providing ancillary services with and for more renewables in Belgium

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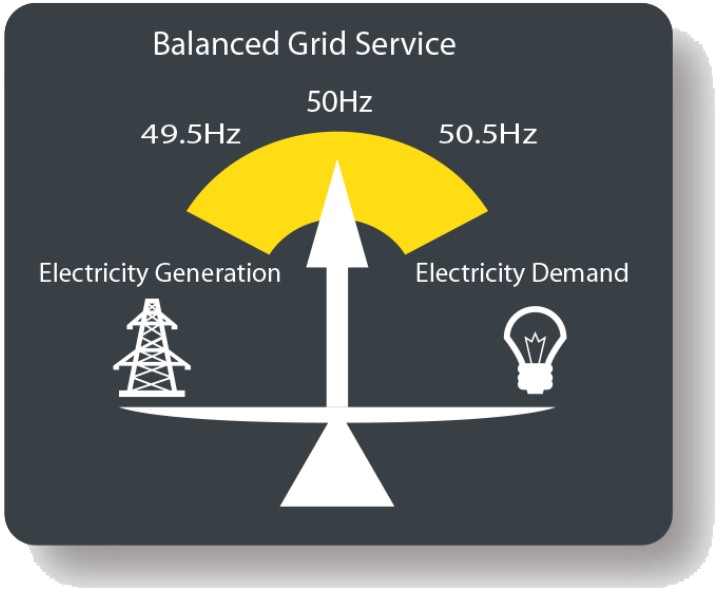
OVERVIEW

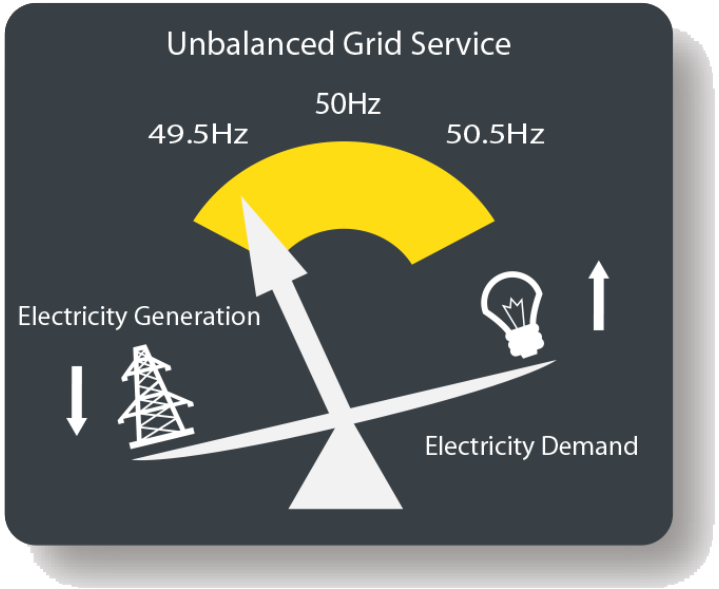
- Why we need more flexibility
- The key: the Virtual Power Plant
- Some examples: renewables providing flexibility
- Conclusion

Why we need more flexibility

A STABLE ELECTRICITY GRID

- In every AC-grid, a stable frequency is primordial
- National grid operators are responsible to safeguard the balance
  - Enforce balanced positions via BRP role
  - Organise markets to procure balancing power: FCR, aFRR, mFRR





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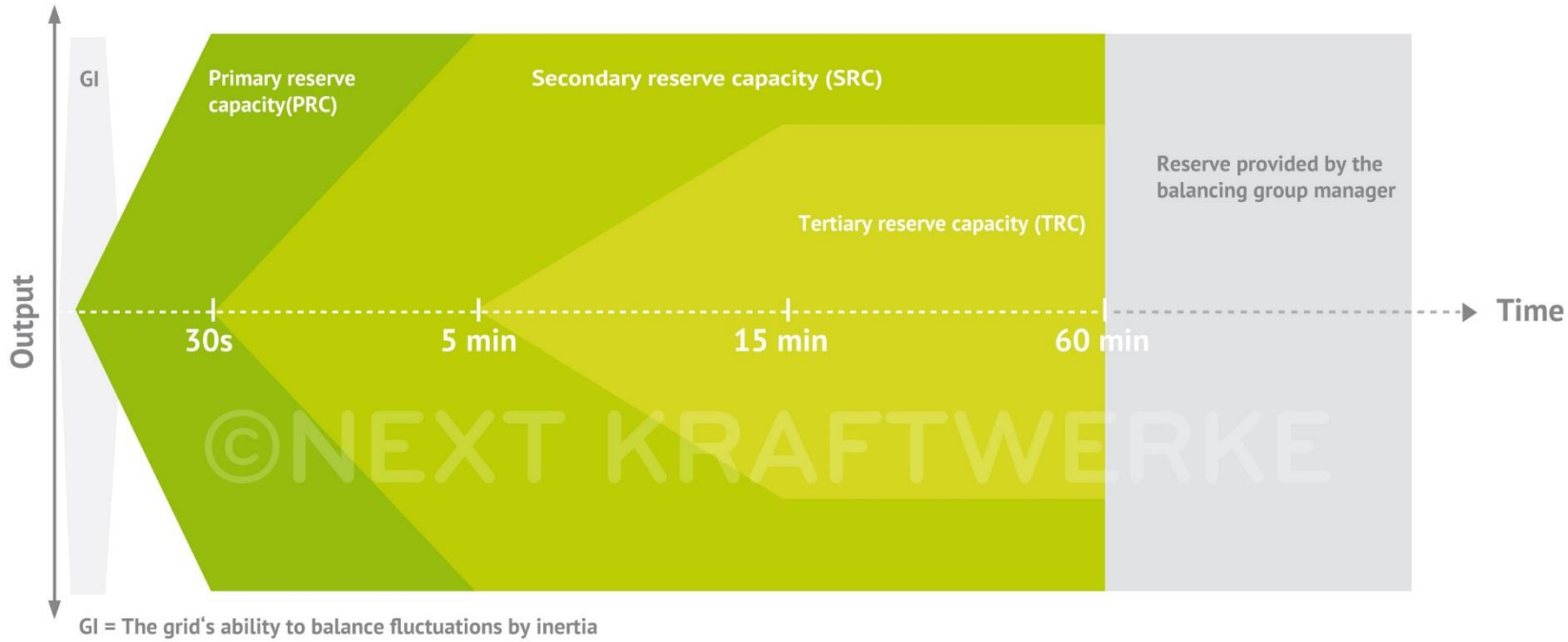
BELGIAN BALANCING POWER PRODUCTS

Primary reserves | Secondary reserves | Tertiary reserves



Very fast common European reserves to stabilize frequency deviations.

Fast automatic reserves to restore the balance of the control area.

Slower manual reserves to free up aFRR.

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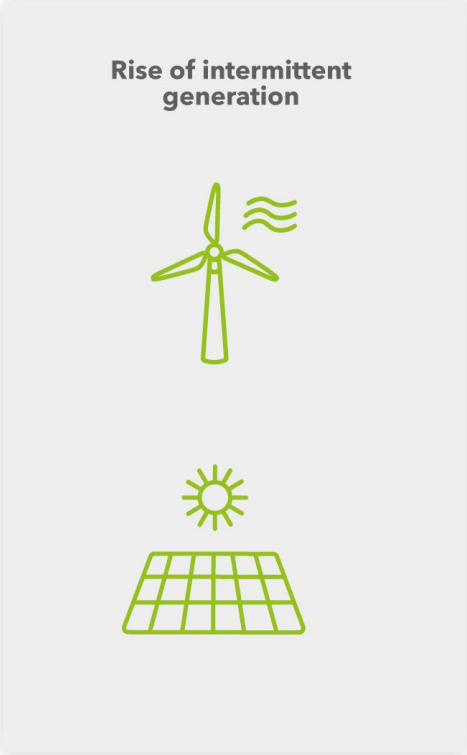
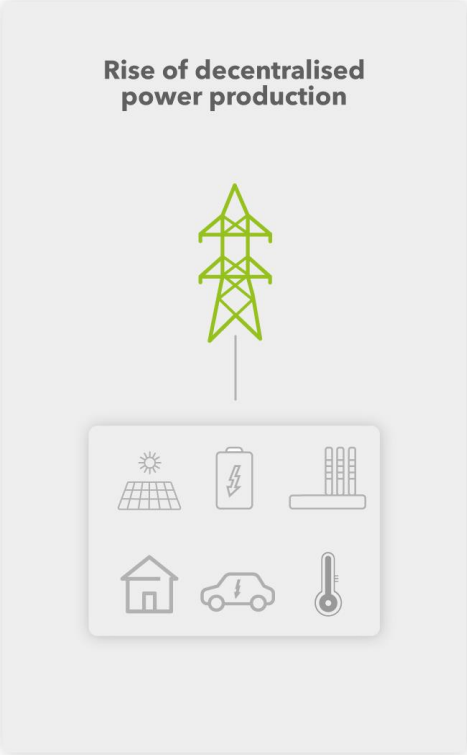
BUT… THE ENERGY LANDSCAPE IS CHANGING

- Three ‘megatrends’ in the Belgian energy sector:





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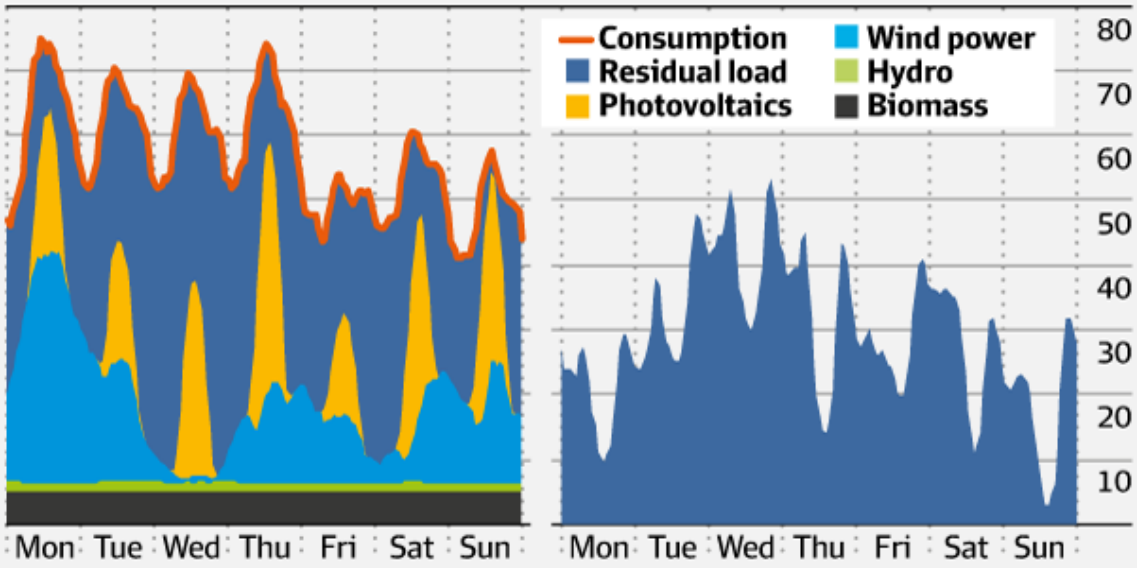
…WHICH PUTS THE BALANCING FRAMEWORK UNDER PRESSURE

- More need for flexibility
- Conventional providers: uncertain future and expensive (must-run)

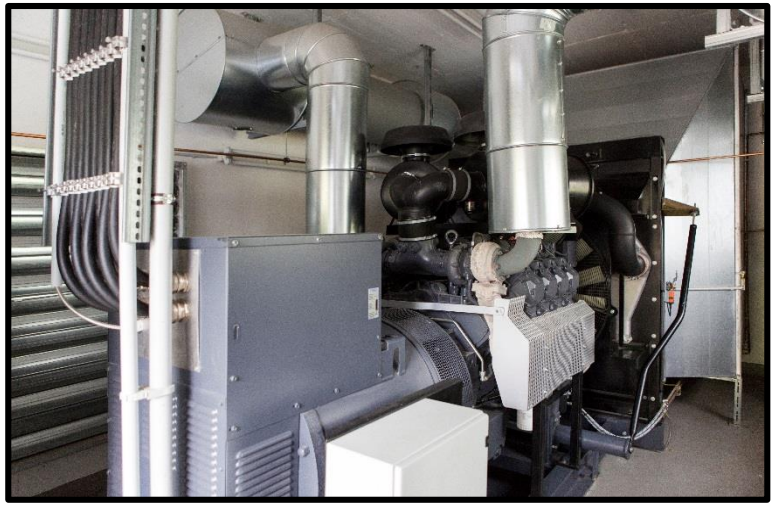
Gross electricity generation and residual load in Germany in a sample week in April 2022 with 50% renewables (GW)



SOURCE: AGORA ENERGIEWENDE

YET… A LOT OF FLEXIBILITY READY TO BE UNLOCKED

- Small-scale flexibility under the radar
- Entrance barriers:
  - Insufficient scale
  - Failing to meet technical requirements
  - Licenses and fees
  - Lack of market and regulatory know-how



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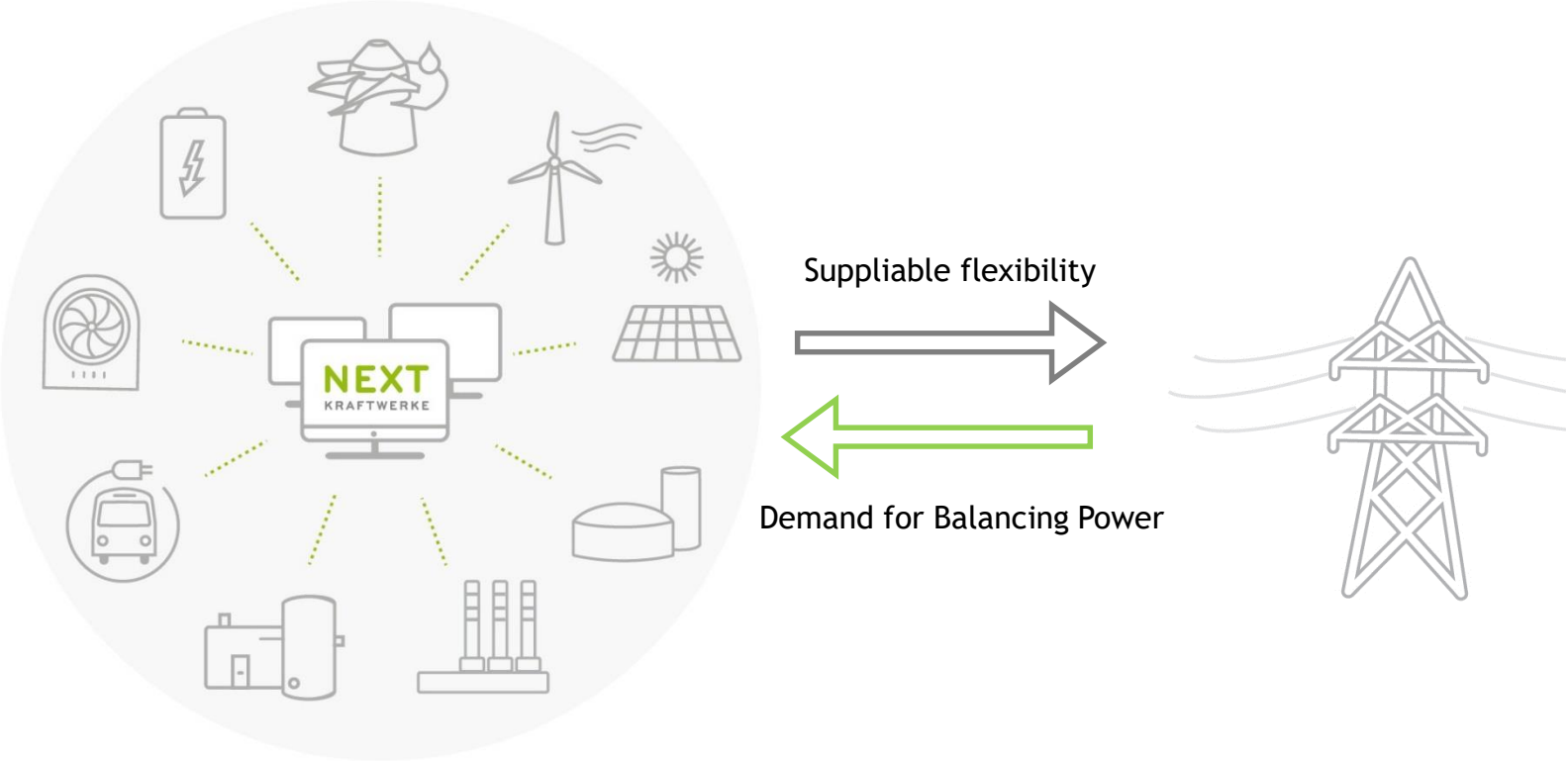
AGGREGATION IN A VPP



+ Additional revenue stream

+ Lower balancing costs

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THE KEY: THE VIRTUAL POWER PLANT

DEFINITION (SORRY!)

- A virtual power plant is a…

technology platform
that **connects distributed energy resources**
to **markets and services**
which they might **otherwise not have access** to.

(Bloomberg New Energy Finance)

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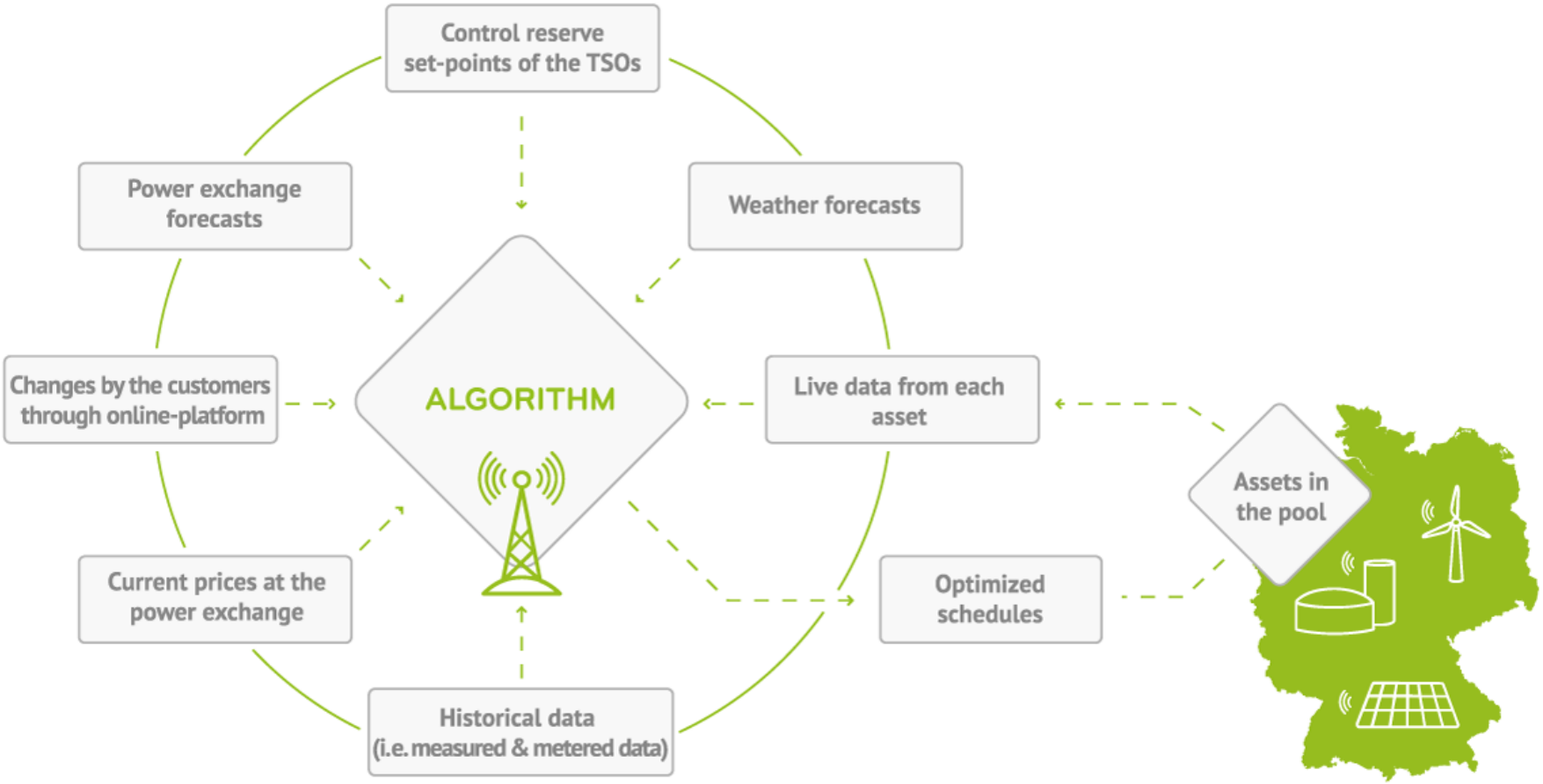
TECHNOLOGY PLATFORM: AGGREGATION BY DIGITALISATION



CONNECTING DISTRIBUTED RESOURCES

- Decentralised (at the DSO level)
- Also behind-the meter
- Production AND consumption (demand response)

- A lean VPP is technology agnostic!

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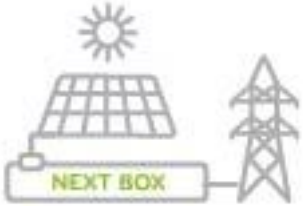
ACCESS TO MARKETS AND SERVICES

- Spot markets
  - Trading in day-ahead, intraday, and imbalance markets

- Ancillary services
  - Balancing markets: FCR, aFRR, mFRR
  - Black-start



- Local network support
  - Voltage regulation
  - Congestion management

- Optimal scheduling
  - Optimising production / consumption schedules based on prices

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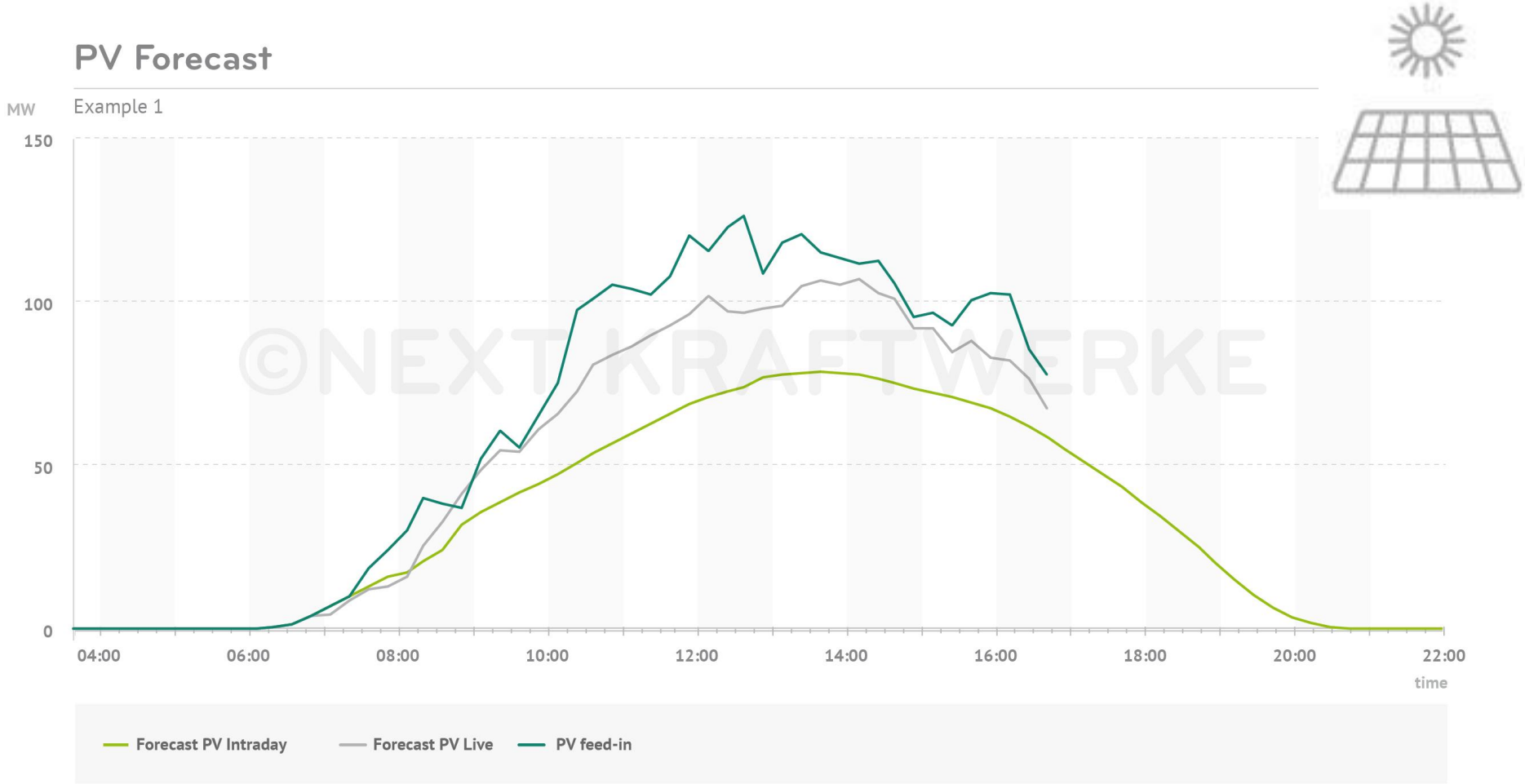
SOME EXAMPLES

EXAMPLE: RENEWABLE POWER TRADING ON SPOT MARKETS



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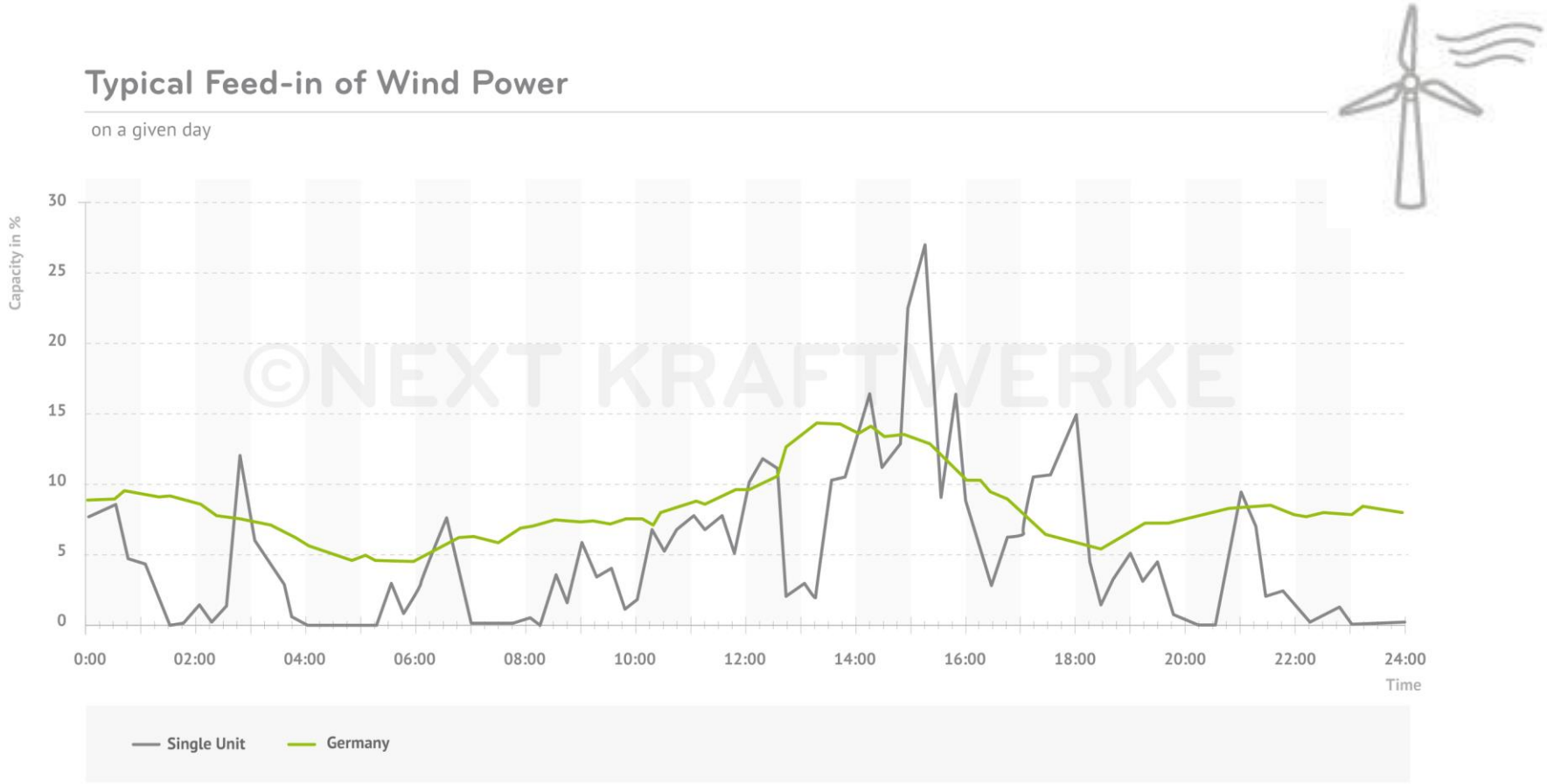
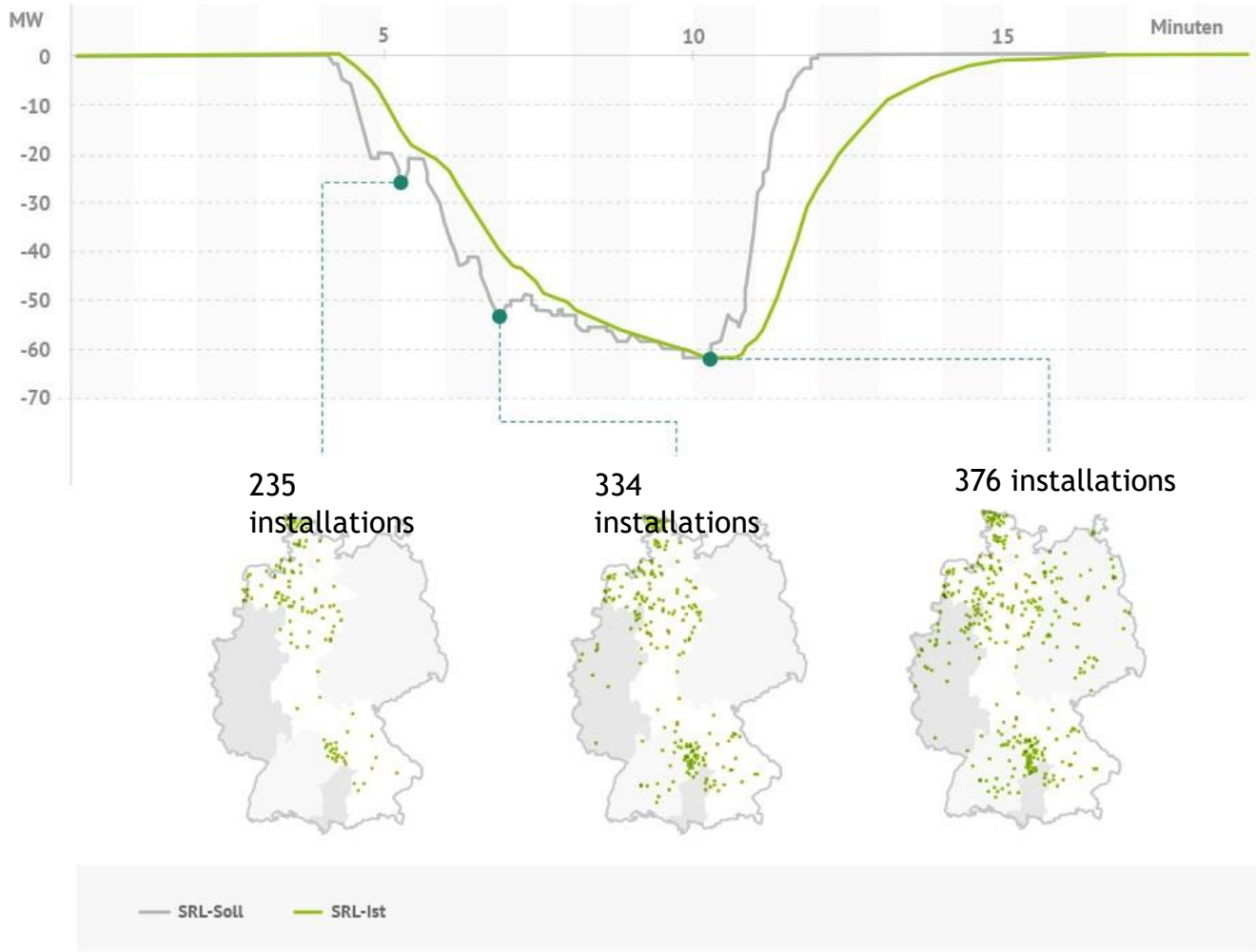


EXAMPLE: ANCILLARY SERVICES (SECUNDARY RESERVE)



EXAMPLE: FCR IN BELGIUM

- 2 MW – 2 MWh battery
- The site:
  - Factory
  - Local wind production
- Applications:
  - FCR
  - Self consumption wind
  - Imbalance price steering

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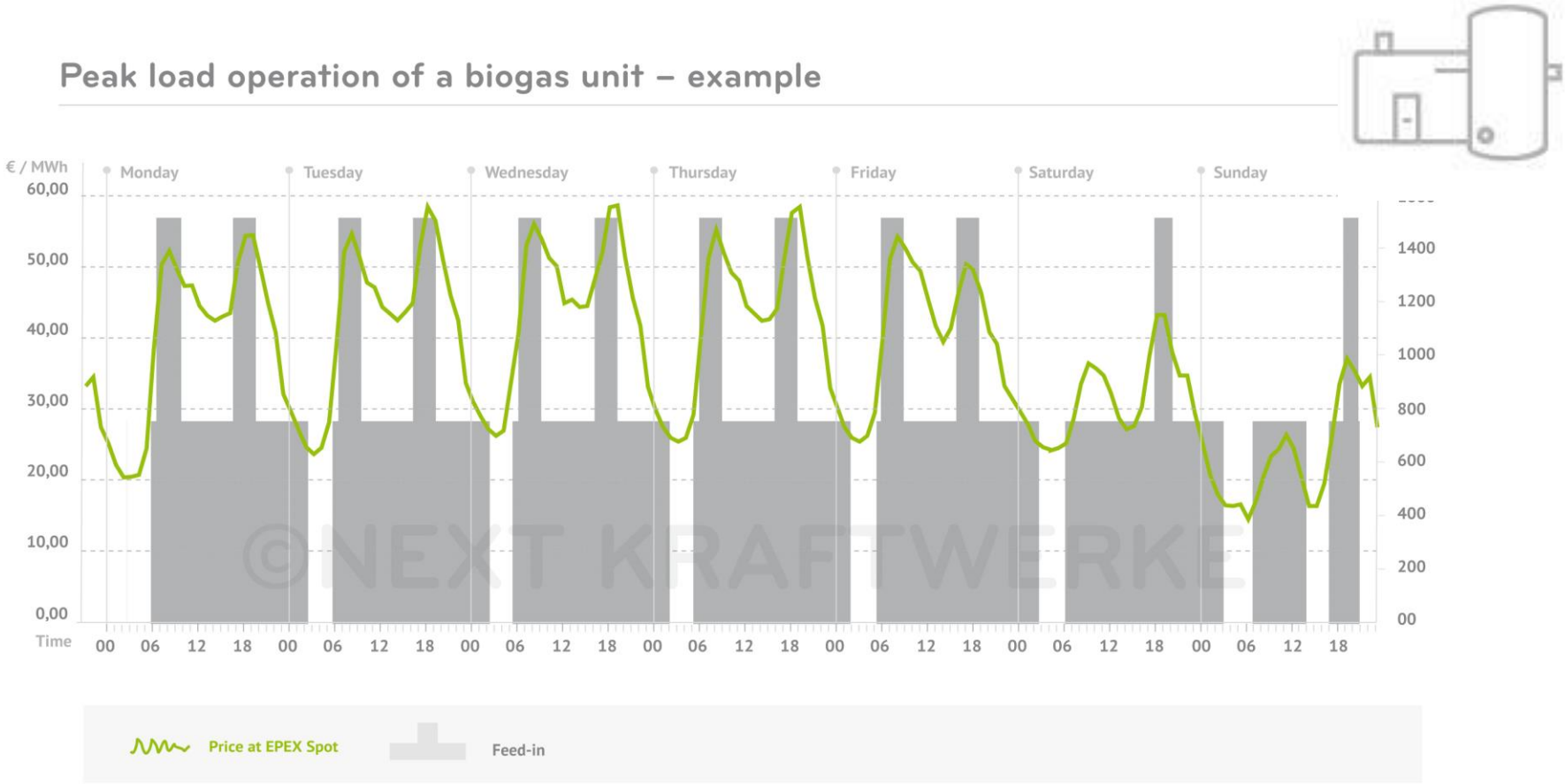
EXAMPLE: OPTIMAL SCHEDULE BASED ON PRICE SIGNALS



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PARTICULARITIES OF THE BELGIAN MARKET

- Usually long term PPAs
- Regional subsidy schemes
- Solar PV mostly small-scale

- Ancillary service markets not fully opened
- Rules are biased towards certain technologies
- Tedious prequalification process

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Conclusion

WRAP UP

- THE PROBLEM: due to renewables we need more flexibility
- THE SOLUTION: we can use decentralized renewable assets to provide that flexibility
- THE ENABLER: the VPP clusters and automatically dispatches them

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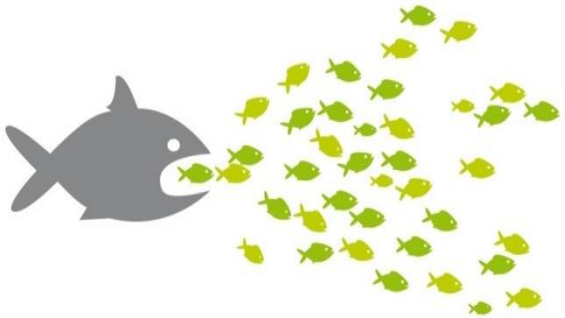

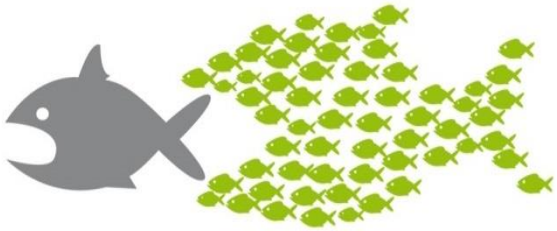

EXTRA

TECHNOLOGY PLATFORM

Remote controller

Interface with installations

Monitor production / consumption

Relay dispatch instructions

Communication

Link between installation and VPP

Fast and secure

Cellular, built-in electricity lines, internet

Algorithms

To monitor and forecast aggregated production and consumption

Dispatch installations optimally

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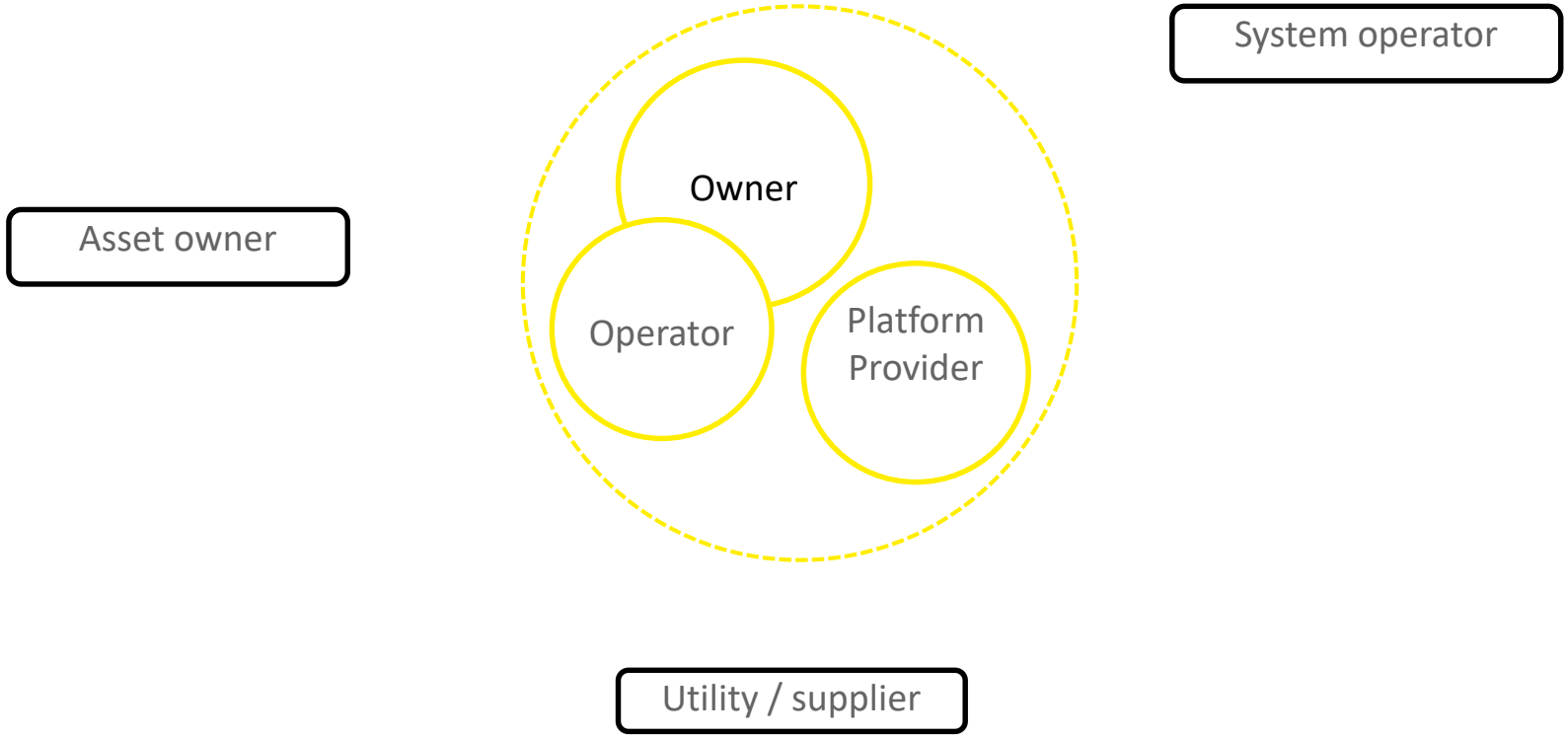
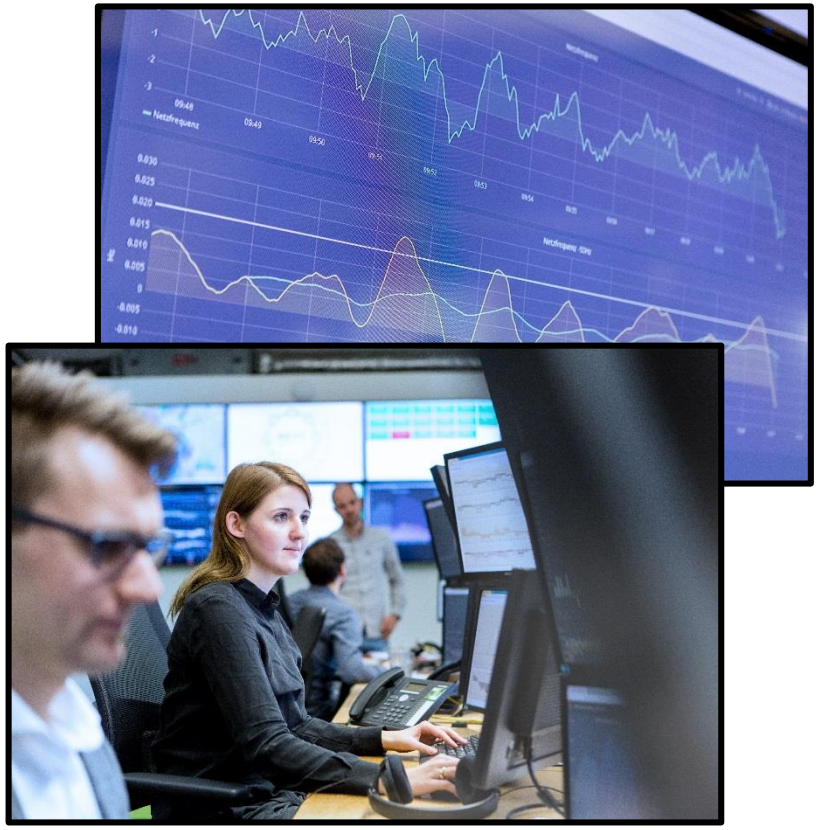
DIFFERENT VPP PLAYERS



THE BRAINS AND THE HANDS OF THE VIRTUAL POWER PLANT

Brains: algorithms and experienced traders



Hands: the Next Box

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ENERGY STORAGE AND VPPs

USE CASES FOR DECENTRALISED ENERGY STORAGE

- Self consumption renewables
- Reducing grid tariffs
- Back up power

Local optimisation

- Optimal schedule based on price signals
- Local grid support
- Ancillary services

Aggregator needed!

Note: trend towards value stacking

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