

# be.storaged GmbH

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**be** ∞  
storaged

## Agenda

- Introduction
- be.storaged – Who we are
- Intelligent Application
- Areas of application
- References

# We are a corporate venture of EWE AG

5th biggest utility in germany

**8.508**  
employess

**1,4 Mio.**  
Electricity customers

**800.000**  
Gas customers

**700.000**  
Telecommunications customers

**5,7 Mrd. €**  
Revenues

# be.storaged concentrates the battery business of the EWE Group

We combine battery technology with digitalisation expertise



- Founded in 2017 as a corporate venture of EWE.
- More than 20 employees divided into the areas of software development, project planning and implementation as well as operation and marketing
- be.storaged owns battery storage facilities with a capacity of more than 25 MWh, has more than 30 MWh under operational management, and currently has battery storage facilities with a capacity of more than 10 MWh in planning or under construction.
- be.storaged cooperates with more than 10 manufacturers for systems based on lithium-ion, sodium-sulphur and redox-flow technologies.
- be.storaged develops and operates its own hardware and software solutions for pooling and marketing storage on the energy market.

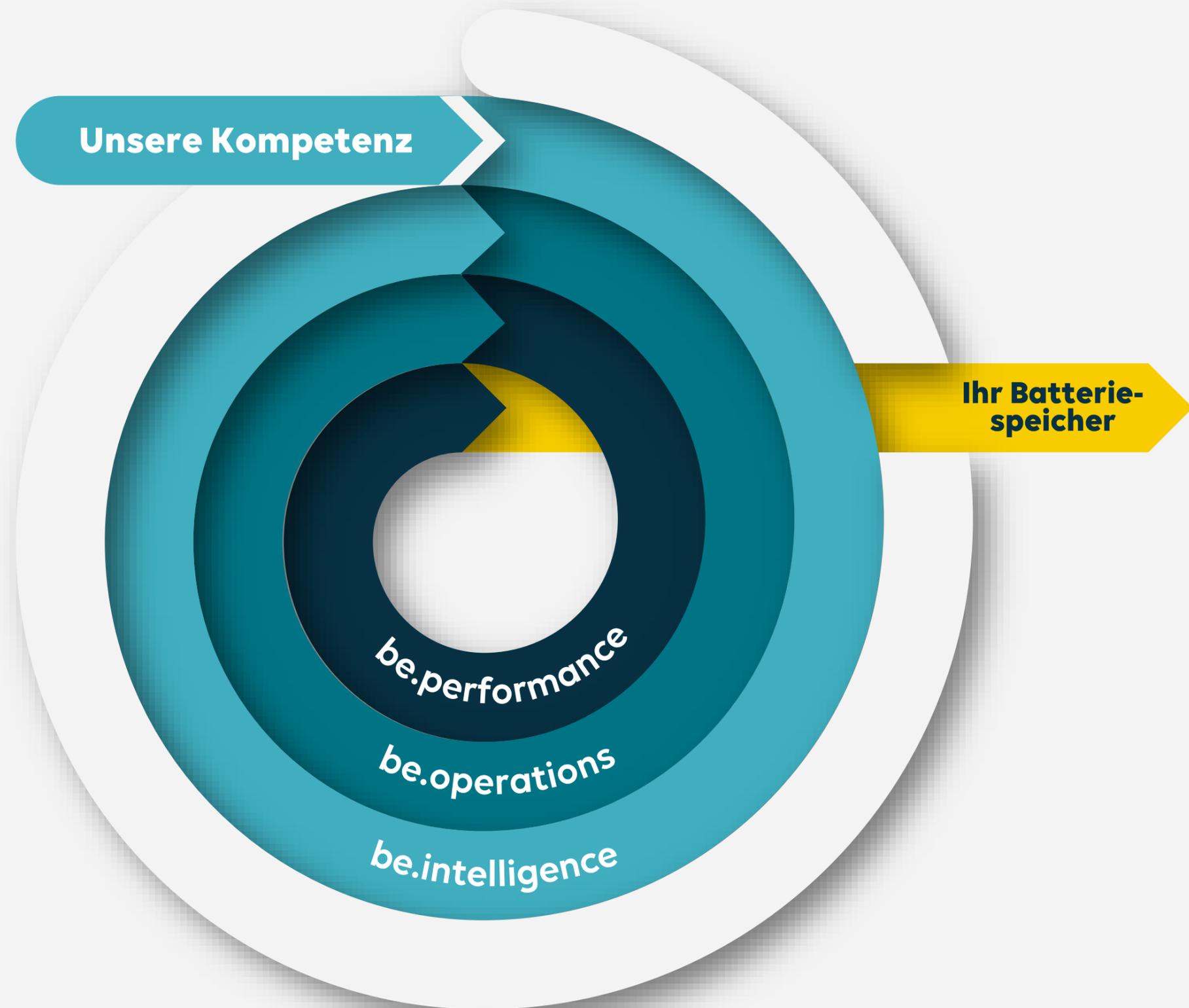
# 3 fields of competences

The complete know-how for

- Software development
- Project planning and realisation
- And optimised operation

is united under the roof of be.storaged.

This is also reflected in the life cycle services.





**metis.**

**The goddess  
of knowledge**

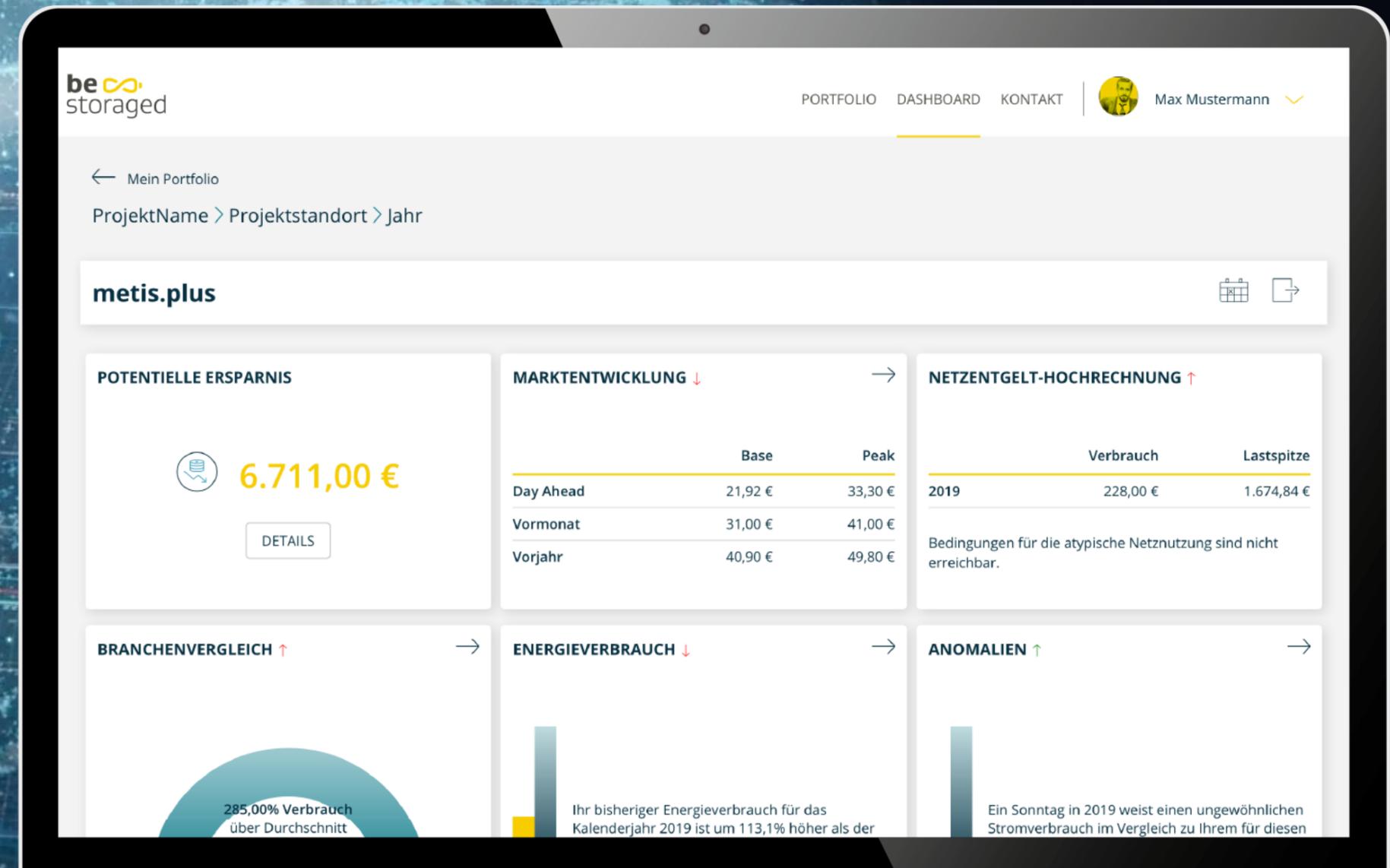
# metis.

## The all-knowing

metis is a framework for data analysis for various applications in the energy context.

It is platform-independent, has a web-based interface and can perform detailed evaluations with just a few pieces of information.

It uses your load profile and provides descriptive results in addition to calculating optimization measures based on the input data.





### Data acquisition

- load profiles (compatibility of different file formats)
- external data sources like energy market data

### Preparation of load profile data

- standardized data format
- Preparation for automated processing
- Substitute value generation (data quality)
- Outlier correction (initial anomaly detection)
- Batch processing (metis.pro only)

### Rollout of load profiles

Transfer of historical energy consumption into the future, taking into account calendar specifics

### Visualization of the load profile

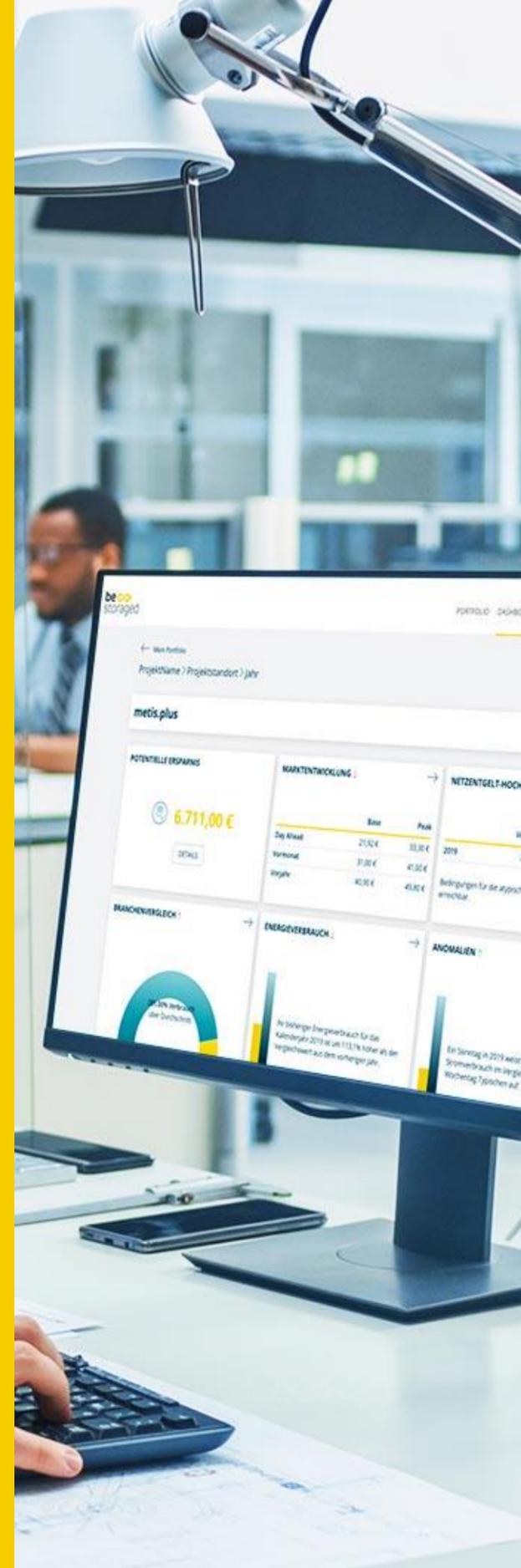
- Annual consumption load peak
- Sector comparison
- Anomaly detection
- Cost of Grid Charges
- CO2 Footprint
- Energy market data (market development)

### Optimization measures

- Reduction of grid charges (peak load capping, atypical, intensive)
- Self-consumption optimization energy costs and CO2 footprint
- Load management with different system components as combination

### Individual forecasts

"Know today what you will consume tomorrow"



metis also takes developments on the energy markets into account in its optimization potential calculations:

This means that metis not only looks at customer data, but also beyond the horizon.

Through this broad spectrum of system components, metis can unlock potential that no one would have suspected.

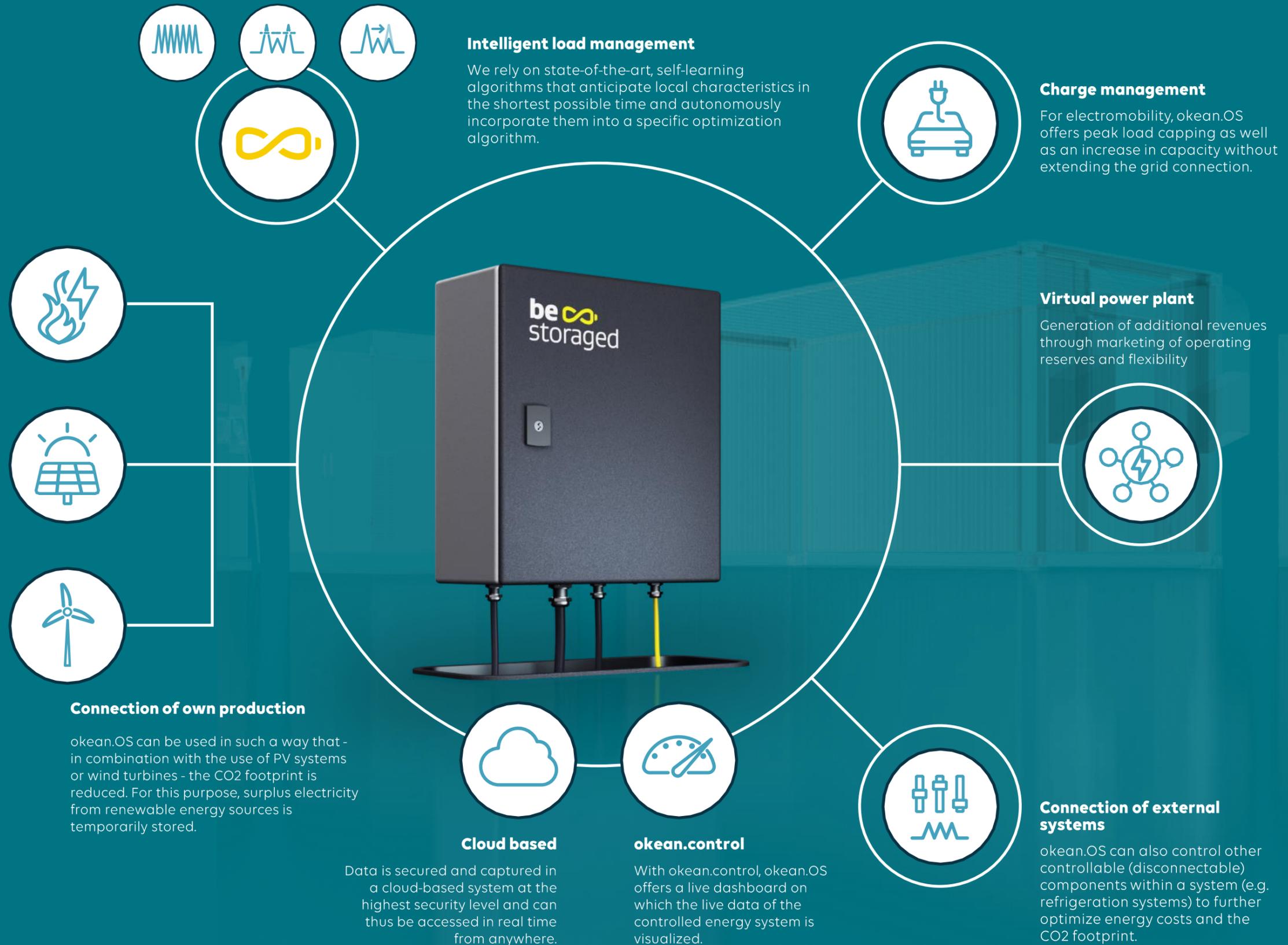


**ocean.OS**

**The all-  
encompassing  
world stream**

# okean.OS

okean.OS is an AI-based agent for the intelligent and automated control of energy systems.



# be.performance ocean.OS

Intuitive graphical user interface provides our customers with a clear and structured overview of various live data from their customer system with/without battery storage.

- Energy consumption
- Energy generation
- CO2 savings
- Marketing revenues



**Things are  
only  
impossible  
until they  
are not.**



# The right system for every application

storage.park



storage.cab



storage.charge



# Possible applications „behind-the-meter“

Modern power storage technologies minimize electricity procurement costs. In addition, they can be used for other purposes:



# Reduce energy costs...

The use of battery storage is the optimal solution to reduce peak loads.

In contrast to conventional load management systems, production processes are not affected.

The integration of existing controllable loads or backup power systems optimizes capacity requirements for battery storage.

**Multi-purpose management reduces rental rates or ROI.**



Peak load capping



Intensive  
Grid usage



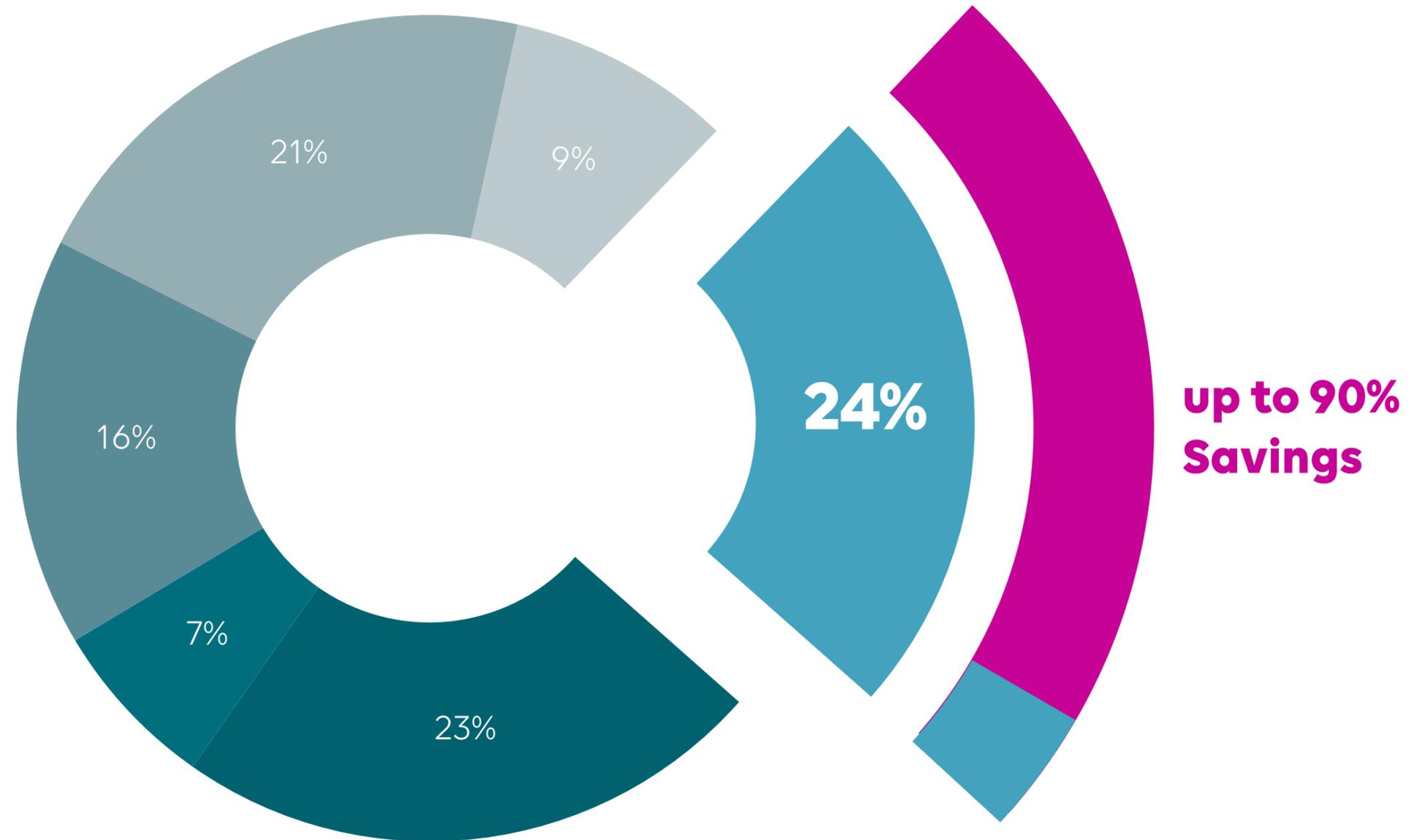
Atypical  
Grid usage



# Grid charge optimization

Savings potential for industry & commerce

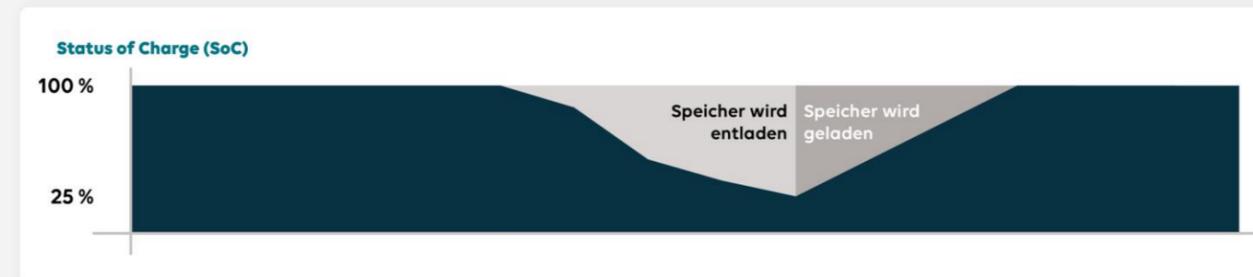
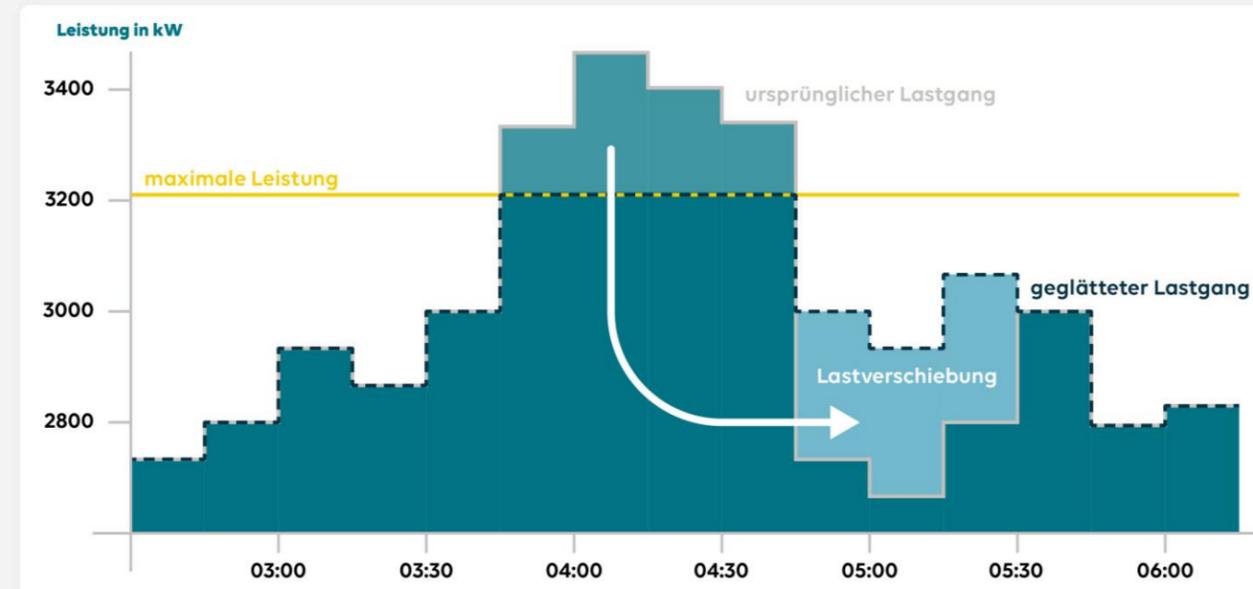
- Grid charges
- Generation
- Tax
- Sales tax
- EEG levy
- Other



# Grid charge optimization in Germany

Intensive grid usage (based on StromNEV, § 19, Abs. 2, S. 2)

## Lastverschiebung bei intensiver Netznutzung



### Functionality

Use of a battery storage system to exceed at a minimum the 7,000 hour limit in full usage hours (FLH) through peak load capping.

### Requirement

> 10 GWh annual consumption

### Advantage

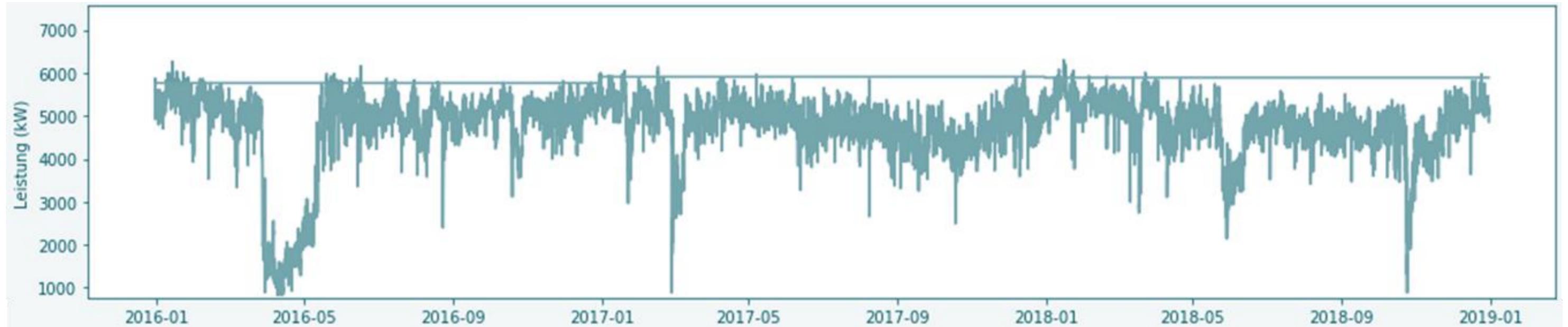
Savings potential of up to 90% in network charges.

The actual saving is determined individually by the network operator according to legal criteria based on the so-called "physical path".

# Sample implementation at a client's site

Industrial customer in the manufacturing sector

## Load profile of the years 2016, 2017 and 2018

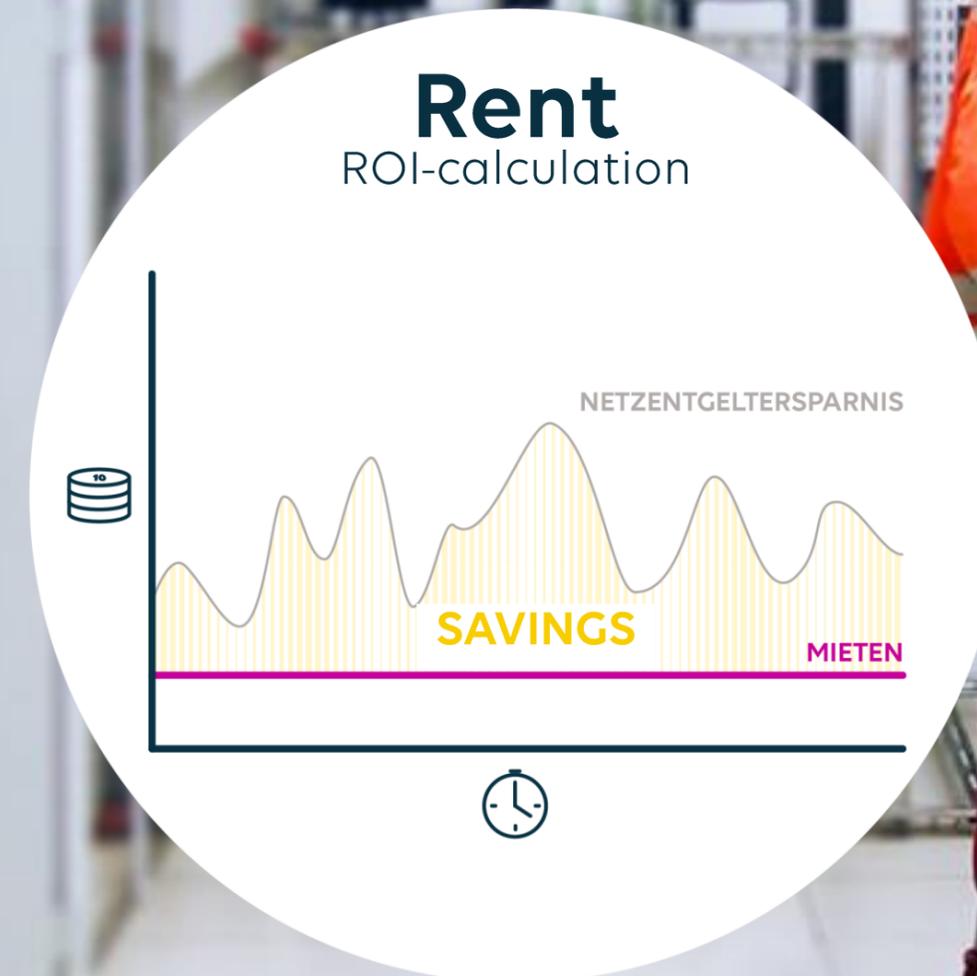
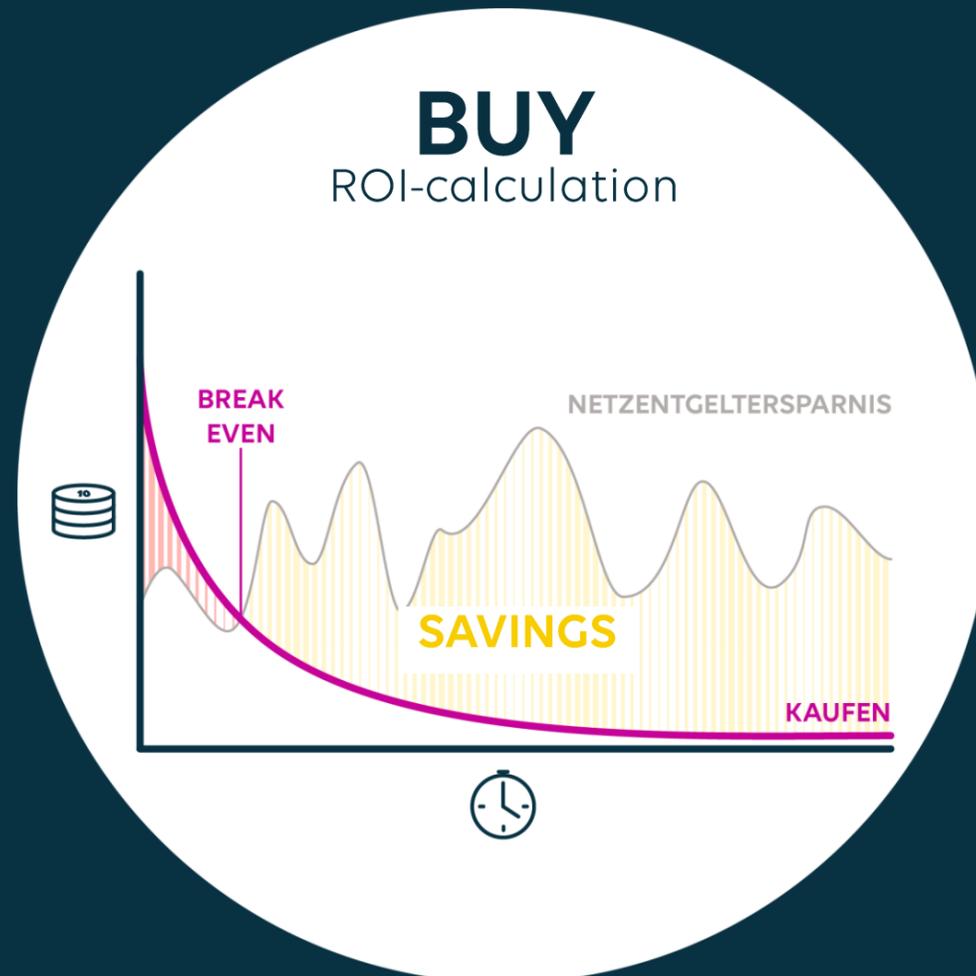


Key figure	2016	2017	2018
Power consumption	40,9 GWh	42,0 GWh	41,9 GWh
Annual peak	6,26 MW	6,14 MW	6,30 MW
Full load hours	<b>6.532 h</b>	<b>6.827 h</b>	<b>6.651 h</b>

Grid fees	2016	2017	2018
Power price	46,04 €/kW	53,69 €/kW	53,16 €/kW
Commodity price	1,34 ct./kWh	1,90 ct./kWh	1,60 ct./kWh
Grid charges sum	<b>837.000 €/a</b>	<b>1.127.000 €/a</b>	<b>1.003.000 €/a</b>

# Our financing model

Minimizing risk the northwest German way



# The be.storaged financing model

ROI calculation: Intensive grid usage (1.6 MW, 2.4 MWh)

	2016	2017	2018	Sum		Purchase price
Peak load (new)	5.846 kW	5.992 kW	5.973 kW			
Consumption (old/new)	40,92 GWh	41,95 GWh	41,81 GWh			
Grid charges (old)	837.000 €	1.127.000 €	1.003.000 €			
Grid charges (new)	377.000 €	516.000 €	455.000 €			
<b>Grid charge savings</b>	<b>460.000 €</b>	<b>611.000 €</b>	<b>548.000 €</b>	<b>1.619.000 €</b>		<b>1.230.000 €</b>
Rent	162.000 €	162.000 €	162.000 €			
<b>Savings</b>	<b>298.000 €</b>	<b>449.000 €</b>	<b>386.000 €</b>			
Effective Savings	<b>36 %</b>	<b>40 %</b>	<b>38 %</b>			

**Break-even  
point after  
less than three  
years**

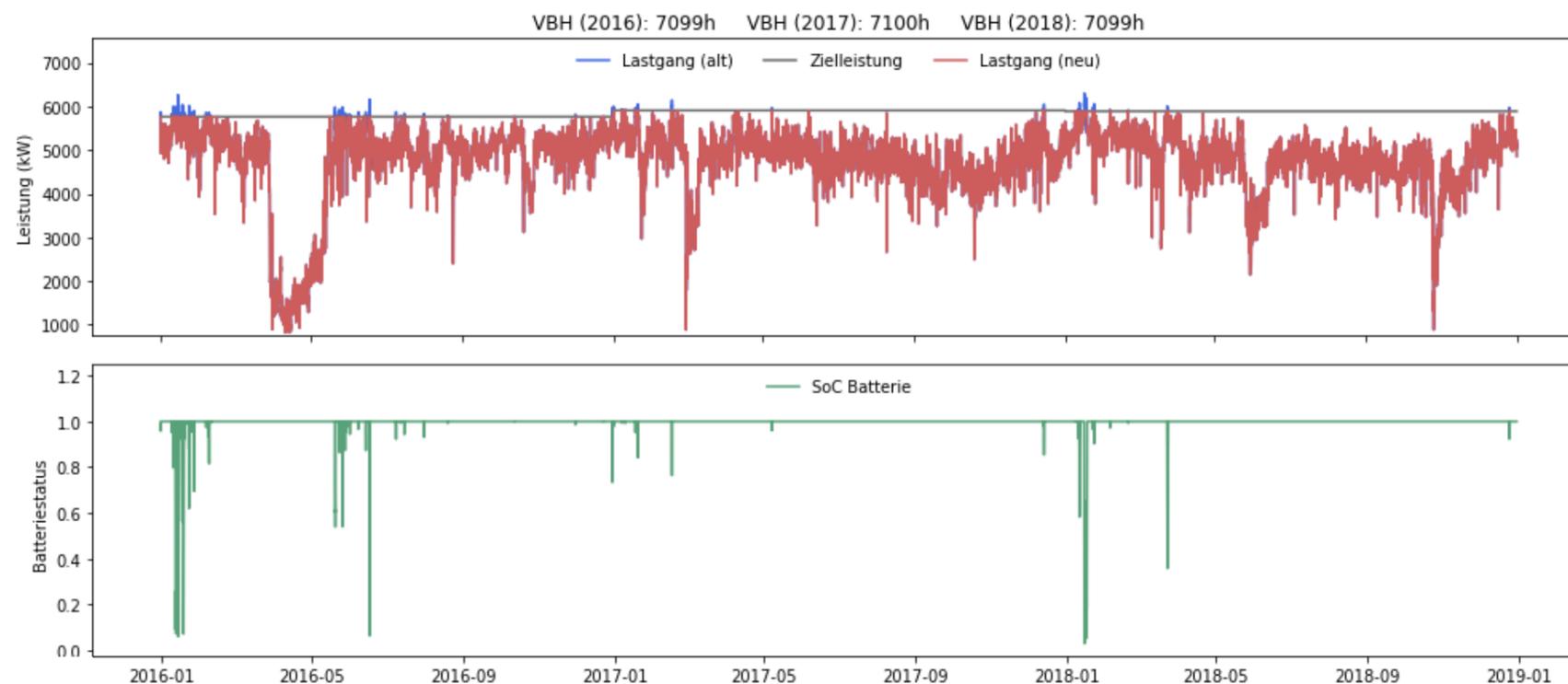
**Working  
on a **secret**  
project, are  
we, Sir?**



# Sample implementation at a client's site

Use of a battery storage system to achieve intensive grid usage.

## Peak shaving of the load profile



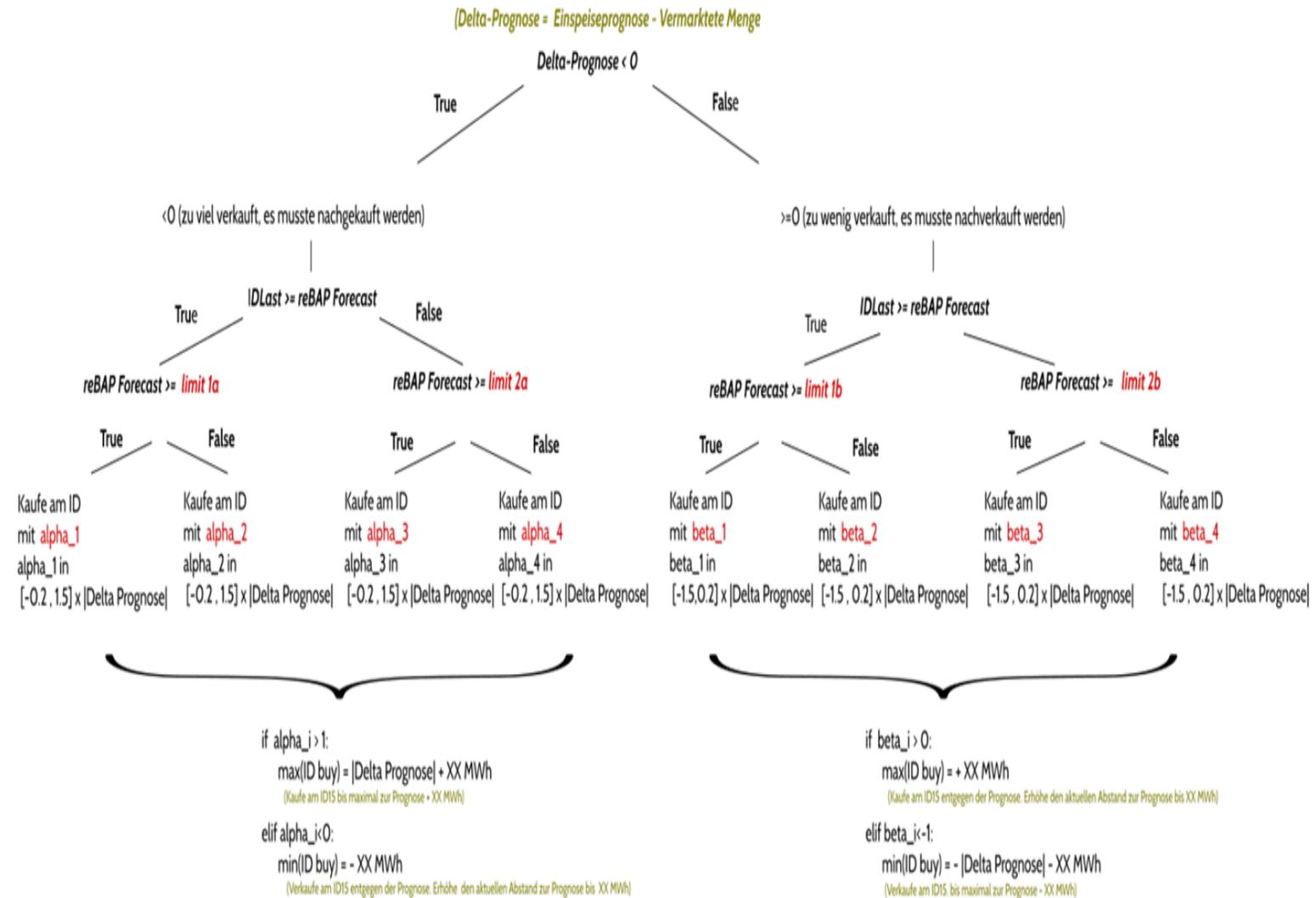
### Use of a battery storage system for peak shaving.

- Reduction of the peak by approx. 500 kW
- Use of a battery storage system with a capacity of 1.6 MW and a capacity of 2.0 MWh
- Achievement of a number of full hours of utilization amounting to at least 7,150 hrs.
- The battery storage system is only used for several days per year with just a few cycles.

Through an individual forecast of the customer's load profile, the freely available flexibility of the battery system can be determined and profitably used on the energy market for multi-purpose use cases.

# References

## Forecast & Optimization



## EWE TRADING

Real-time forecasts based on live feed-in data can be used to reduce forecast errors and thus the balancing energy risk of the portfolio.

In addition, remaining errors are compensated in real time according to battery storage availability.

# Our large-scale hybrid storage system

Starting point of multi-purpose strategies with third party systems

## Main operation:

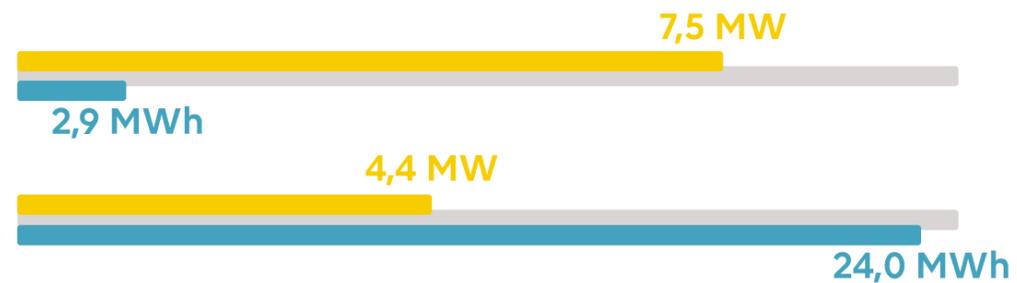
Frequency control reserve

## Prequalified for different markets

- FCR market: 9 MW
- SCR market: 6 MW
- Connected with EWE TRADING desk

## Key datas

- Lithium-Ion-Battery
- Sodium-Sulfur-Battery



## Areas of Application

- Frequency control reserve
- Secondary reserve



Balancing group correction



- Spot trading
- Reactive power supply



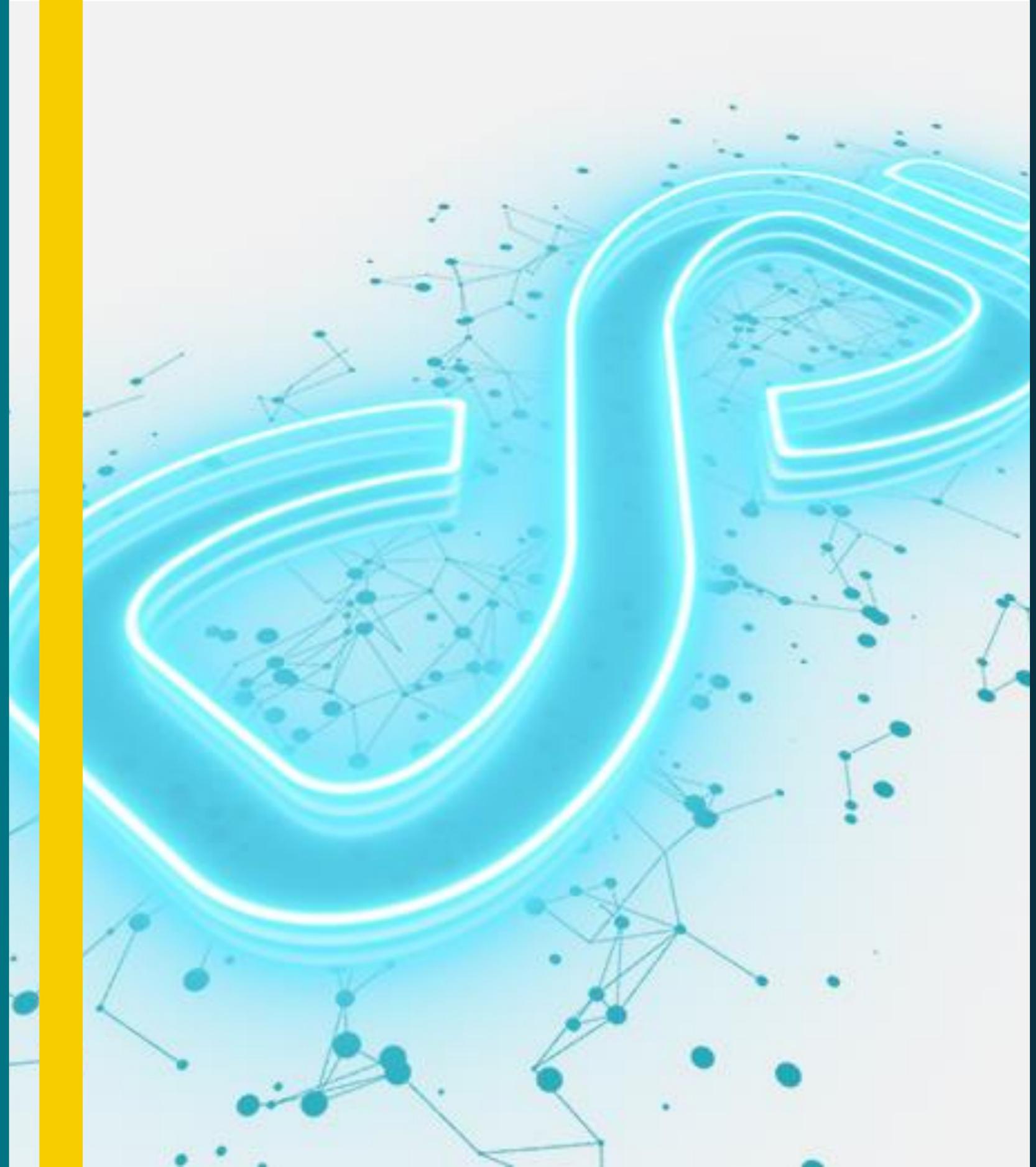
# Executive Summary

We analyze your savings potential free of charge and without obligation and provide you with a framework for a technical implementation for different applications.

Various contract and financing models are available to you for the implementation - tailored to your needs.

With our software & hardware solutions we bring further benefits to your battery operation by realizing multi-purpose use cases.

We accompany you from start to finish - from planning, approval, construction and commissioning to operation marketing.



# Thank you!

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