

Marketing flexibility in a virtual power plant



Gurobi Energy Innovation Summit 2024

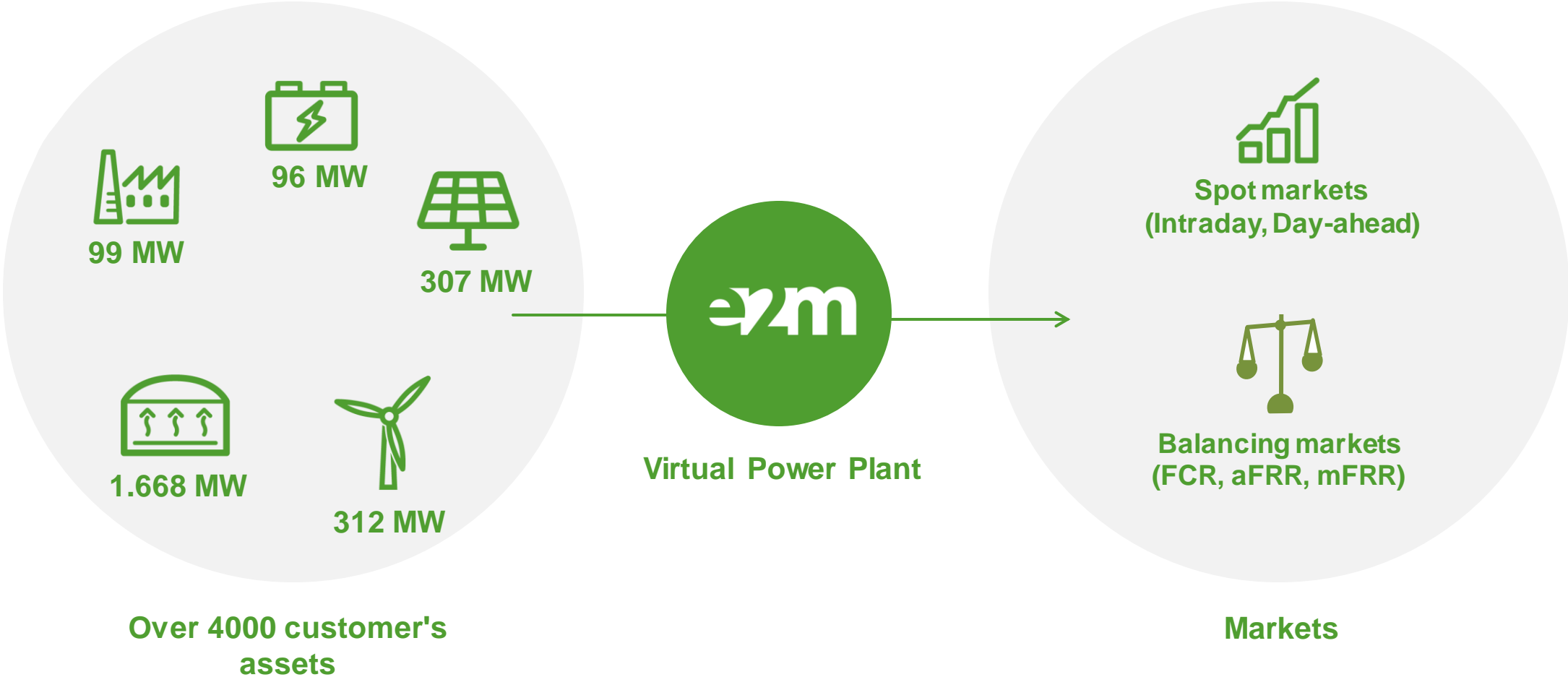
*Florian Kühnlenz
Guido Pleßmann*

energy2market

Energy2market
is part of EDF Group



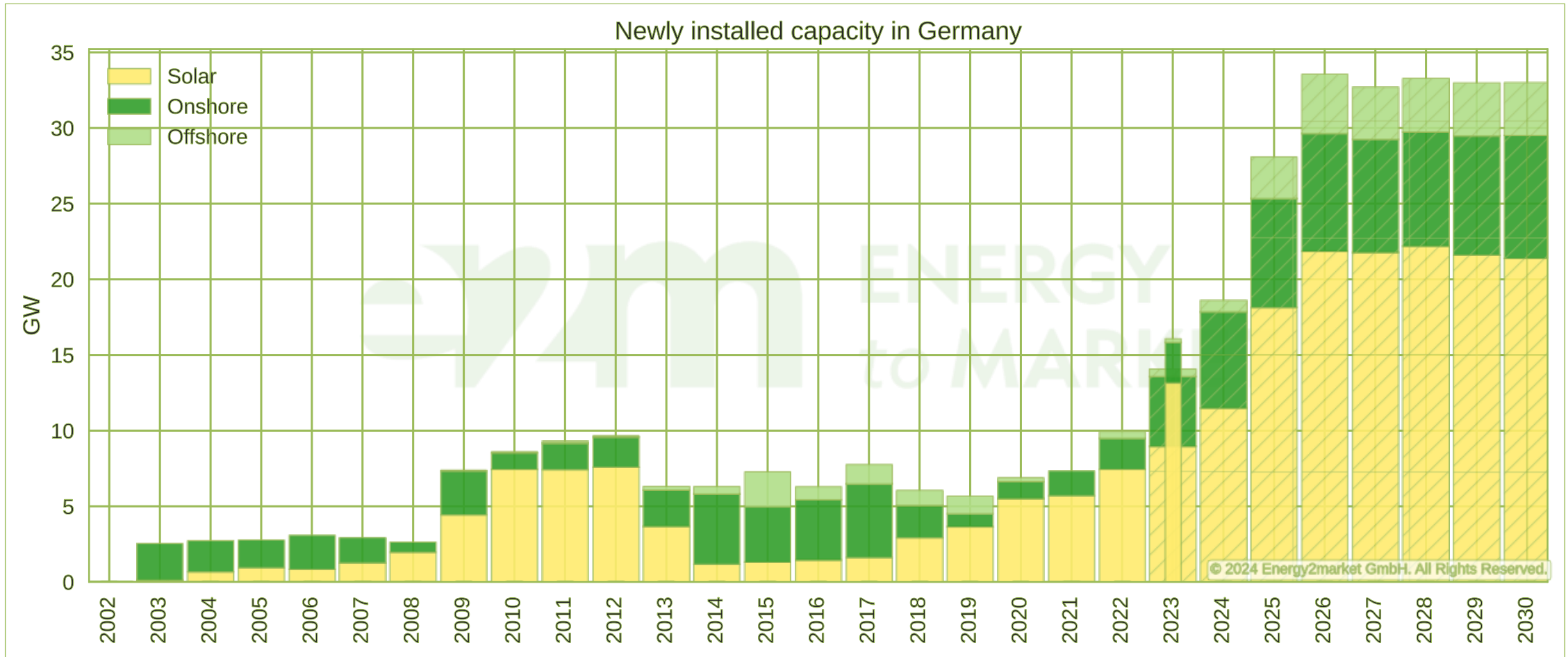
Power marketing at e2m



1. Chancen & Herausforderungen der Industrie



Ein Blick in die Zukunft

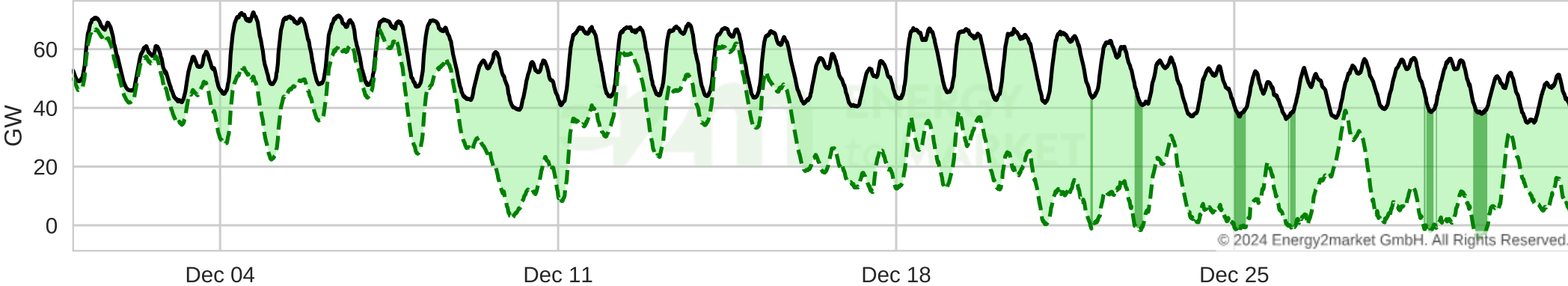


Challenges and chances

Flexibility increasing important



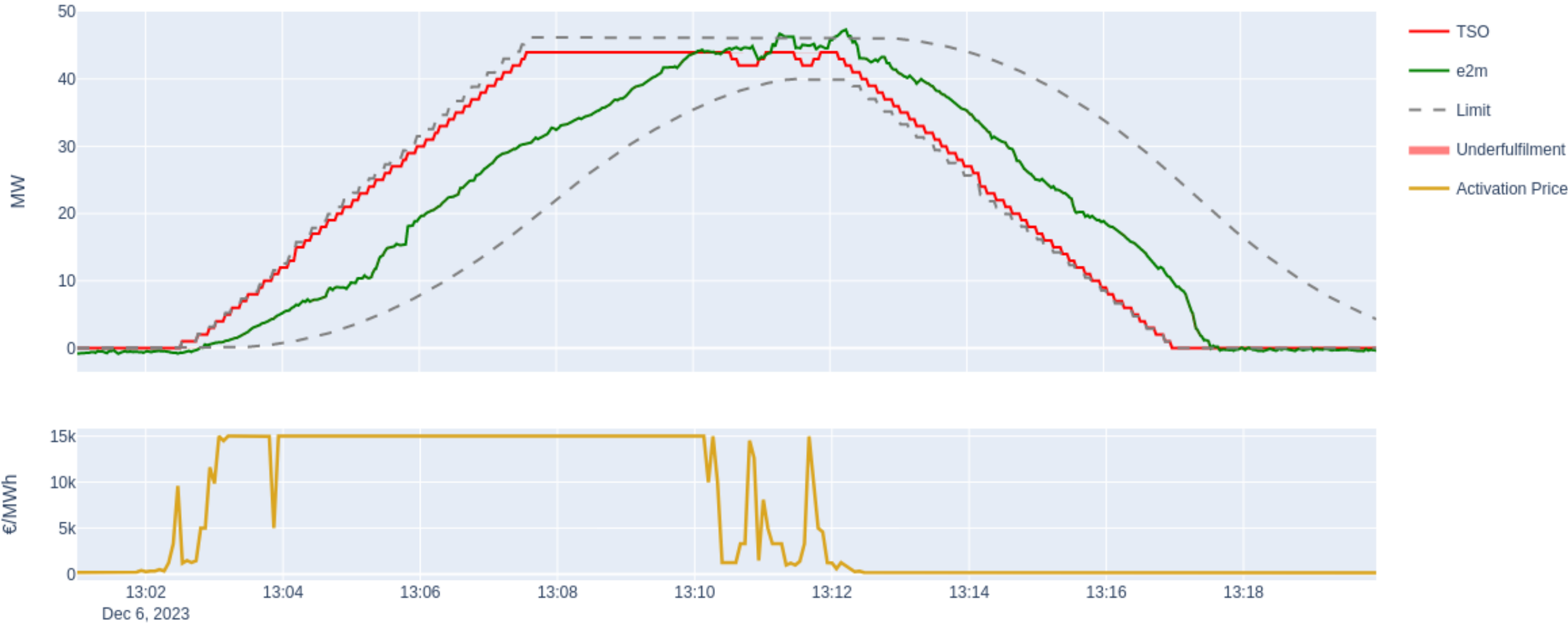
Residual load in Germany – December 2023



Spot Preise in Deutschland – Dezember 2023



On-Demand Flexibility



Agenda

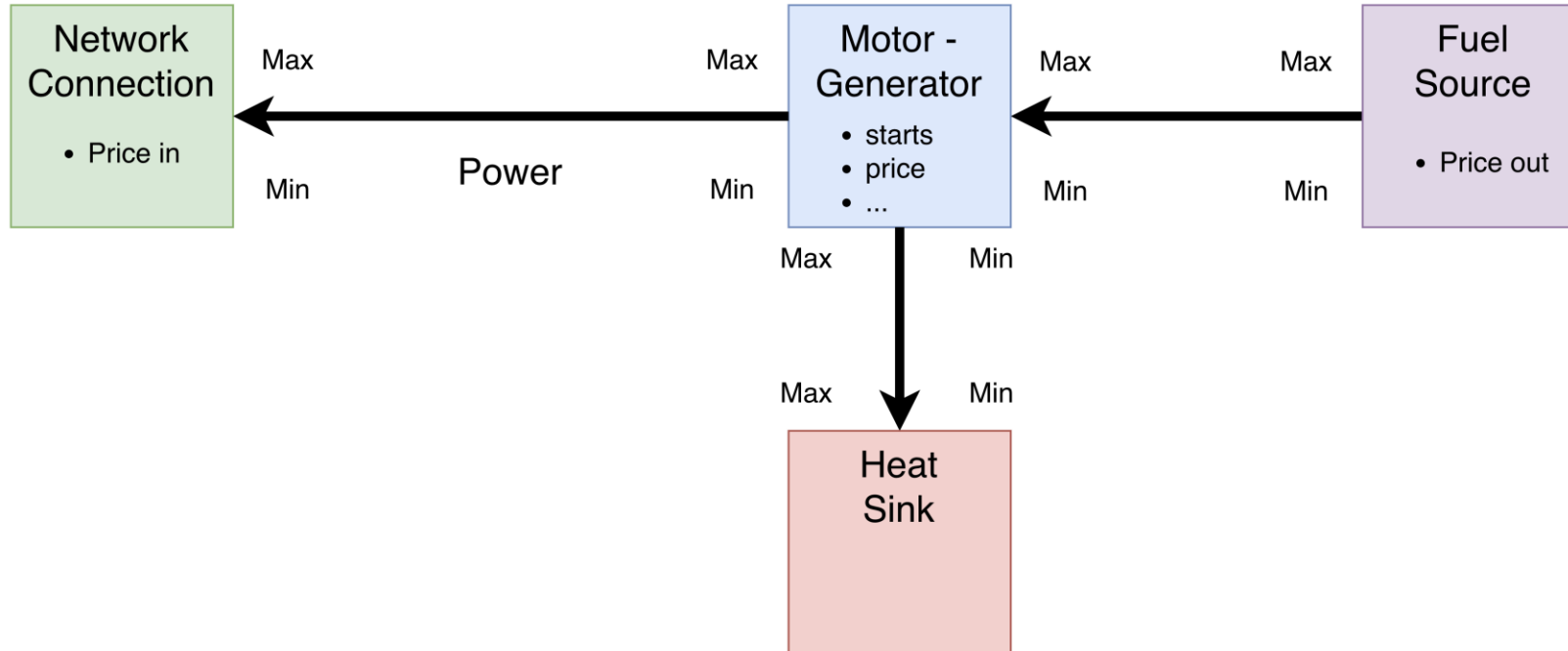


- 1 Generalized modelling library:
Prosumer Optimization
- 2 Use case 1: Biogas
- 3 Use case 2: Continuous optimization
- 4 Application Architecture



Modelling library Prosumer Optimization

Generic blocks as fundamental element



Energy flows between blocks

Prices can be attached to flows

Generic block becomes source, sink, transformer or storage depending on configuration



It can get more complex

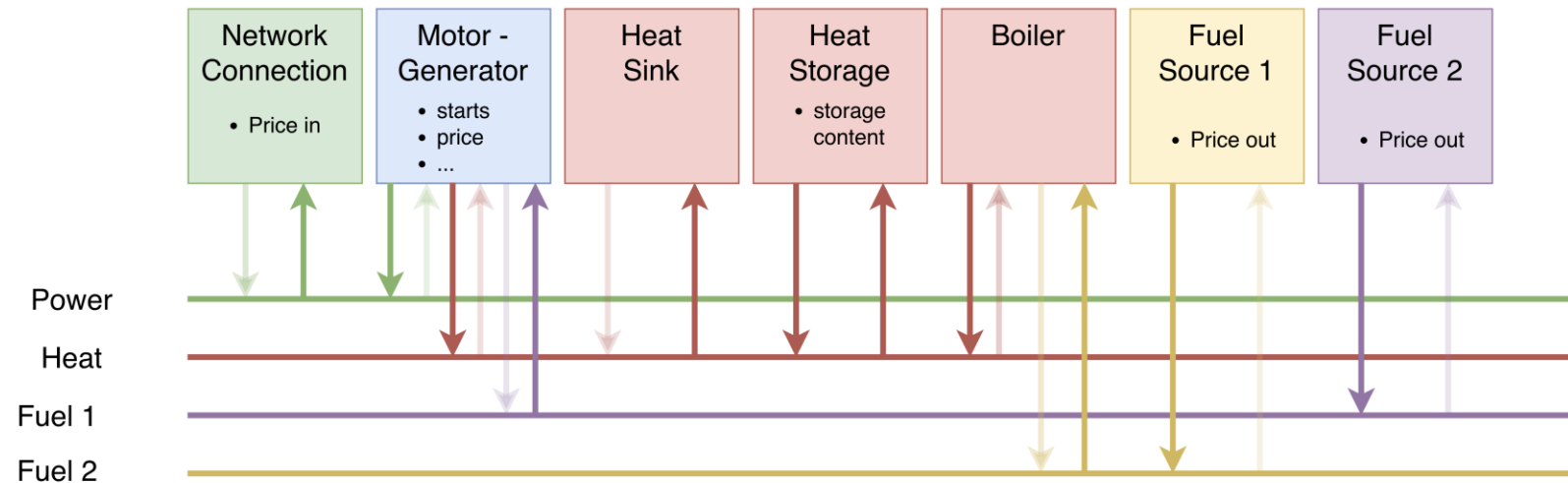


Inputs and outputs can be connected to different energy types

Balancing services (FCR, aFRR, mFRR) are included in the optimization problem

Integer constraints introduced, i.e. by

- Operational ranges
- Balancing power constraints
- Start and stop conditions



Agenda



- 1 Generalized modelling library:
Prosumer Optimization
- 2 Use case 1: Biogas
- 3 Use case 2: Continuous optimization
- 4 Application Architecture



Biogas optimization

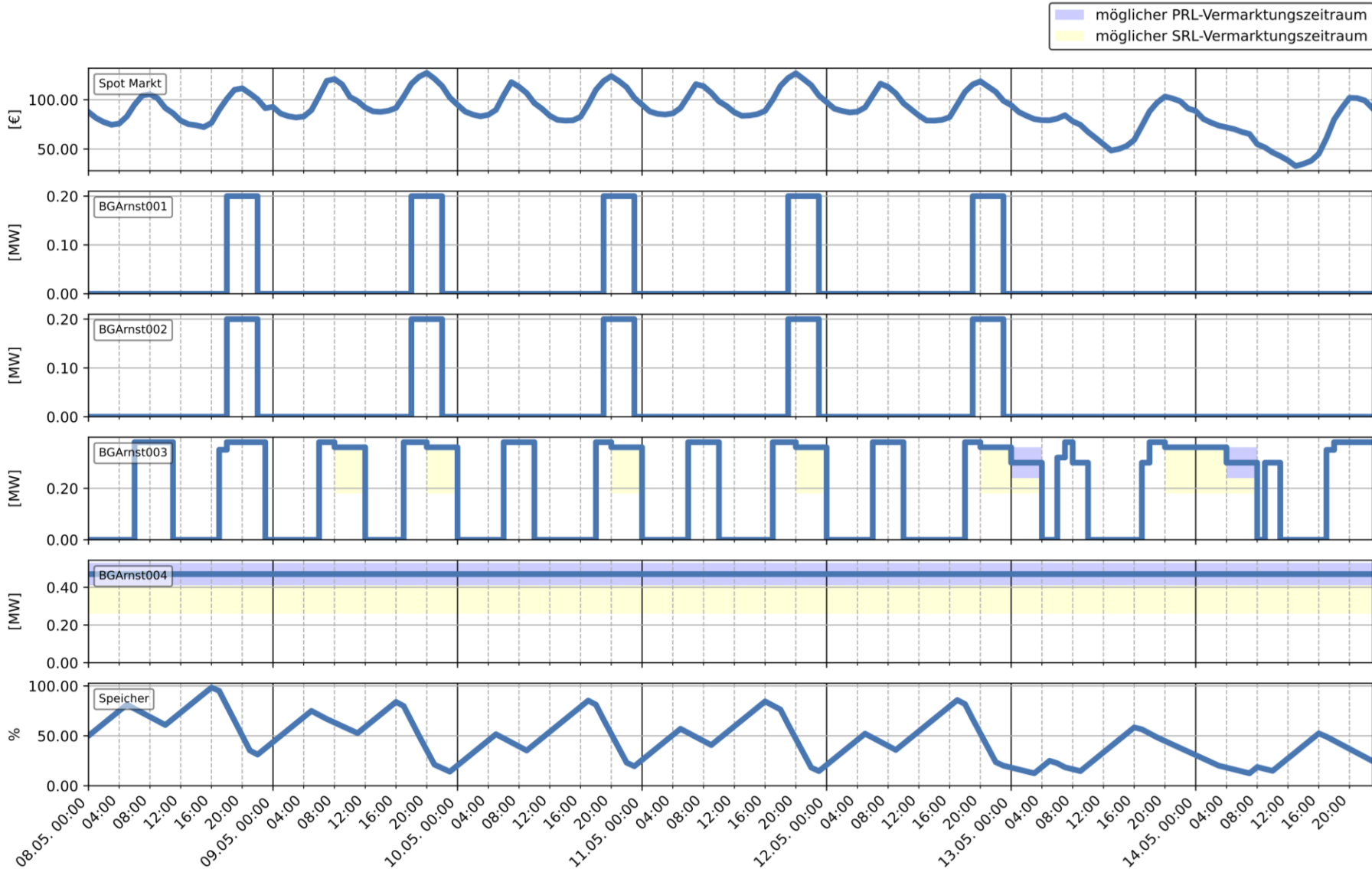


Markets: Day-ahead, FCR, aFRR

Challenges

- Annual target rated power
- Expected gas production and storage levels
- Limited number of starts and stops
- Minimum on and off time
- Dependency of balancing power and wholesale marketed power
- Markets time slice lengths
- Balancing power ranges

Weekly schedule biogas



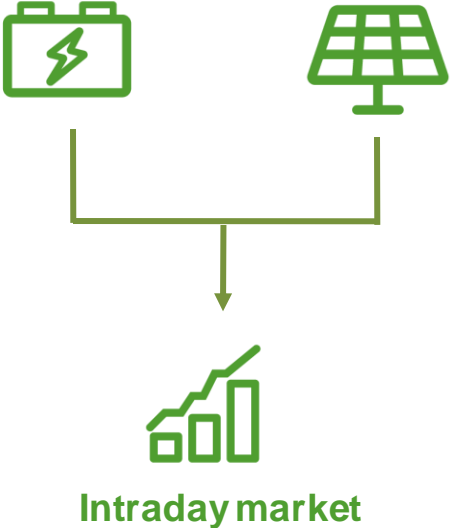
Agenda



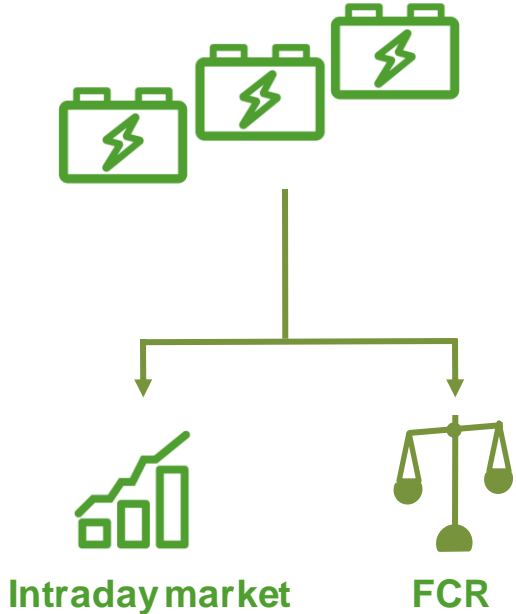
- 1 Generalized modelling library:
Prosumer Optimization
- 2 Use case 1: Biogas
- 3 Use case 2: Continuous optimization
- 4 Application Architecture



Innovation Tender



Fleximum Batteries



Agenda



- 1 Generalized modelling library:
Prosumer Optimization
- 2 Use case 1: Biogas
- 3 Use case 2: Continuous optimization
- 4 Application Architecture



Application Architecture



interactive users



Pre-processing

Pre-processing

Pre-processing



Opt.

Opt.

Opt.

Opt.

Post-processing

Post-processing

Post-processing



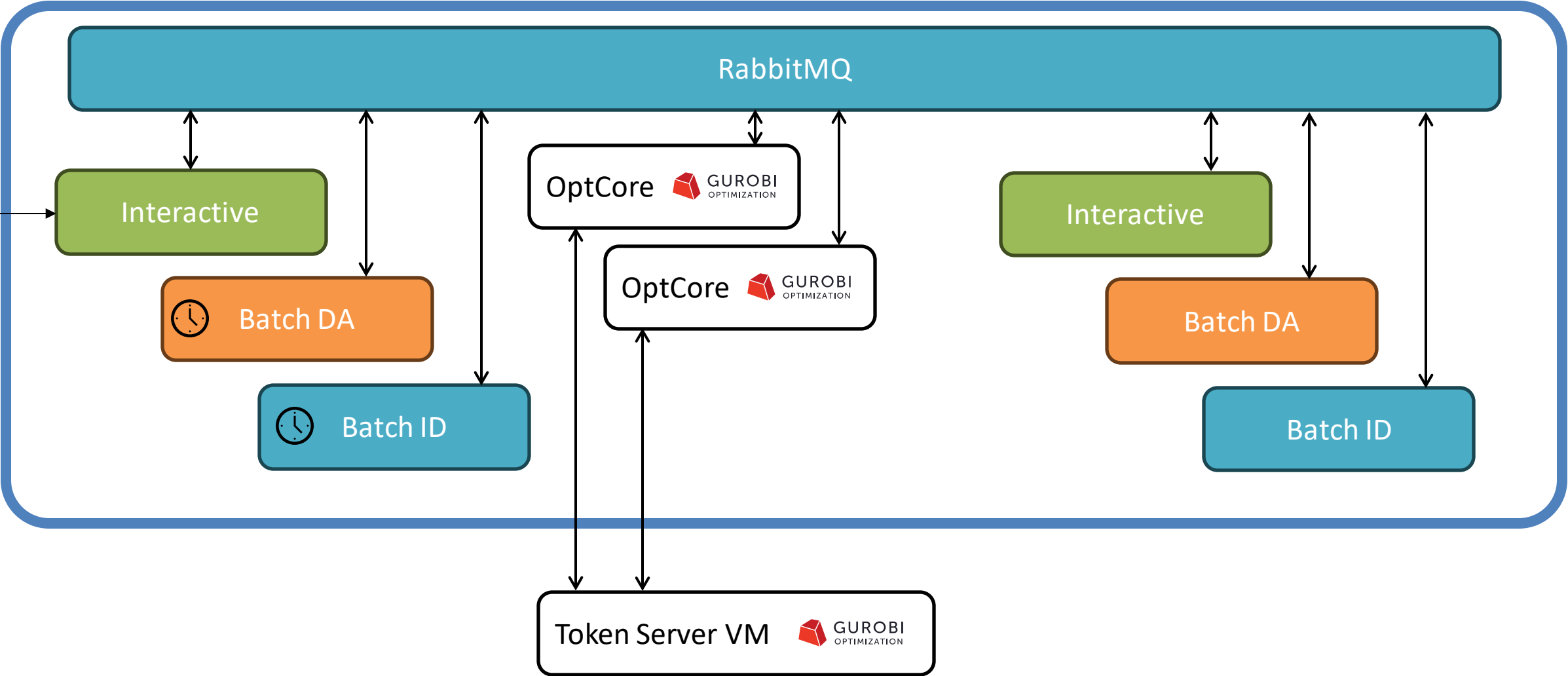
batch runs
day ahead

batch runs
intraday

Infrastructure



 **kubernetes**



Contact



Energy2market GmbH
Weißenfelser Str. 84
04229 Leipzig

Florian Kühnlenz
Team Lead Data Analysis
Email: florian.kuehnlenz@e2m.energy

