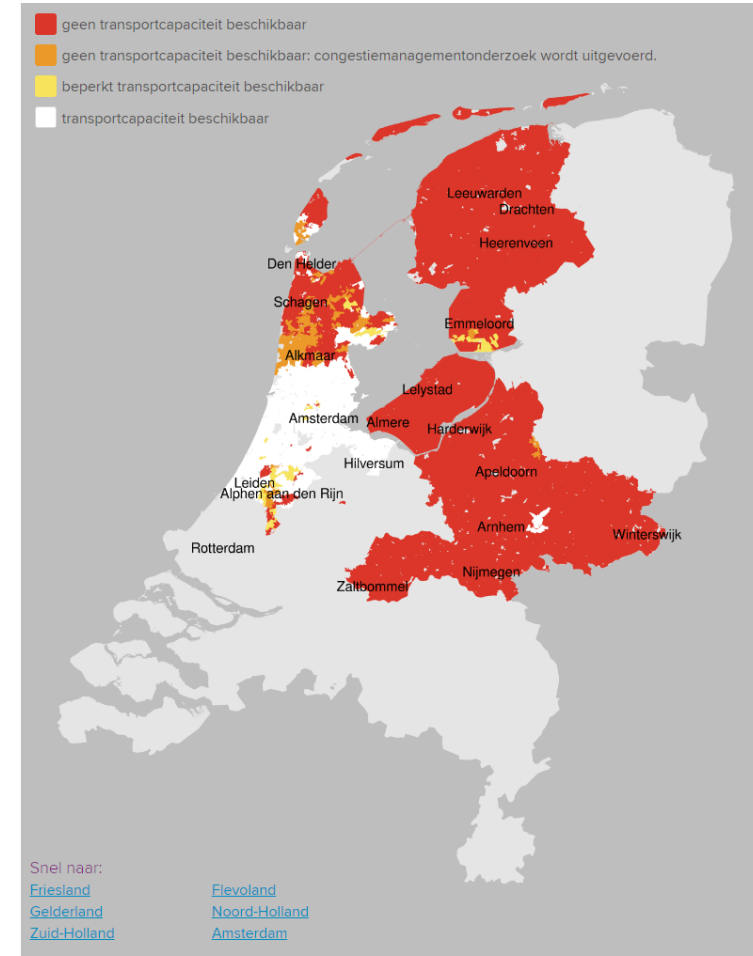
## Transport restrictions

### Energy consumption



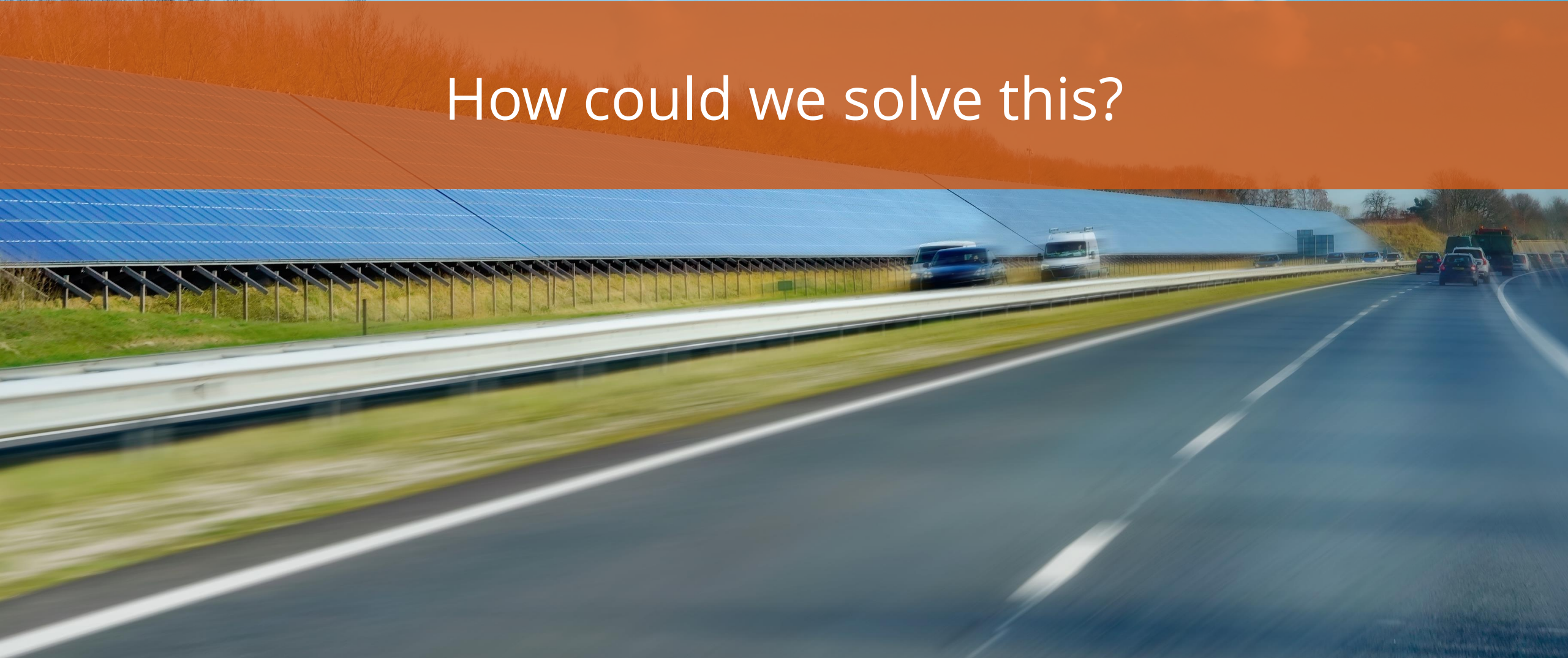
\* Deze kaarten zijn indicatief. U kunt er geen rechten aan ontleen.

### Energy production



\* Deze kaarten zijn indicatief. U kunt er geen rechten aan ontleen.

How could we solve this?



# Grid Insight: Transmission Forecasts

Anticipate congestion



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Customer



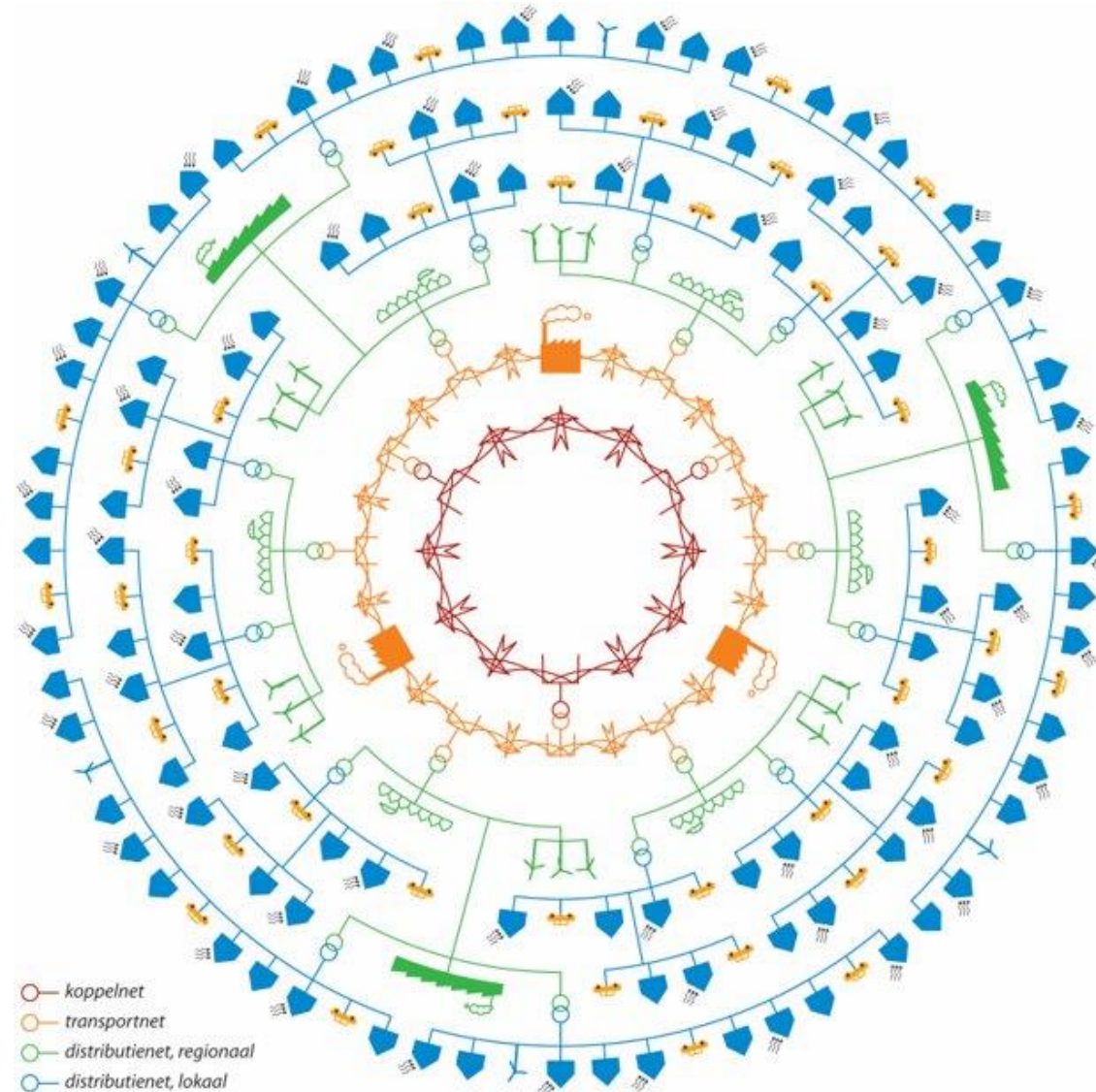
DSO

Distribution System Operator



TSO

Transmission System Operator



# Enable 'Smart' solutions

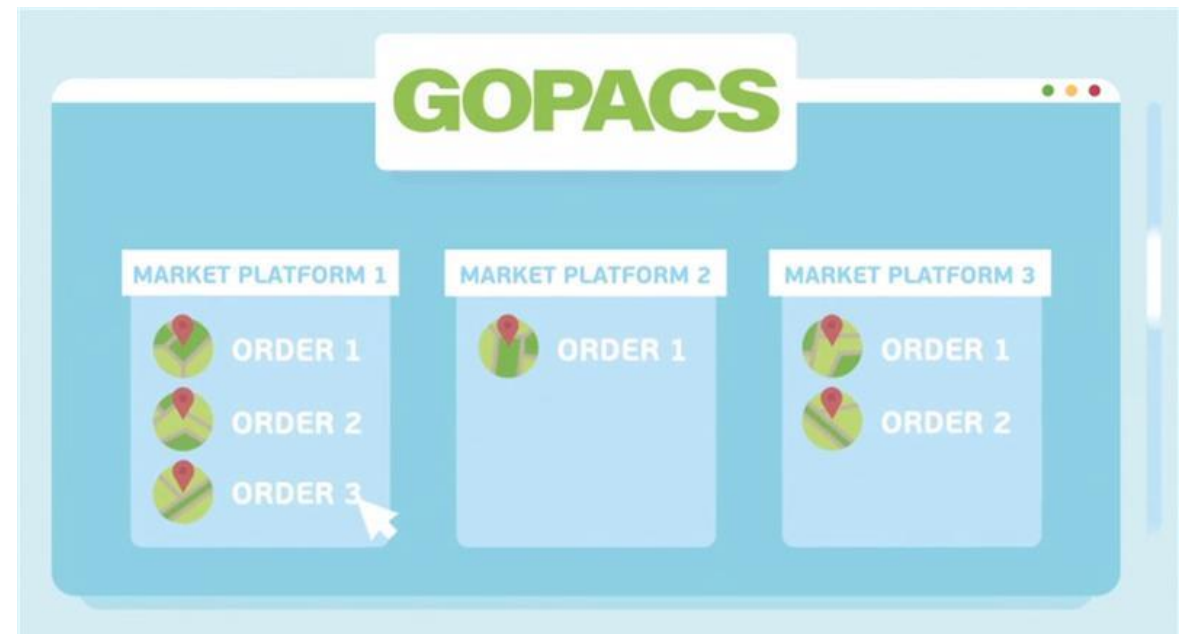
Make the most of current assets

## Smart EV charging



<https://elaad.nl/proef-in-amsterdam-succesvol-meer-elektrische-autos-opladen-op-een-druk-elektriciteitsnet/>

## Market redispatch



<https://en.gopacs.eu/about-gopacs-copy/>

# OpenSTEF

## Short Term Energy Forecasting

# Outline

Technical part



**Introduction to OpenSTEF**



**Forecasting in practice with OpenSTEF**



**OpenSTEF in an operational setting**

# Introduction to OpenSTEF

## Machine learning pipeline

- **Input validation**

- Completeness



# Introduction to OpenSTEF

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- **Feature engineering**

- Lag features
- *Wind turbine power output*
- *Direct normal irradiance (DNI)*





# Introduction to OpenSTEF

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# Forecasting in practice with OpenSTEF

Live demo



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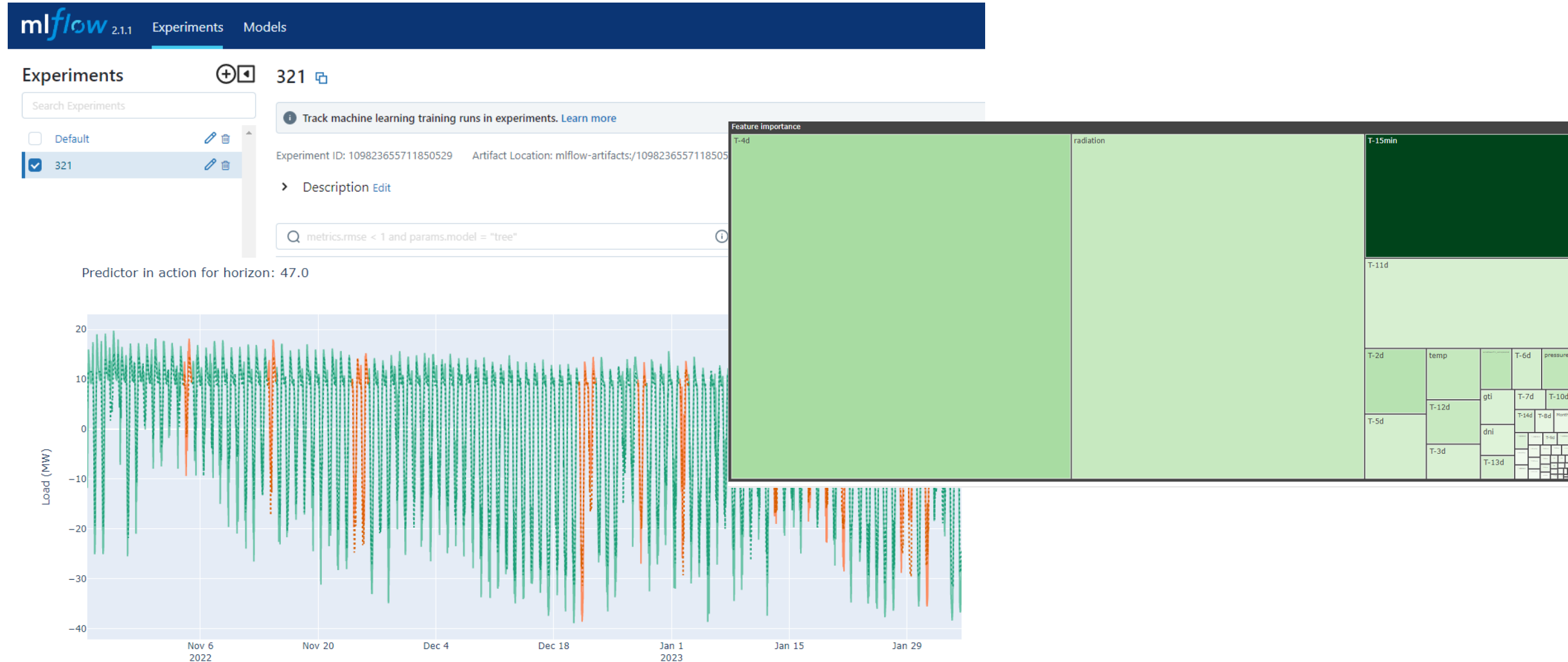


# Forecasting in practice with OpenSTEF

Backup slide

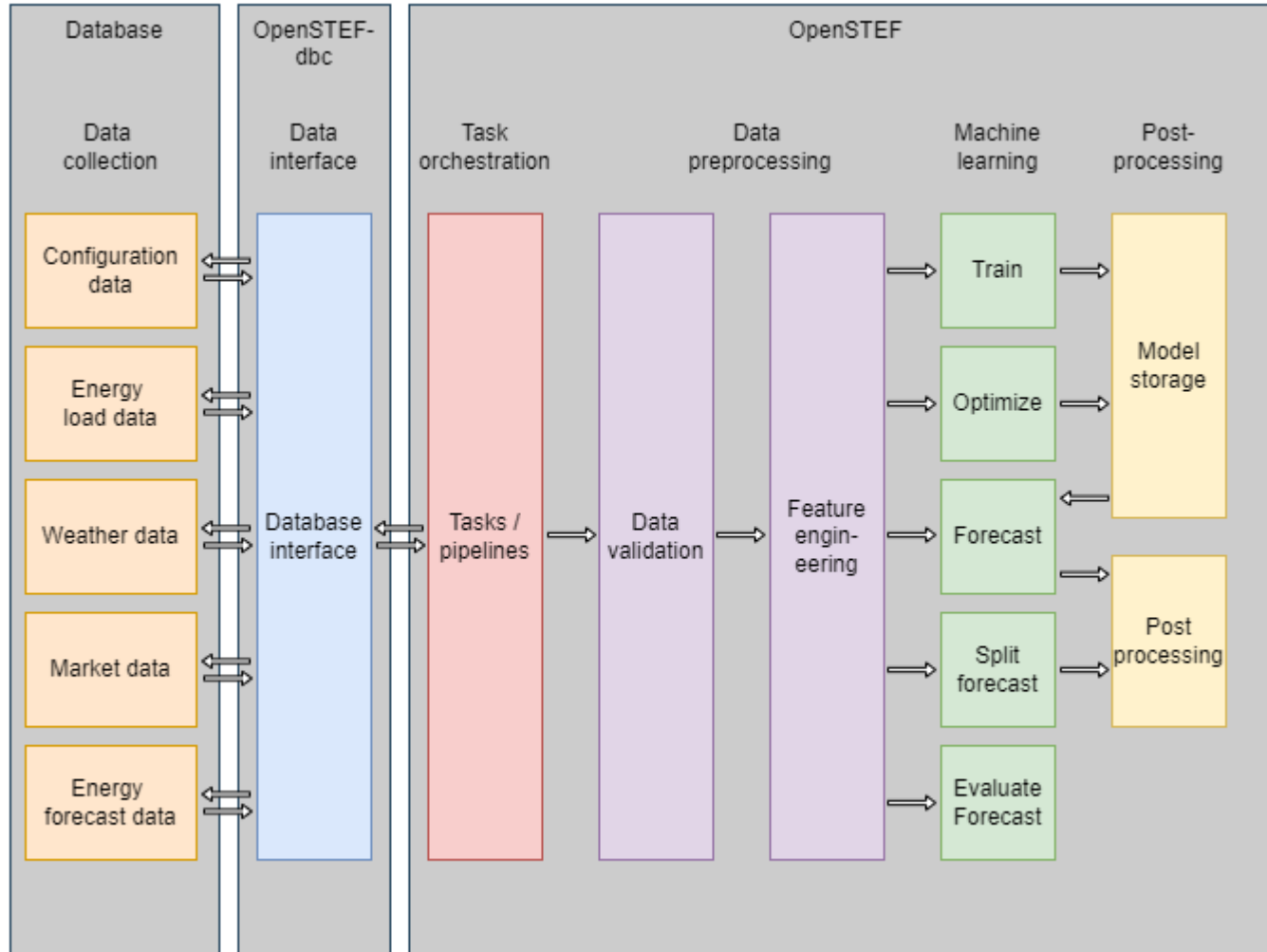


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**OpenSTEF**



# OpenSTEF in an operational setting

## Quick overview



# OpenSTEF in an operational setting

Live demo

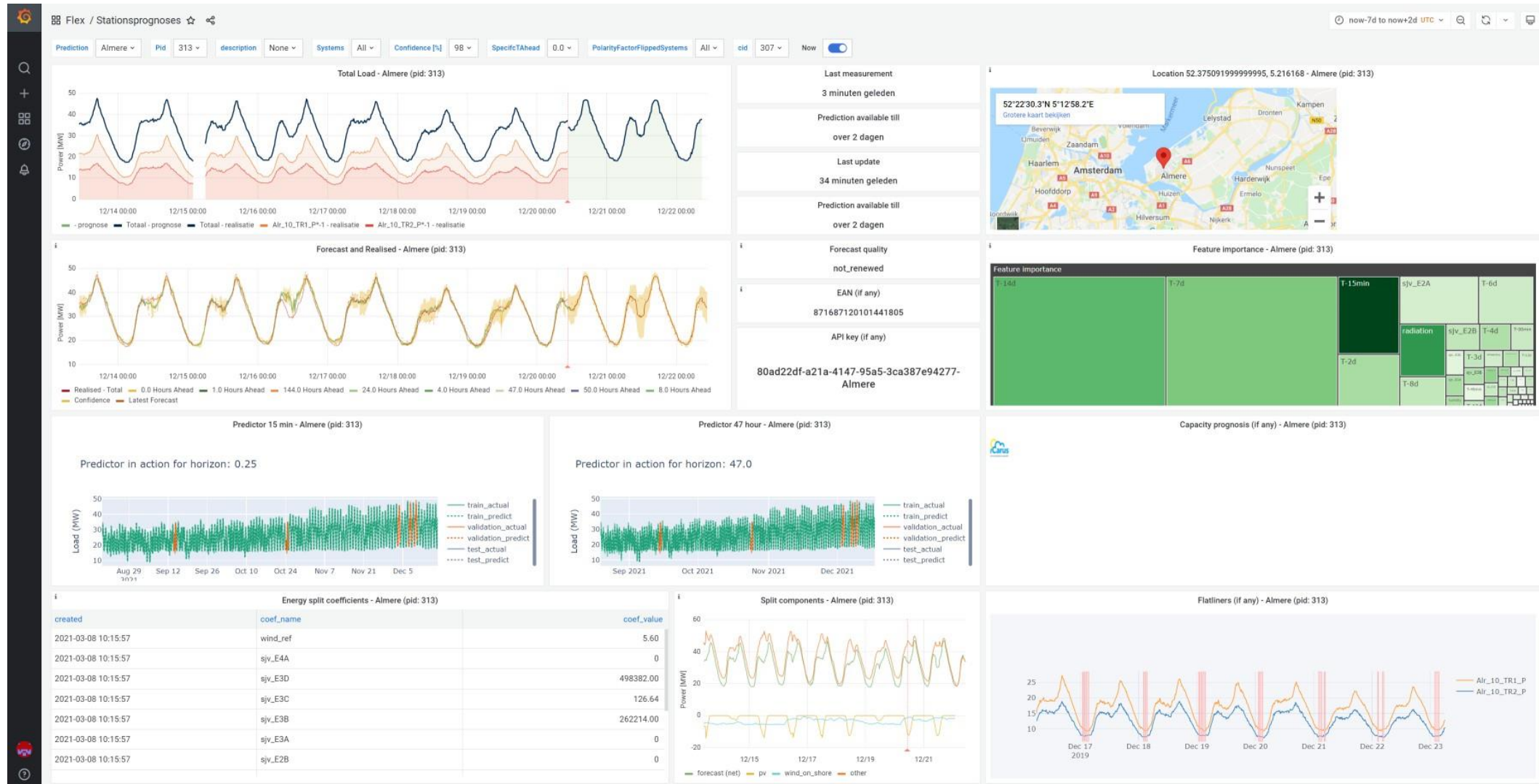


# Grafana



# OpenSTEF in an operational setting

Backup slide



# OpenSTEF

## Key information

**Website** <https://openstef.energy/>

**GitHub** <https://github.com/OpenSTEF>

<https://github.com/OpenSTEF/openstef-offline-example>

<https://github.com/OpenSTEF/openstef-reference>

**Docs** <https://openstef.github.io/openstef/>

**Wiki** <https://wiki.lfenergy.org/display/OS/OpenSTEF>



## Installation

```
$ pip install openstef
```

## Additional contributors



Le réseau  
de transport  
d'électricité



**Radboud University**



Do you have questions, remarks or are you interested in collaborating?

[frederik.stoel@alliander.com](mailto:frederik.stoel@alliander.com)