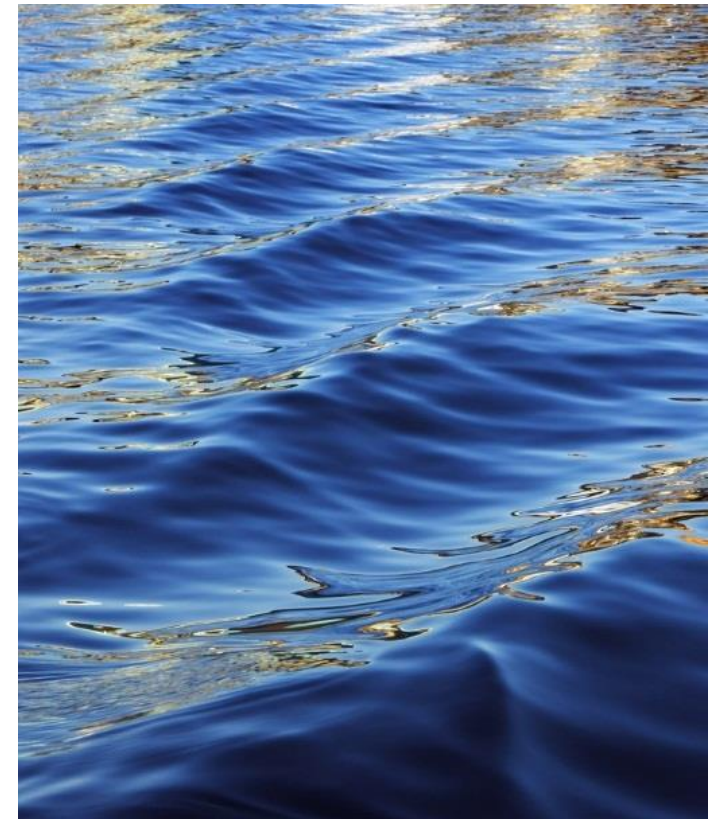
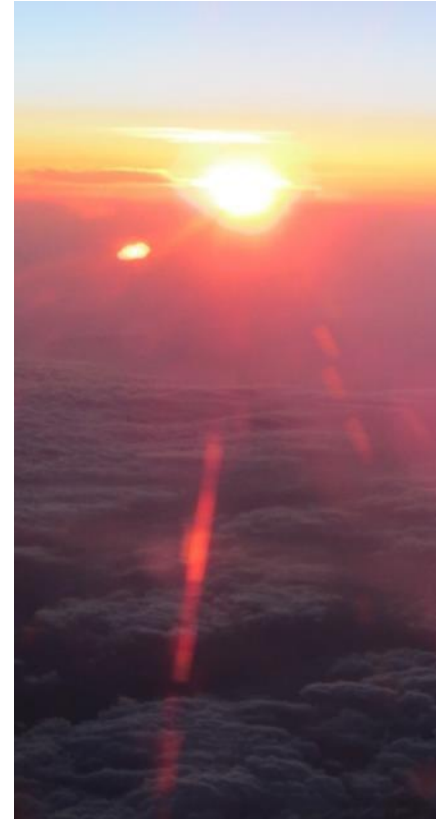




A New Partnership of Greener Energy and Smarter Industry

Smart Energy Management
for a Net Zero Industry

Greener Manufacturing Show, Cologne, Nov 10-11th 2021
Thomas Walter, Managing Director, Easy Smart Grid GmbH

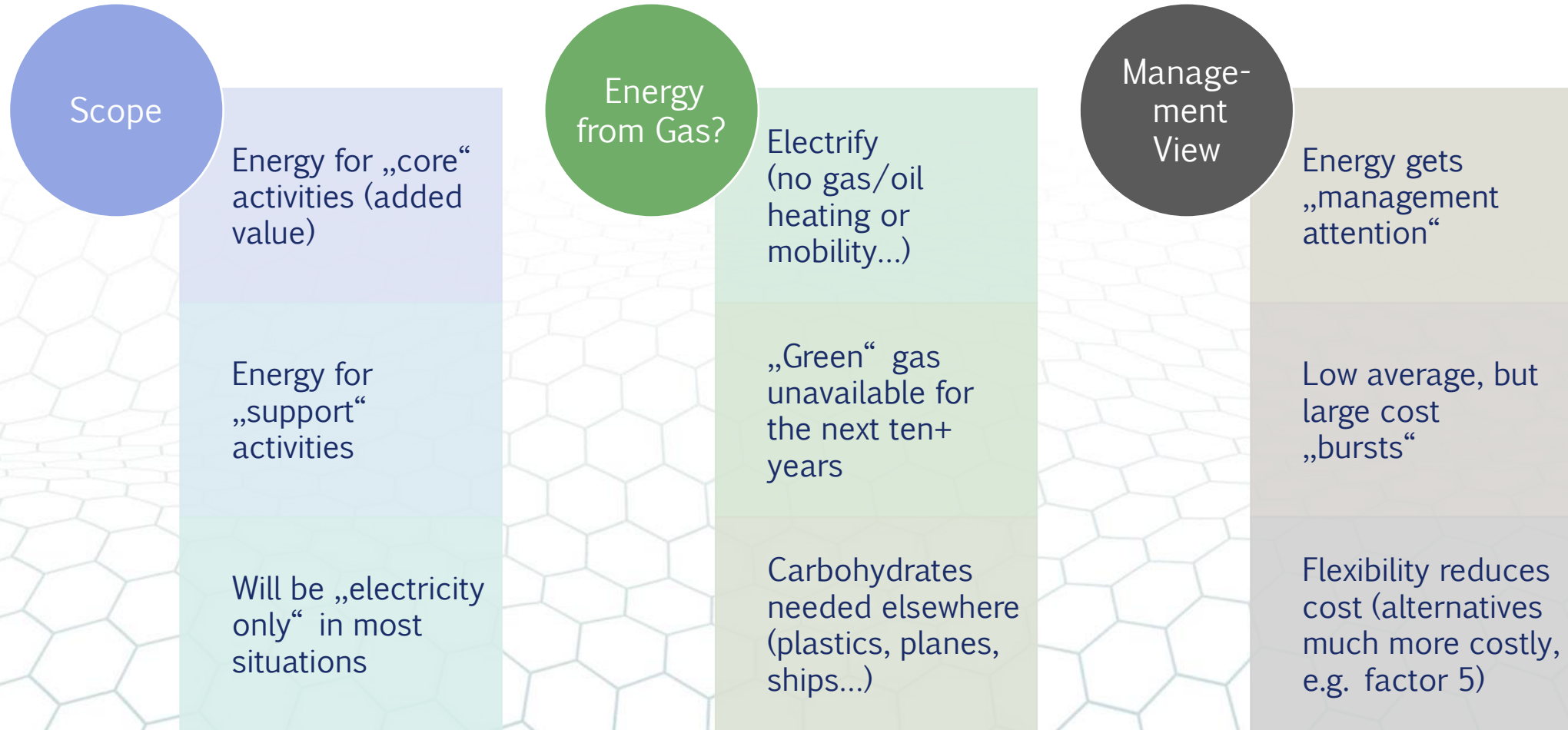


The rise of renewables

- Scope and future trends
- Potential and learnings from other sectors
- Specific industry needs
- Use cases in industry
- Our contribution

Scope and trends

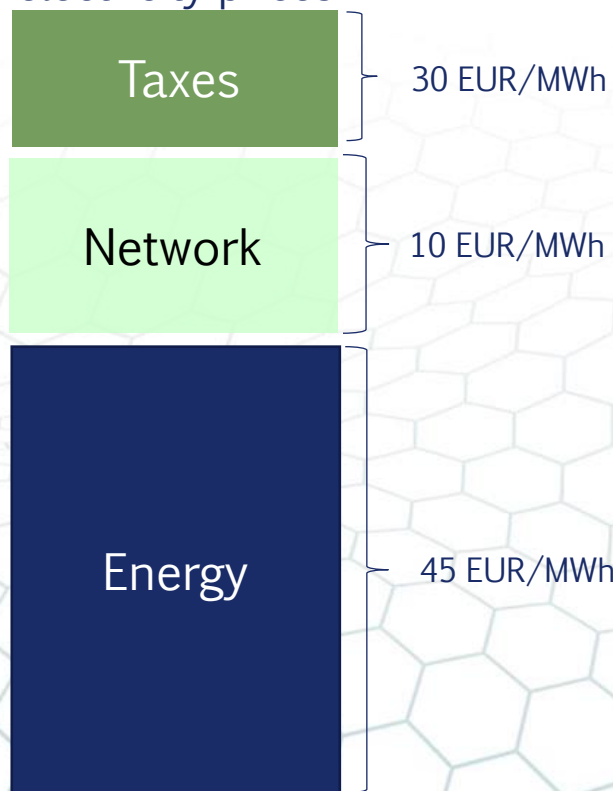
Efficiency and flexibility matter



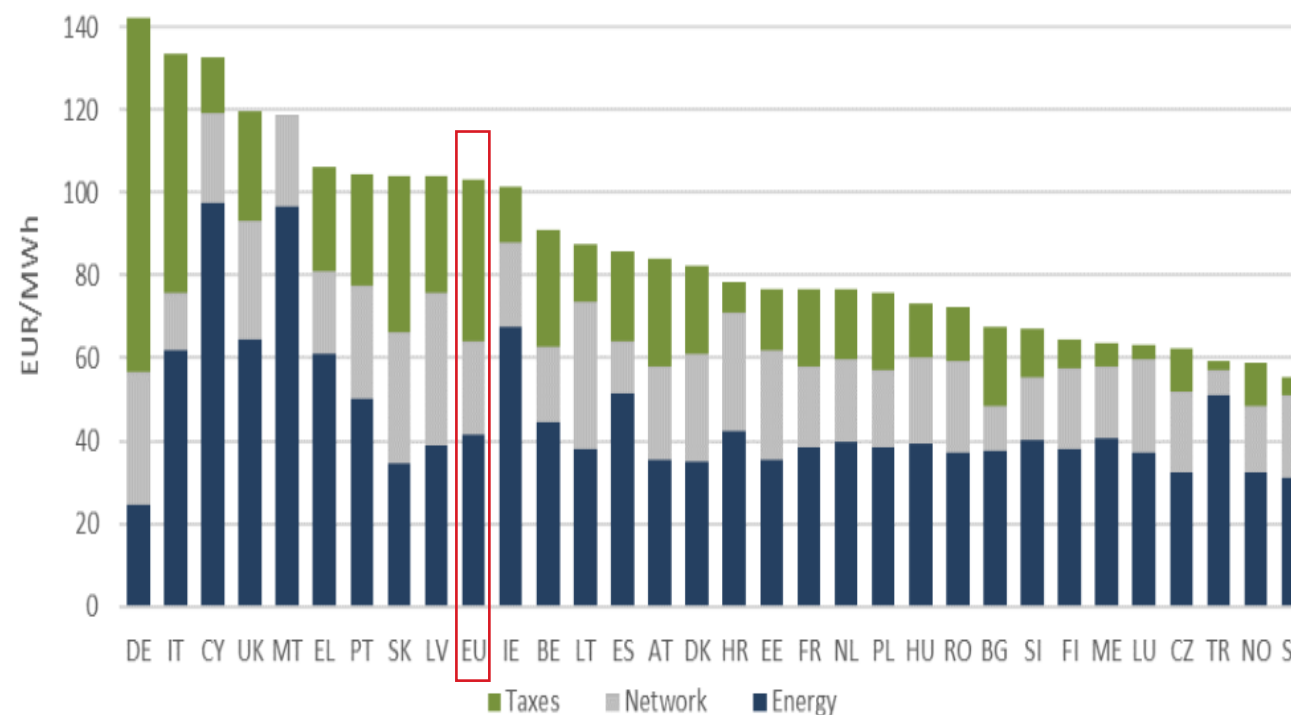
Scope and trend

Scenarios very different per country

EU Industrial
electricity prices



Industrial electricity prices in 2017



Source: DGENER in-house data collection

Potential

Flexibility value estimated by “industRE”

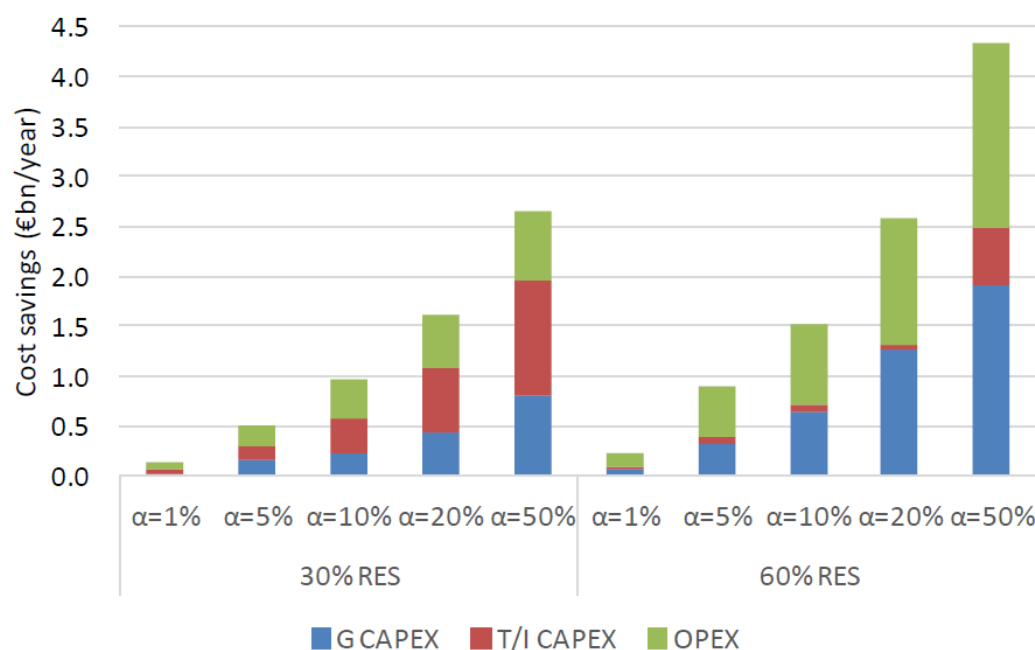


Figure ES1: European electricity generation and transmission cost savings brought by FID for different scenarios of industrial demand flexibility and renewable generation.

Flexible Industrial Demand (FID) value key observations:

- grows with RE share
- grows with flexibility
- created mainly externally
- value drivers change over time

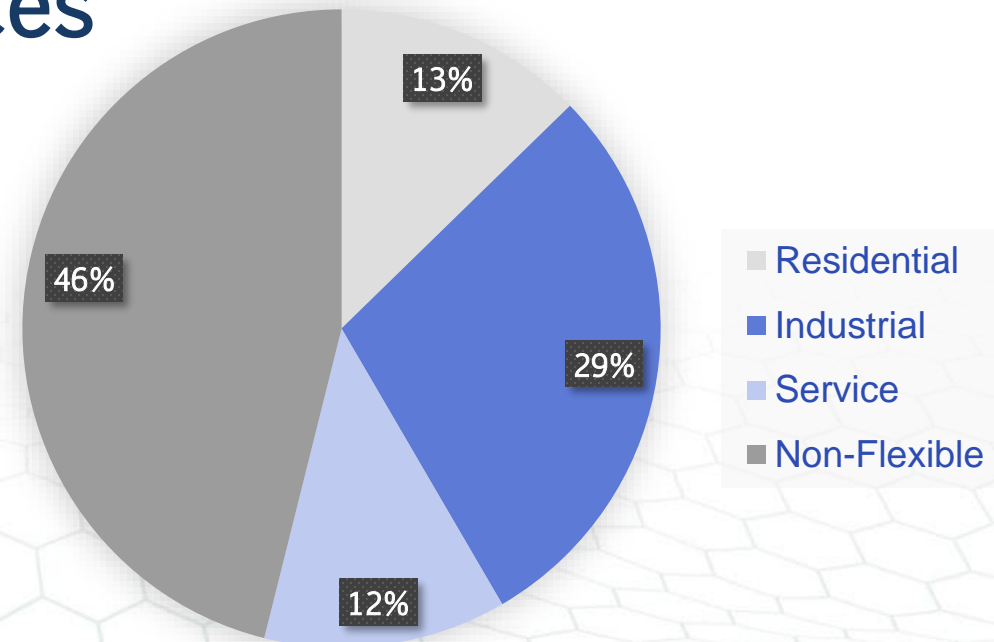
European project with six countries

- G CAPEX – avoided generation investment
- T/I CAPEX – avoided transmission/interconnect investment
- OPEX – savings from better use of RE
- α – share of flexible load

Source: <http://www.industre.eu/downloads/category/project-results?page=1>

Potential Flexibility has many sources

Estimation of Sectors in EU
(internal ESG study)



Heating/Cooling



EV charging



Manufacturing Process



Ventilation



Pumping

Learnings

Industry benefits from other's learnings

Good news: cheap „virtual“ batteries

- Decarbonized heating/mobility can absorb volatile RE at fraction of storage cost (1%)
- Applications directly relevant for industry

More and smaller actors

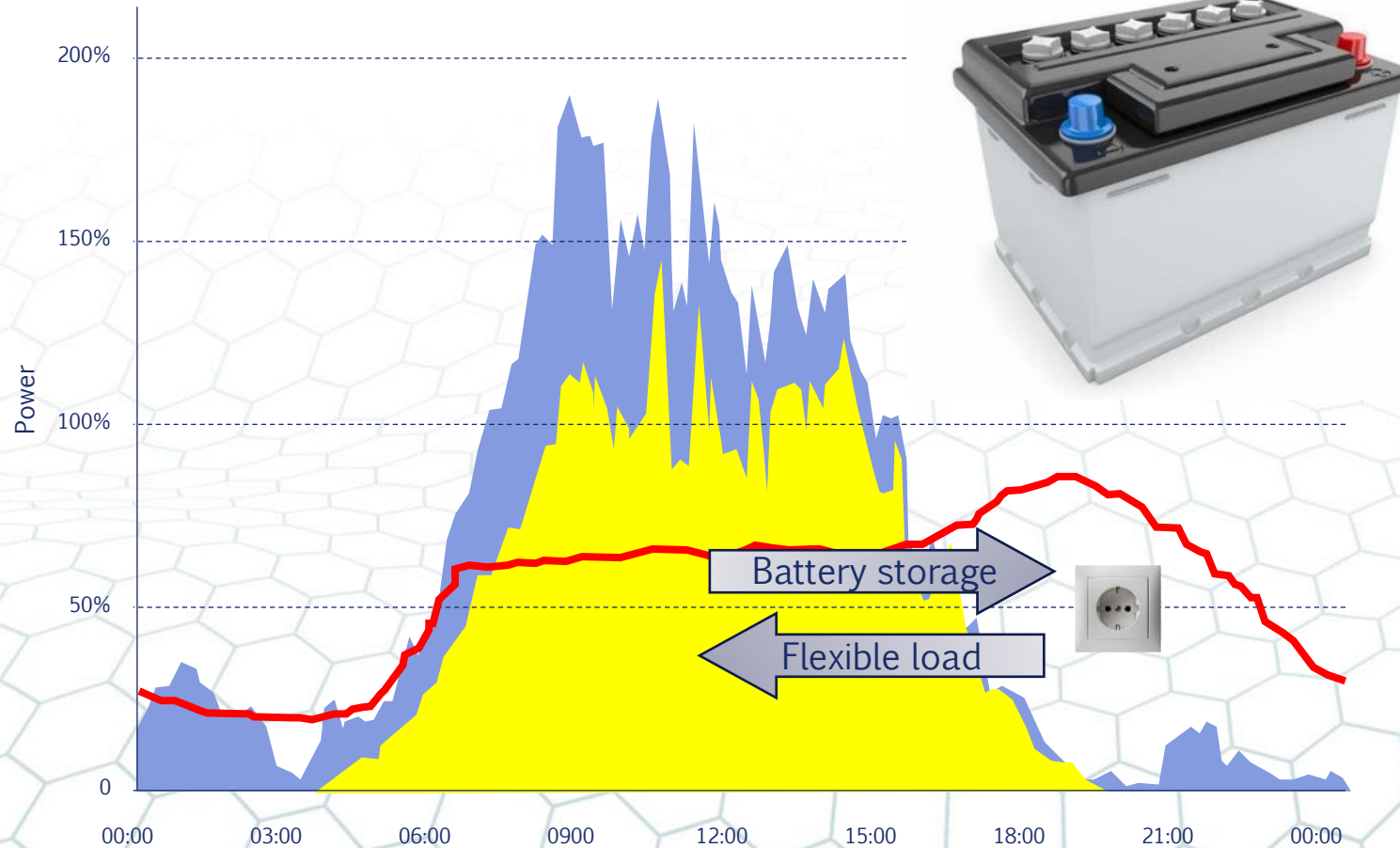
- Numbers of flexible processes grow
- Sizes of useful flexible loads drop
- Optimise between many actors
- Plan for changing optimisation targets

New methods are needed

- EMS handle only few processes with insight need
- „Old“ markets too slow, with high transaction cost
- Dynamic tariffs will make life much simpler (CEP)

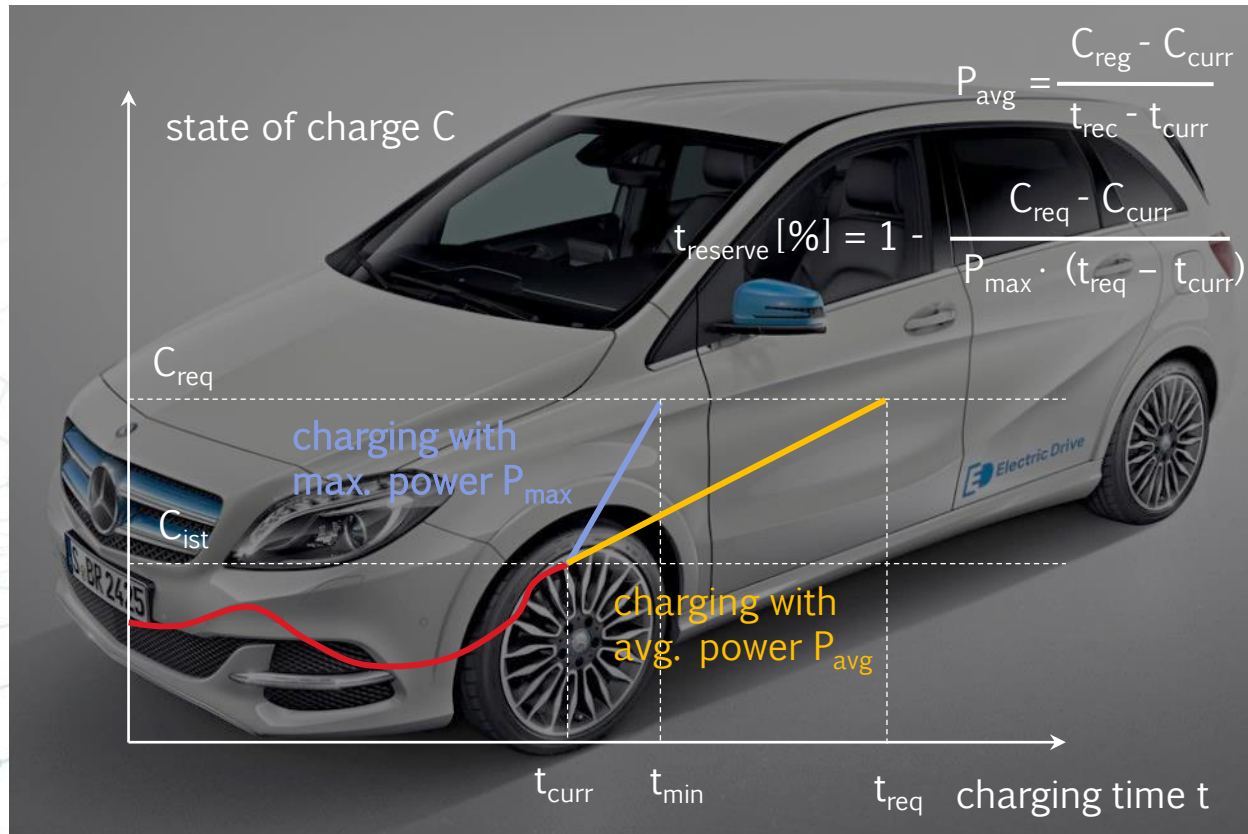
Learnings

Lower CAPEX through „virtual“ batteries

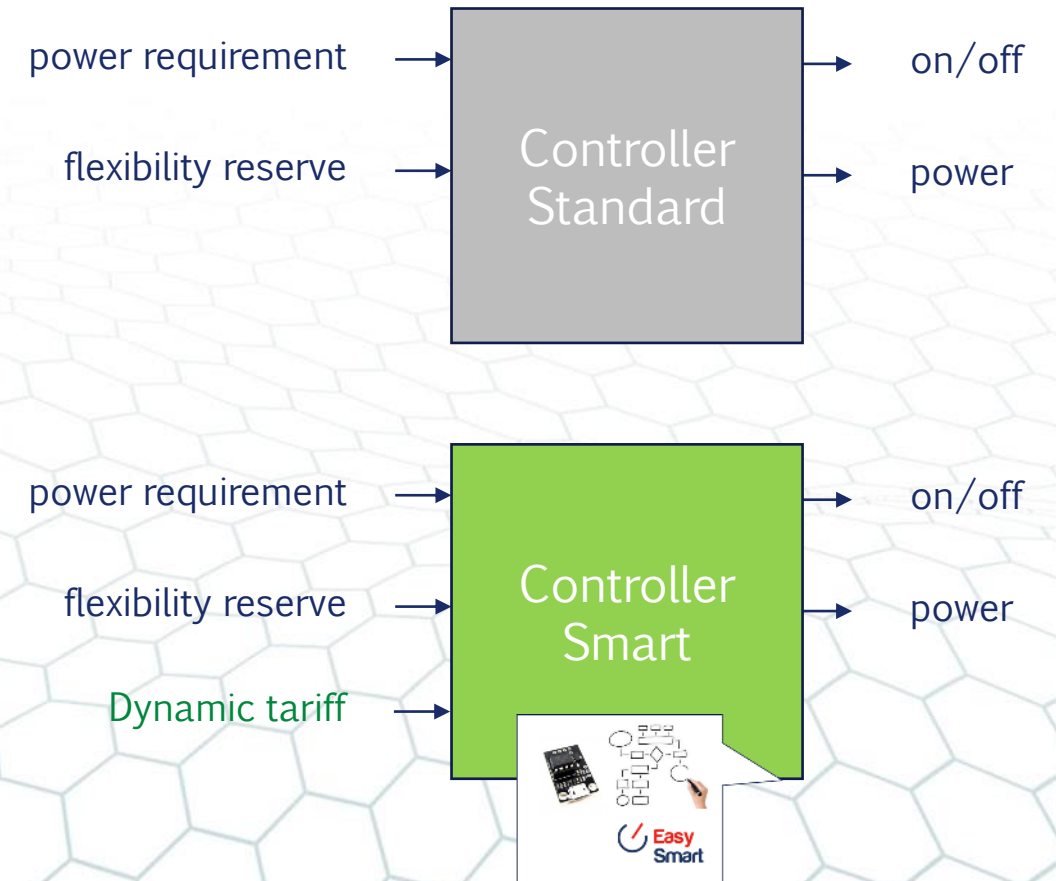


Learnings

Lower CAPEX through „virtual“ batteries



Source: Daimler



Learnings

Real world implementation with private customers



Project supported by:  Baden-Württemberg
MINISTERIUM FÜR UMWELT, KLIMA UND ENERGIEWIRTSCHAFT

Contract Partners:



Associated Partners:



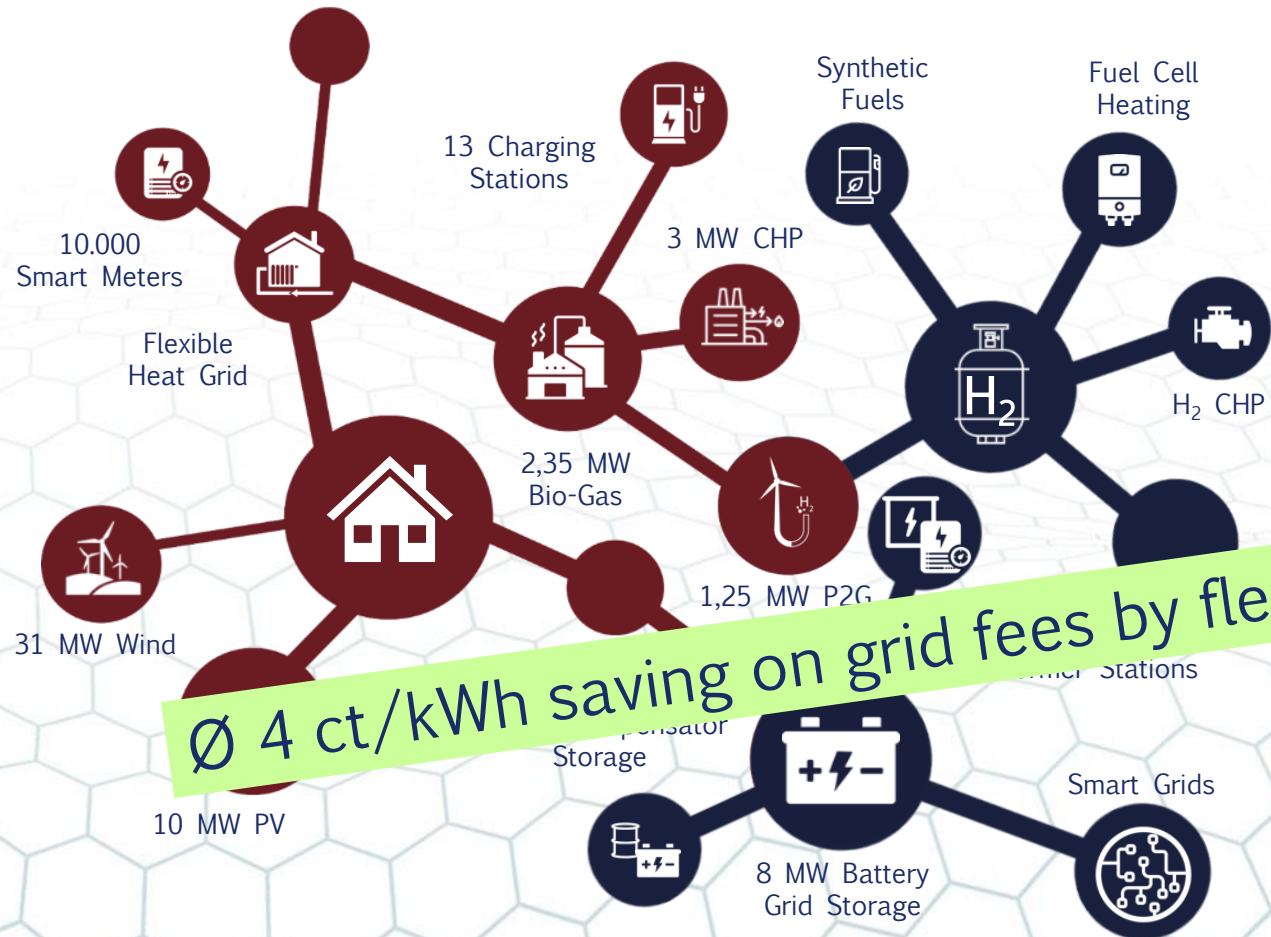
Supporting Partners:



stadtwerk haßfurt

- 200% of demand served by local RE
- 38% of energy still supplied from HV grid
- Reduce import by better matching to save grid fees

→ Same model can be applied to industrial areas and individual companies

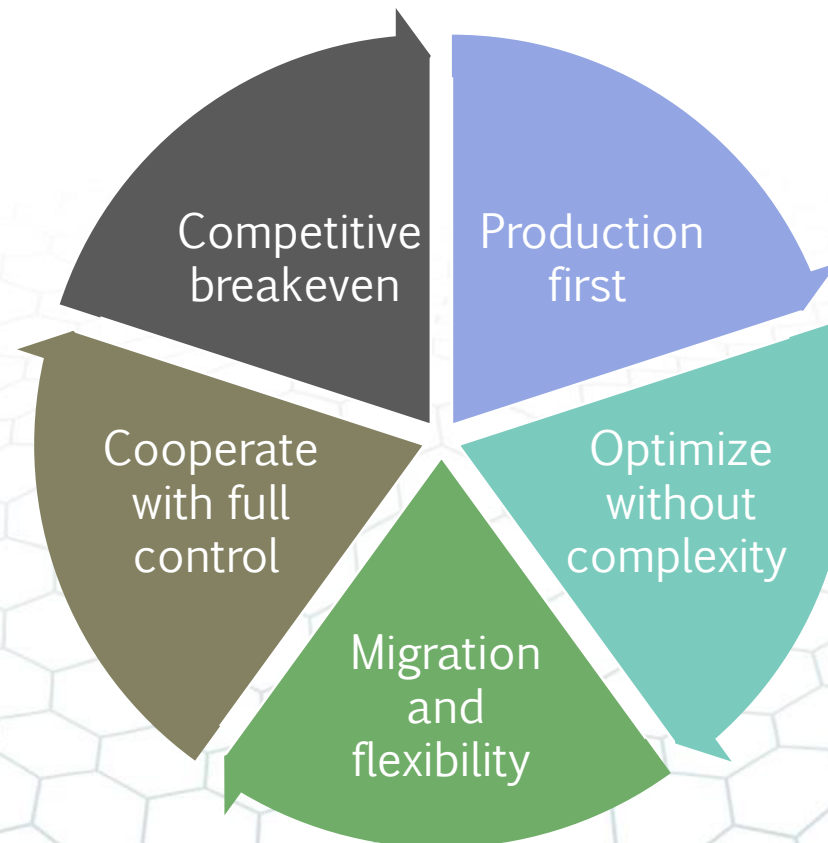


Industry needs

Five industry-specific requirements

- Payback in 1-3 years
- Infrastructure has >20
- > Reduce cost

- Create value jointly yet
- Avoid external control of your assets
- > Market mechanisms



- Limit constraints
- No obligation (bids)
- > Optimise in real-time

- Balance with other challenges:
- Labour, quality, supply chain, materials
- > Keep it simple

- Move step by step and keep options on product mix, quantity and technology
- > Decentral decisions to follow common objectives

Industry needs

Many use cases may be relevant

Value Proposal 1

Active trading – benefit from price spread



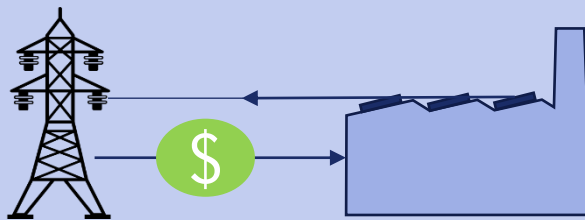
Value Proposal 2

Peak Shaving



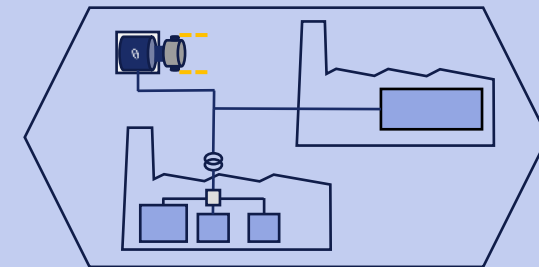
Value Proposal 3

Cost-effective RE integration



Value Proposal 4

Islanding operation



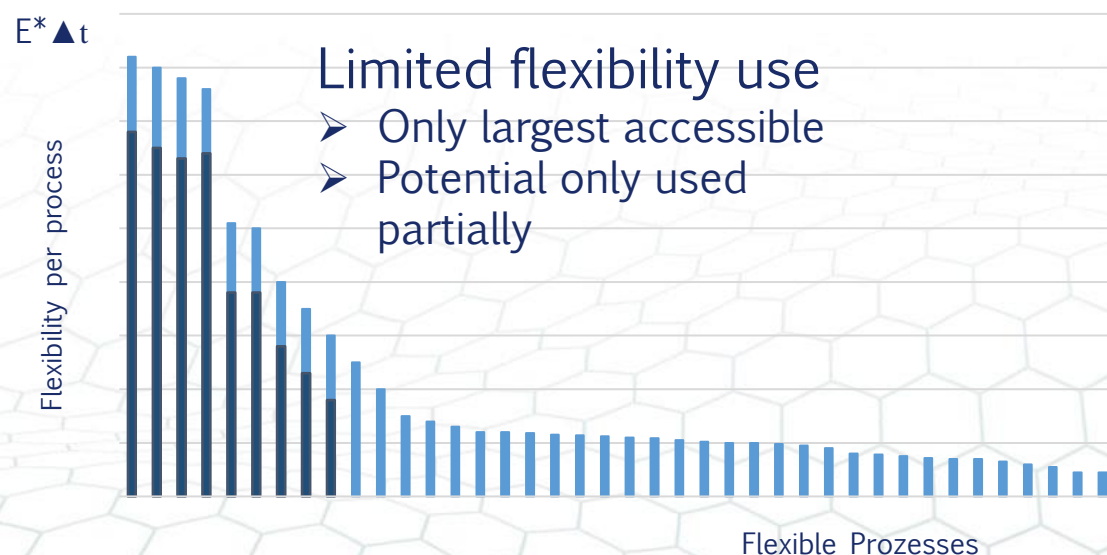
Industry needs

Local real-time market vs. traditional methods

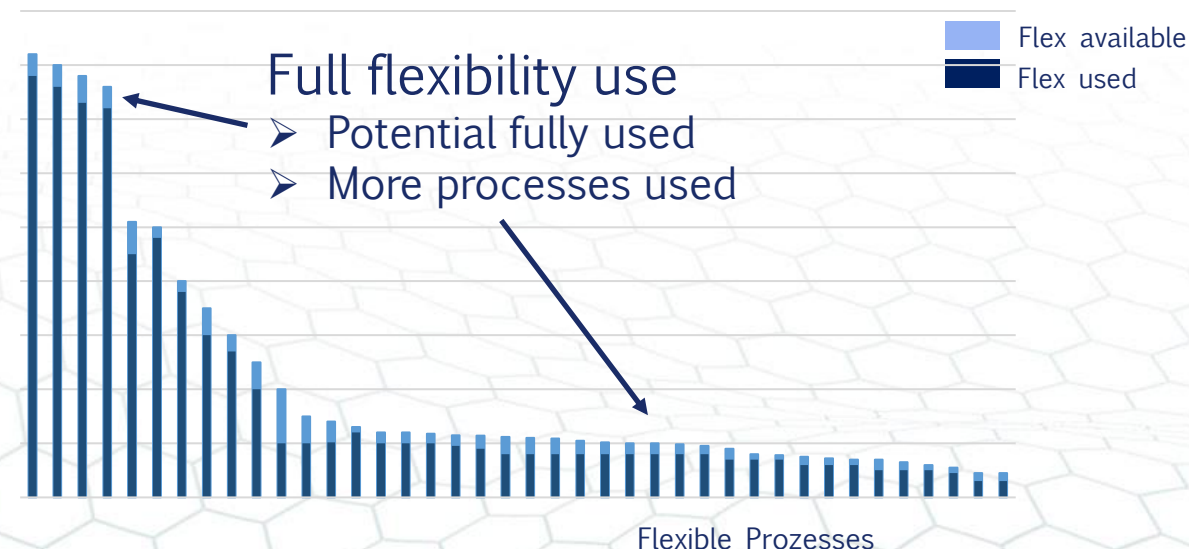
| Criterion | Central EMS | Trad. Market | Local RT market |
|-------------------------------|-------------------------------------|-----------------------------------|---|
| Number of Participants | Very small | Small due to transaction cost | Practically unlimited |
| Operational schedule required | Yes, with full process transparency | Yes, without process transparency | No, predictions used for better decisions |
| Reaction on events | Depend on computation time | Product duration (15 min) or more | Reaction in seconds |
| Fair financial compensation | Only external benchmark | Yes, market mechanism | Yes, market mechanism |
| Algorithm and any changes | Complex (MILP or other algorithms) | Simple (self-learning) | Simple (self-learning) |

Industry needs

Use more flexibility – create more value



Traditional technology

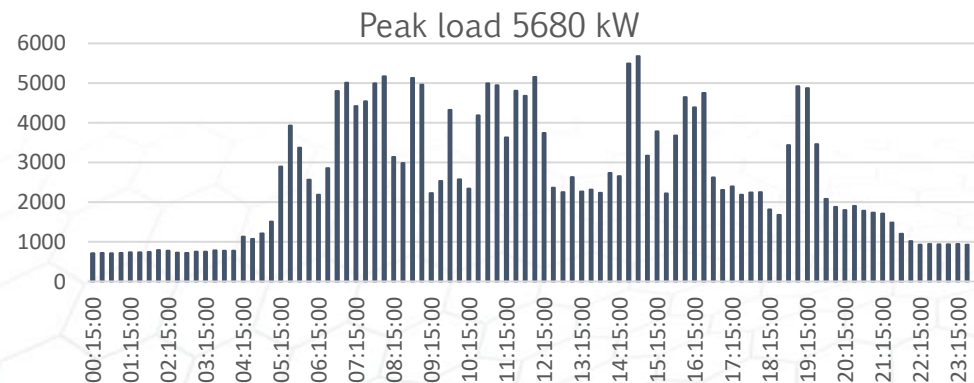


Swarm intelligence

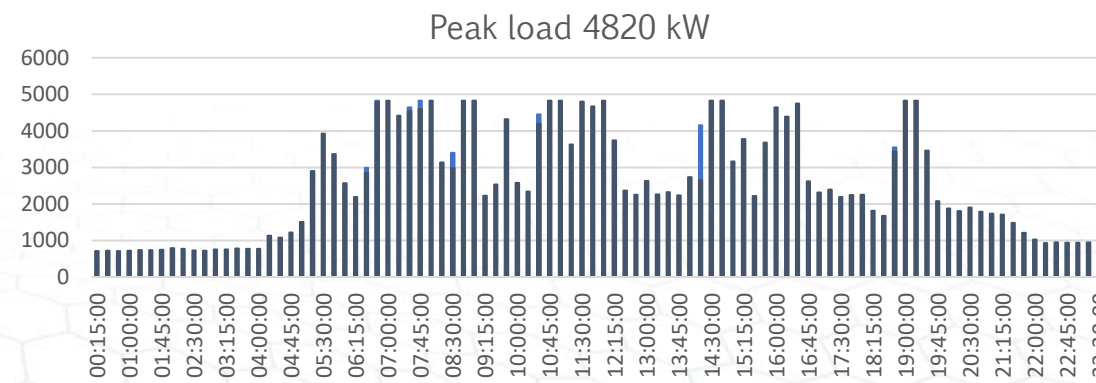
Industry needs

Example peak shaving

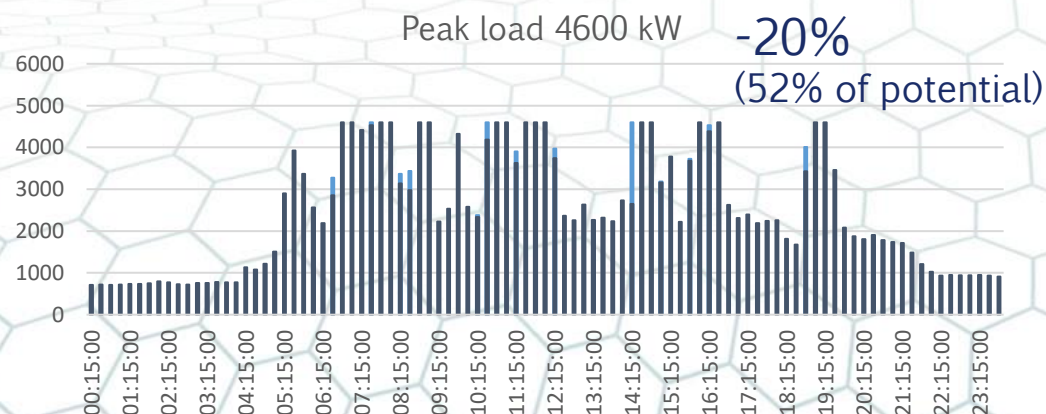
No energy management



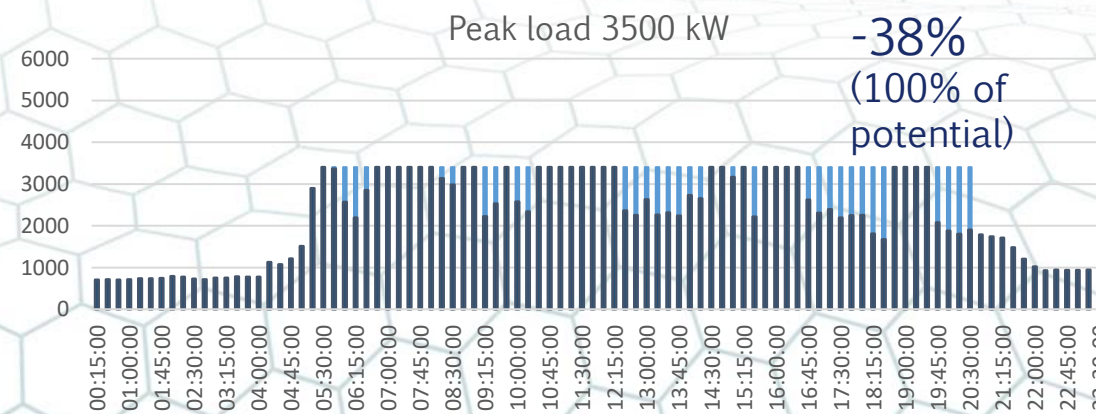
Only melting furnaces



Melting furnaces + few processes

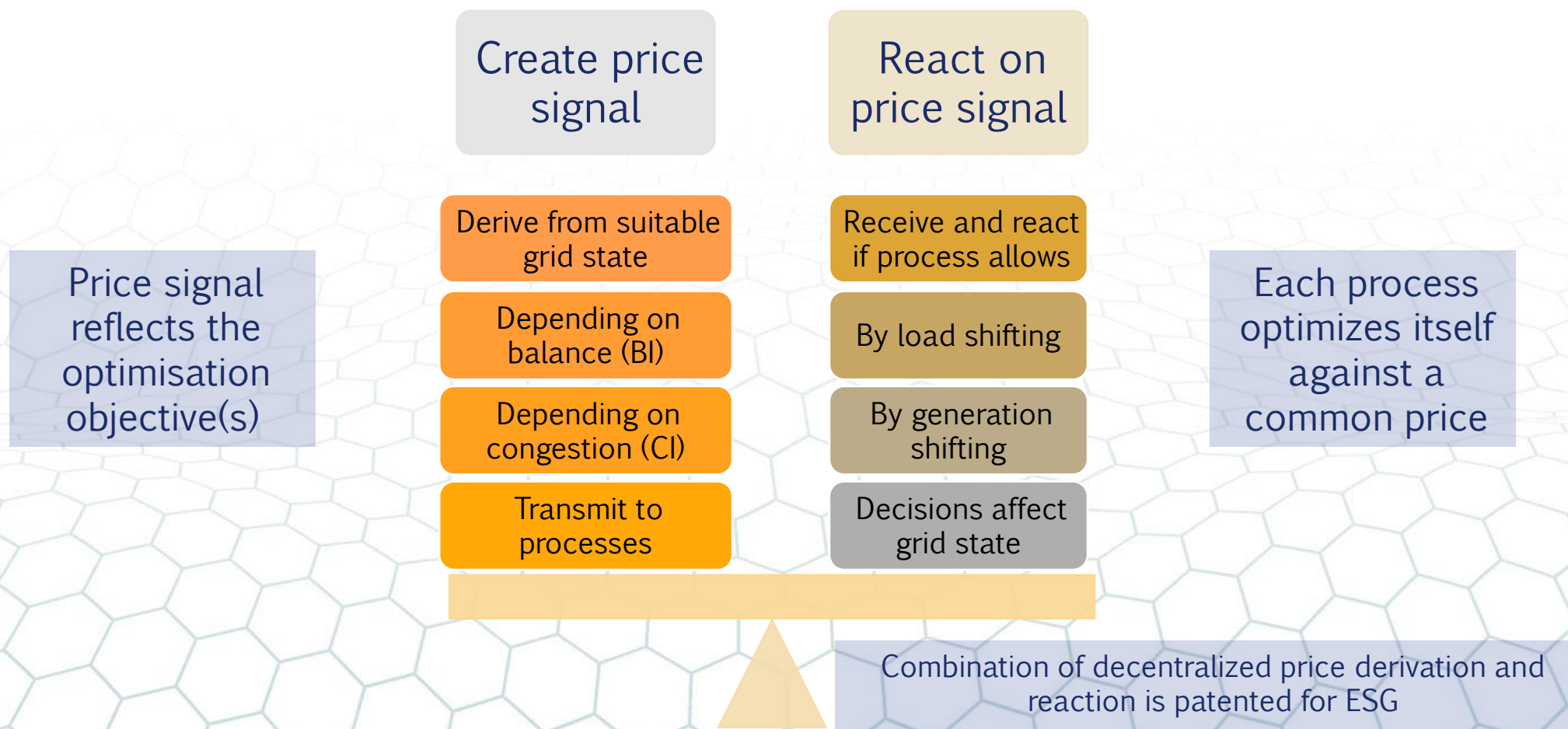


„Optimal“ energy management



Our contribution

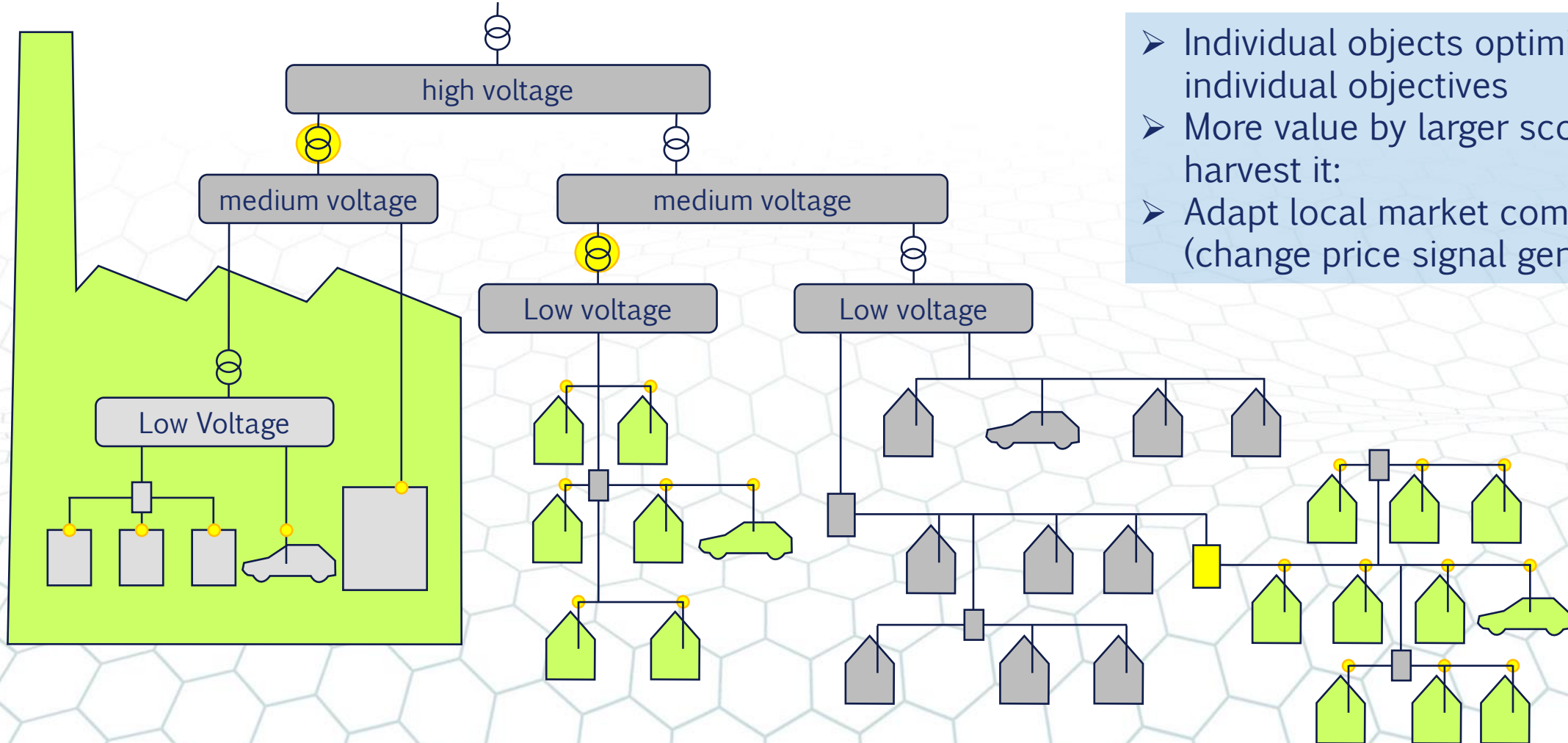
Local real-time markets implemented easily



Our contribution

Example: Individual and cross-sector optimisation

- Individual objects optimised for individual objectives
- More value by larger scope. To harvest it:
- Adapt local market composition (change price signal generation)



Our contribution

Optimising a representative village in the lab



FUSE
FUTURE Smart Energy

Demostedt models
industry, businesses
and households of
Germany.

Gefördert durch:

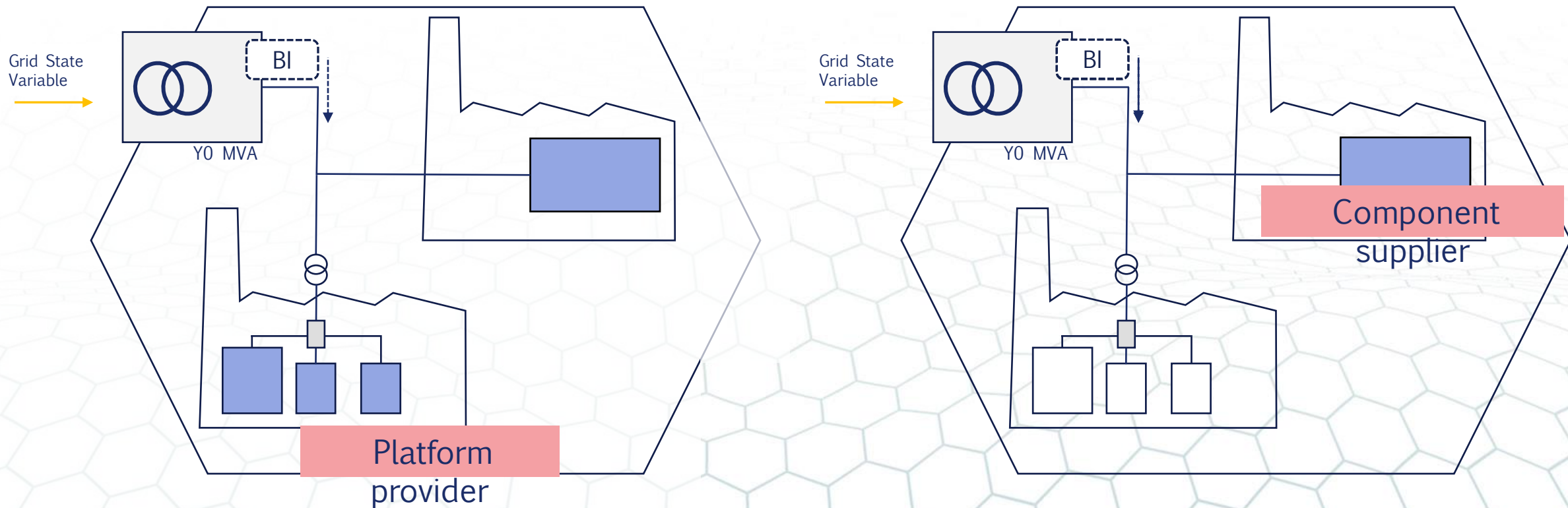


aufgrund eines Beschlusses
des Deutschen Bundestages

<https://www.fuse.ac/>

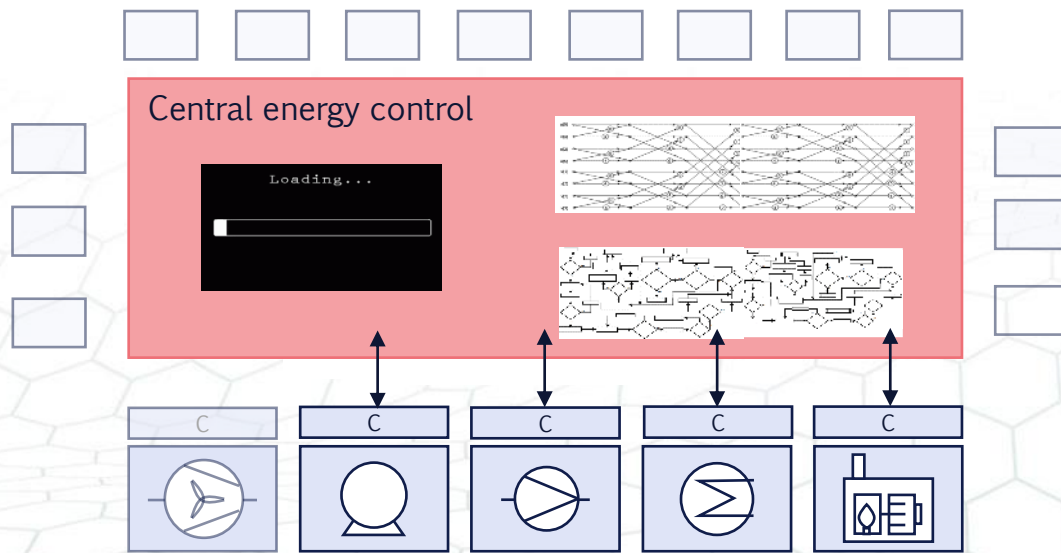
Our contribution

Technology for better platforms and components



Our contribution

Migrating central control to smart platform



Traditional technology

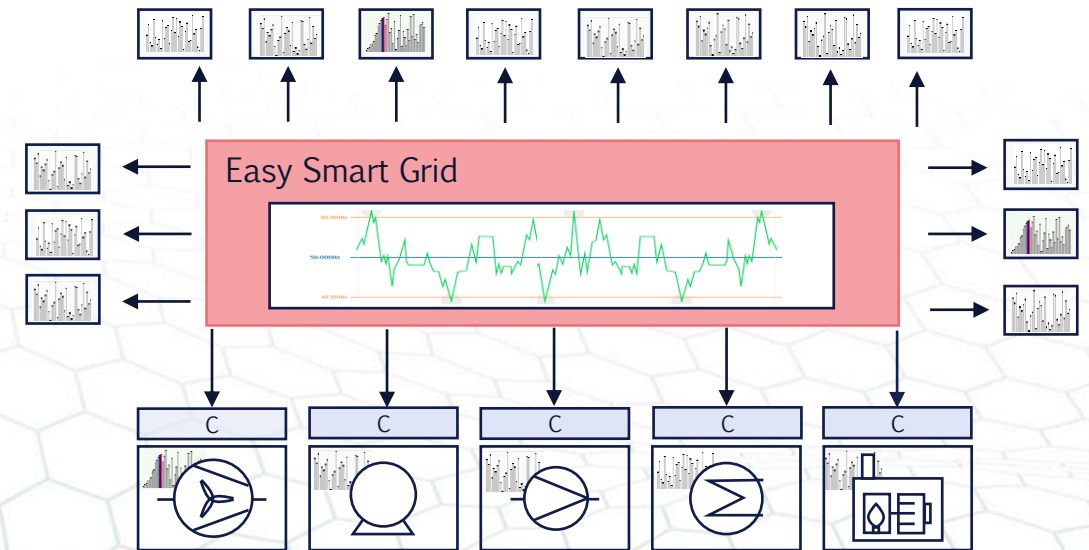
Growing complexity

High reconfiguration cost

Low resilience

IP disclosure needed

Slow to react



Swarm intelligence

Low complexity

Easy migration and adaptation

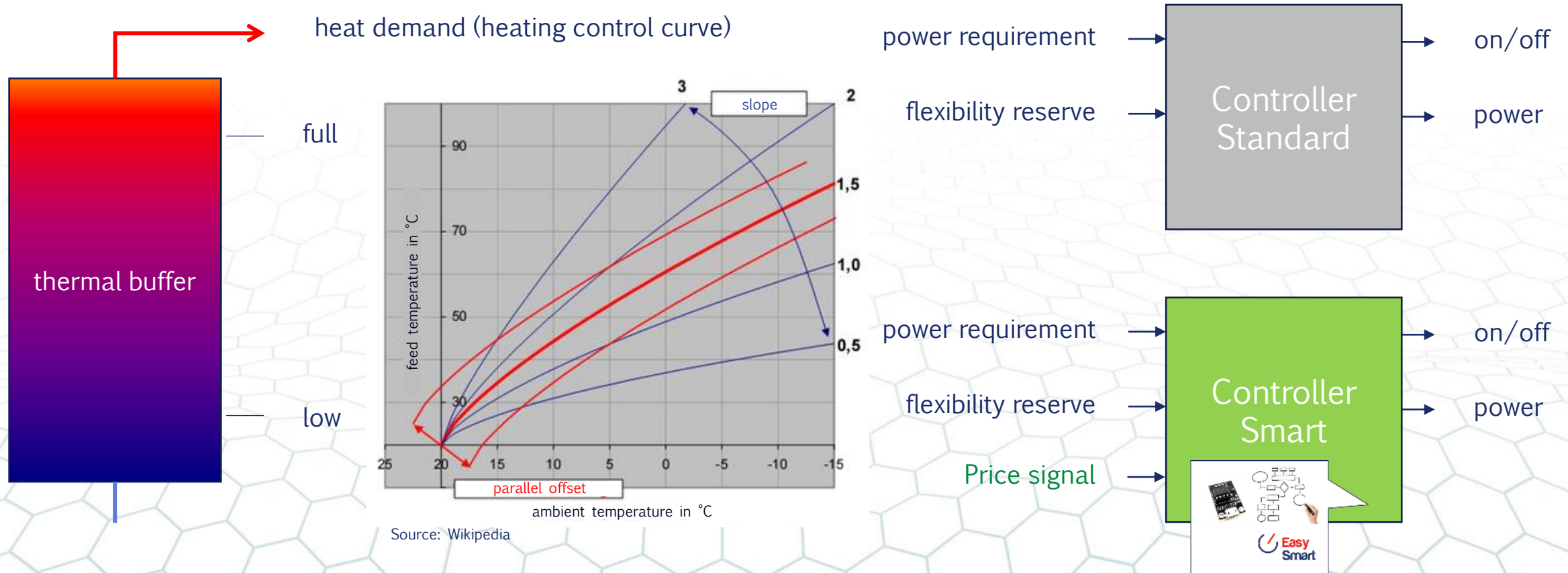
Hi resilience

No IP disclosure

Real-time reaction

Our contribution

Making a standard heat pump “smart”



Our contribution

A powerful tool for smart energy!



A vertical rectangular image on the left side of the slide showing a bright sun setting or rising over a layer of white clouds, with a warm orange and red glow.

Thank you and let's work
together for Greener
Manufacturing!

Dr.-Ing. Thomas Walter
Easy Smart Grid GmbH
www.easysg.de
thomas.walter@easysg.de
+49 171 229 4629

