

Second-Life Energy Storage System

ASFINAG → Energiespeicher für Rastanlagen

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Up to

4.5 MWh

capacity per container



Our mission: driving the transformation to renewable energy through advanced battery system technology and 2nd-life batteries.

Revenue	Foundation	Employees	Order Book
~4 Mio. EUR in 2022 with steady growth and >500,000 battery parts and packs sold since foundation	2019	50+ Battery-specific engineers and manufacturing employees	~45 Mio. EUR contracted revenue in next two years in EU, America and Asia and 100 Mio. EUR under advanced negotiation

- Leader in battery technology with world class hardware, software and thermal management
- Fully produced in Austria
- Profitable financial growth profile

- Start-up with history
- Global customer base

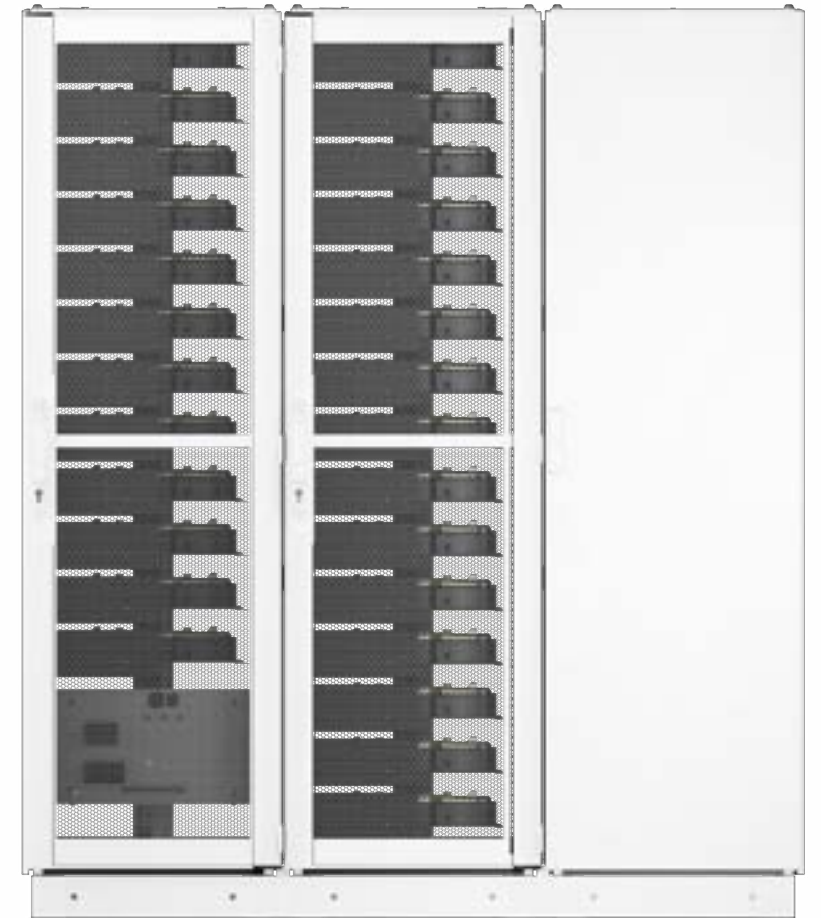
e.battery systems core business model includes the
production of battery modules and packs

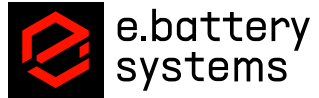
Furthermore, e.bs has developed the **first commercialized second-life battery energy solutions.**

Second-Life Battery Energy Storage Solutions:

Initiated business model

- Development and manufacturing of products for smart storage with second-life lithium-ion batteries.
- Development and build-in energy management system.
- Potential of “energy-storage-as-a-service”; offering asset-light model to solve customers’ pain points.





Existing customer base ↓



DAIMLER



ZUMTOBEL



Fraunhofer



ottobock.

DEUTRONIC 

AL-KO



AMMANN

aircontech™

ESGE-



→ **Only 50 %**

of all used Lilon Batteries will be recycled

→ **2.000.000**

tons of discarded EV batteries available 2030

→ **2.600**

GWh demand for new batteries worldwide in 2030



**That's why we are
committed to
supporting the shift
towards a circular
economy in
everything we do.**

178+
kg of CO₂/kWh

saved when compared to using new batteries in energy storage. Making new batteries consumes energy and generates CO₂ emissions. Repurposing batteries enables storage without increased CO₂ emissions.

40+
Tons of CO₂

saved per building by using second-life batteries as energy storage. Energy storage improves the utilization of energy produced by renewable sources, reducing the need to purchase power from other sources.

Our energy storage systems ↓



70% reduced energy waste
more usable energy
by our unrivaled
energy efficiency.

Future-proof
Technology
storage system can
be upgraded years
after the installation.

100% safe low voltage
easy and cheap
maintenance and
system construction.

Fail-Operational
Failures limited to
module level; the
system stays
operational.

e.battery systems sets the new standard for large-scale battery storage systems.

e.battery systems has developed a **proprietary device** that supplements the power from your normal 3-phase outlet.

Switching between battery charging and discharging for peak shaving is very fast and fully automated by the integrated control system.

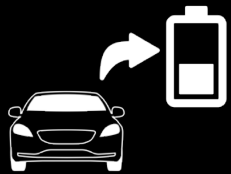
The system is based on a 30-kW converter, and additional power can be added by upgrading the system with additional modules. **A capacity of up to 4,5 MWh is available** when using a 40-foot container.

Modular concept uses battery modules with safe voltage below 60 Volts

Entirely new patented inverter system concept solves issues and replaces the complex ensemble of various components.

By using second-life batteries as storage modules from e-mobility applications like e-cars, e-buses, e-machines, this concept is becoming the most sustainable, green and innovative storage system on the market.

The current second-life-approach is **too expensive and time consuming.**



Extraction



Optical
inspection



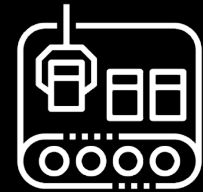
Read data



Transport to
contract
partner

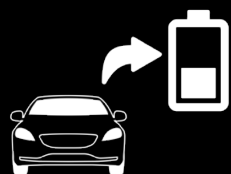


Detailed
analysis



Second-life
batteries are
produced

With e.battery systems, upcycling old batteries is
easy and cheap.



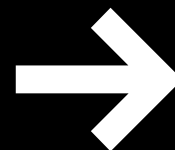
Extraction



Optical
inspection



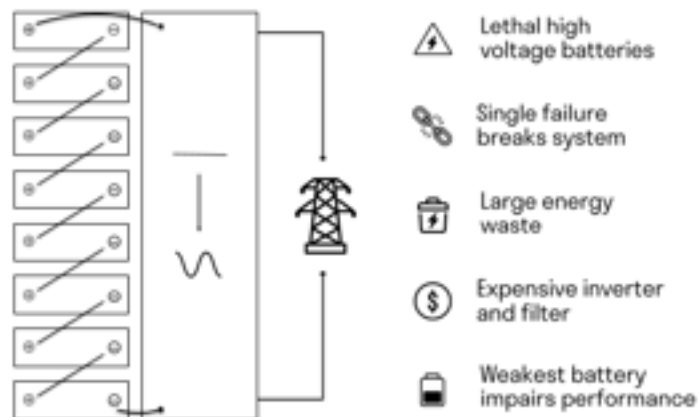
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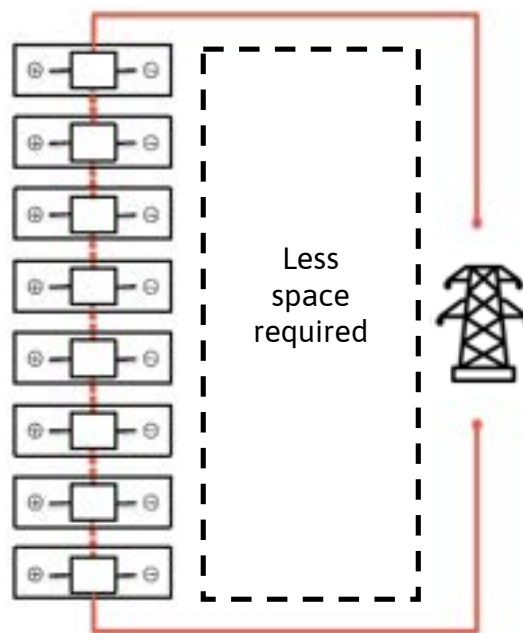
Plug-and-play
integration into the
system

Our energy storage systems ↓

Conventional systems



e.battery systems



100%

safe low
battery voltage



fail safe system

70%

reduced
energy waste

50%

smaller electronics

5%

more
battery capacity

01

e.battery systems electronics actively form DC battery voltage to AC grid voltage

02

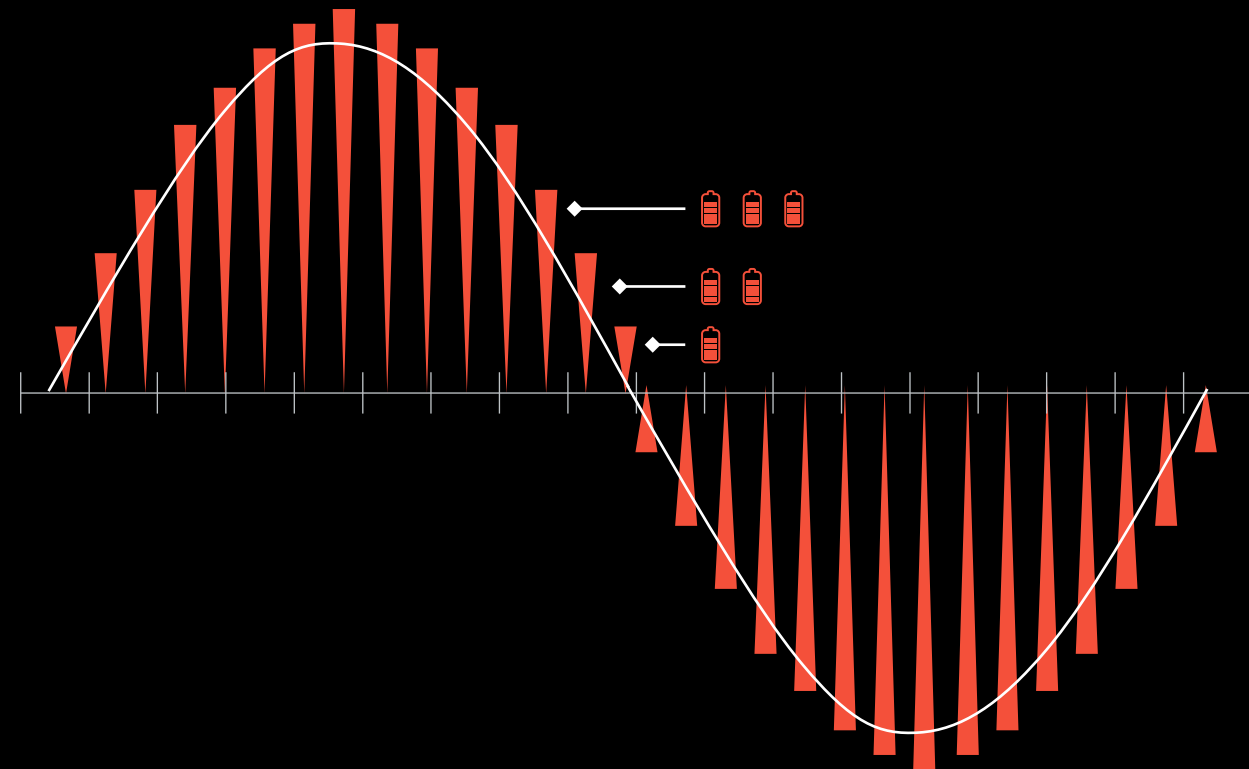
Static series connection

03

Battery voltage is chopped with high frequency to match the grid voltage.

Dynamic connection

The voltage is actively built by dynamic battery connection



Our energy storage systems ↓

End-to-end business model, enabling sustainability and cost advantages.

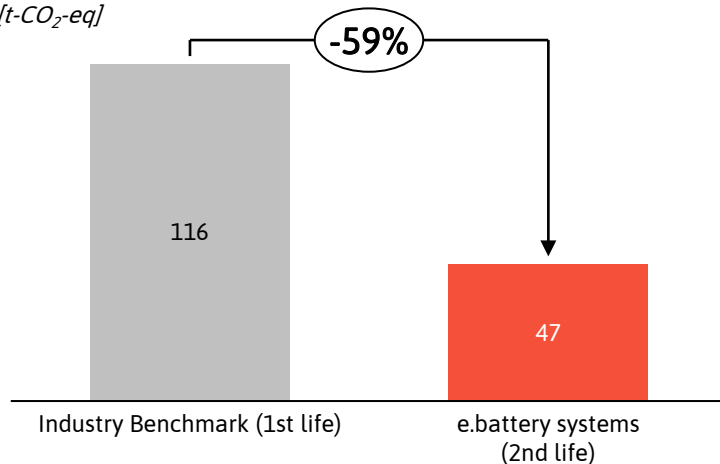
→ Battery cells from e.battery systems have lower emissions than global peers though using second-life batteries and green Austrian energy mix for ESS manufacturing.

Key data on the underlying BESS

Storage capacity	261 kWh
Cycles per year	230
Electricity price	21 ct/kWh
Utilization time	15 years
Overall efficiency [conventional]	75 %
Total efficiency with e.bs	> 95 %

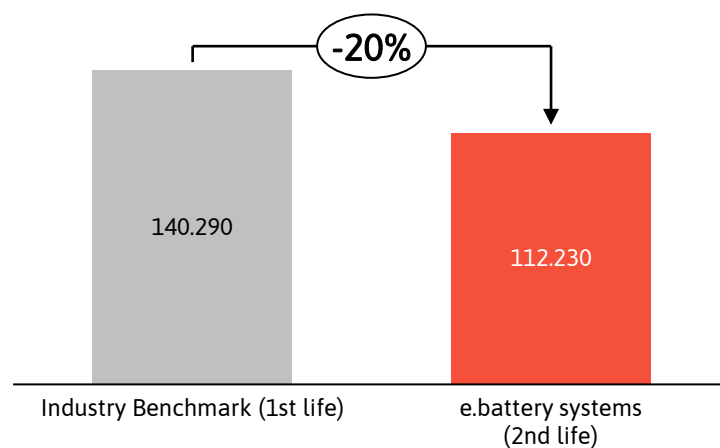
Slashing lifecycle CO₂ emissions from battery manufacturing

[t-CO₂-eq]



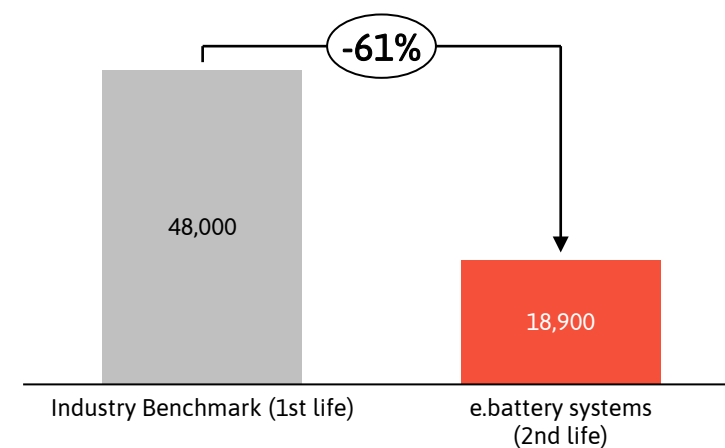
Cutting investment costs

[EUR]



Cutting operating costs

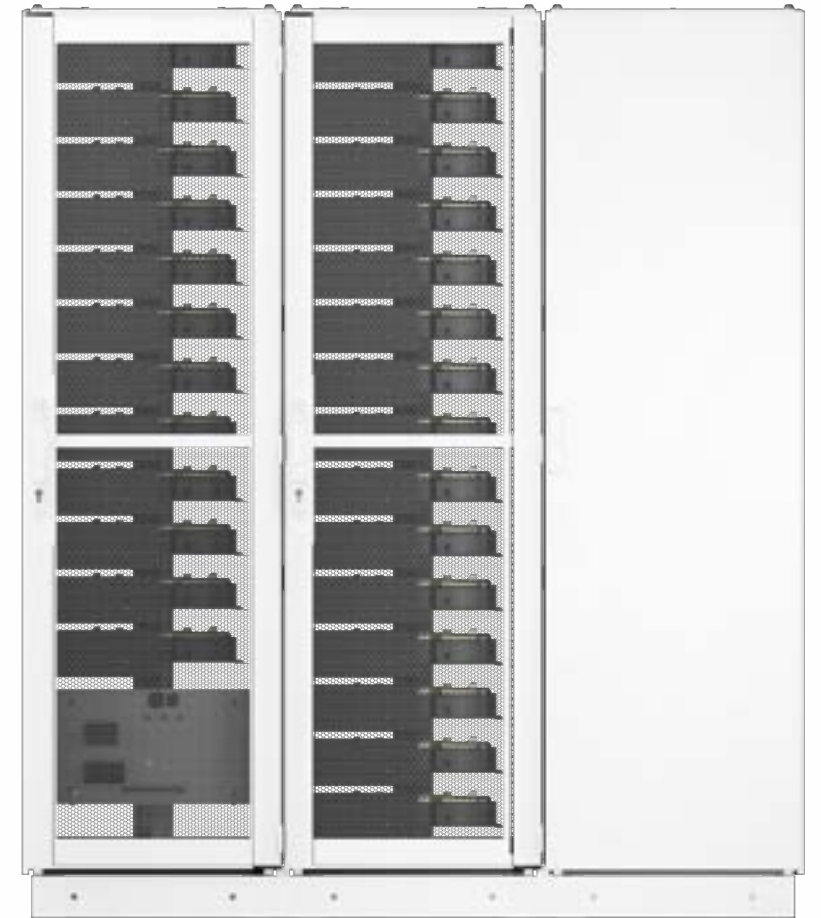
[EUR]



The master hosts the software and controls the various battery modules.

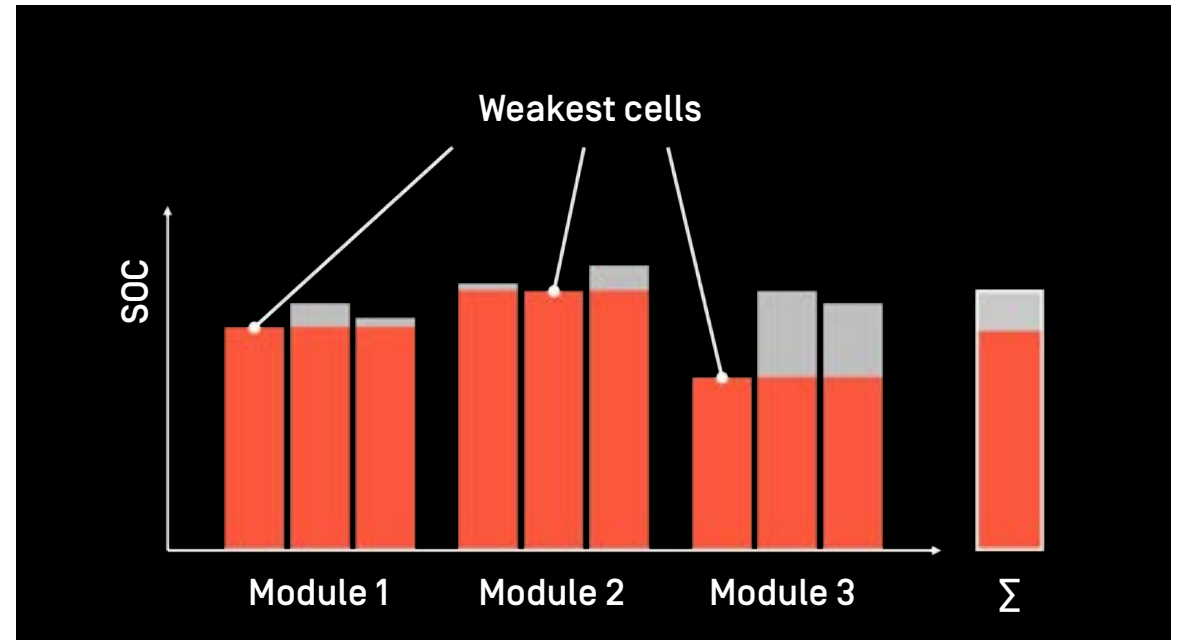
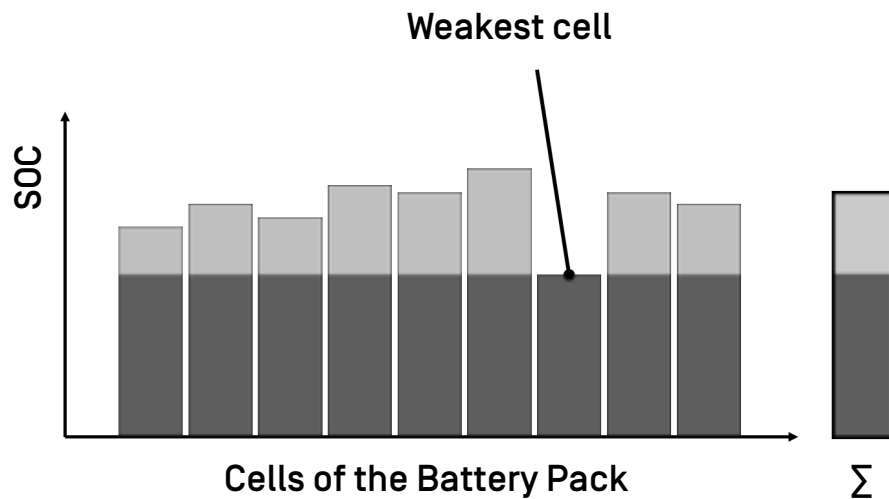
Our hardware is the gateway for our software to control the battery system.

The central inverters are replaced.



More usable battery capacity ↓

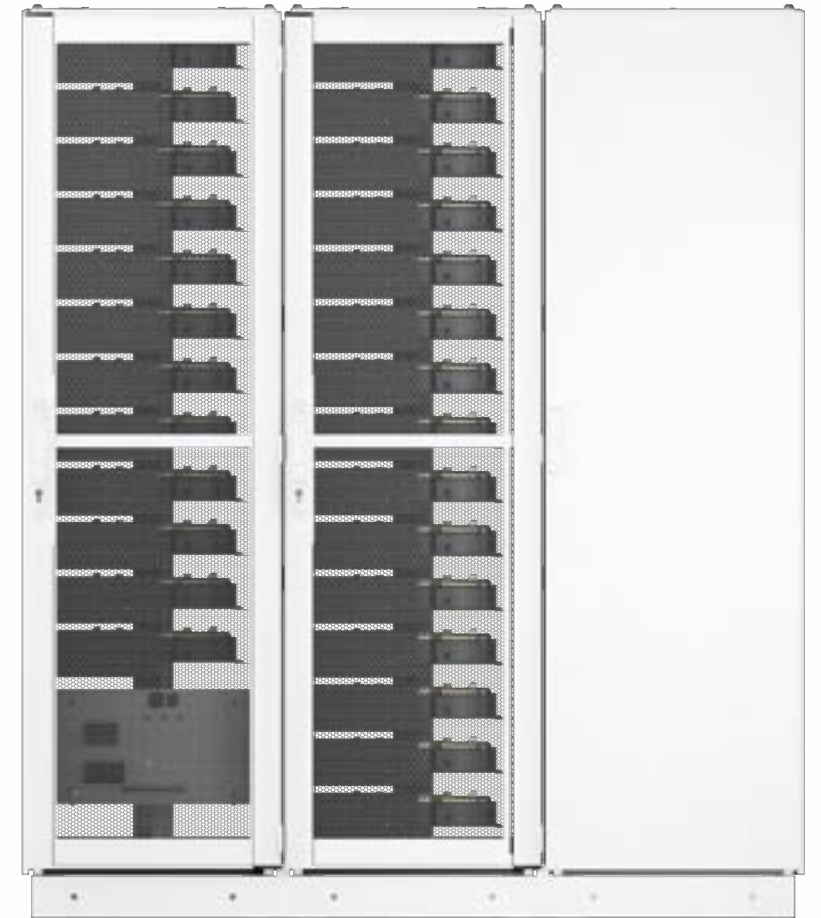
Weak batteries do not affect the whole pack, but only the single module.



New battery inverter technology. ↓

Parameter	Value*
Power rating	67.5 kVA (22.5 kVA per phase)
Reactive power / $\cos \phi$	0 – 100% $S_{\max}$ / -1 to 1
Rated current	100 A RMS
Grid voltage	230 V / 400 V 3ph, 690 V
Grid frequency	50 Hz/60 Hz/any
Operating mode	On-grid / grid forming
THD	<1.5%
Cooling	Passive cooling
Mech. Rating	IP 20
Communication	Modbus TCP / Sunspec (more upon request)
Grid codes	VDE AR 4105 and VDE AR 4110

*intended for final product/preliminary and subject to change



→ **Sector coupling electricity, heat & mobility:**

Control consumers such as the heating or the boiler and link them intelligently with the energy generators.

→ **Self-consumption optimization:**

The consumers are switched on or off according to defined priorities

→ **Control large consumers optimally:**

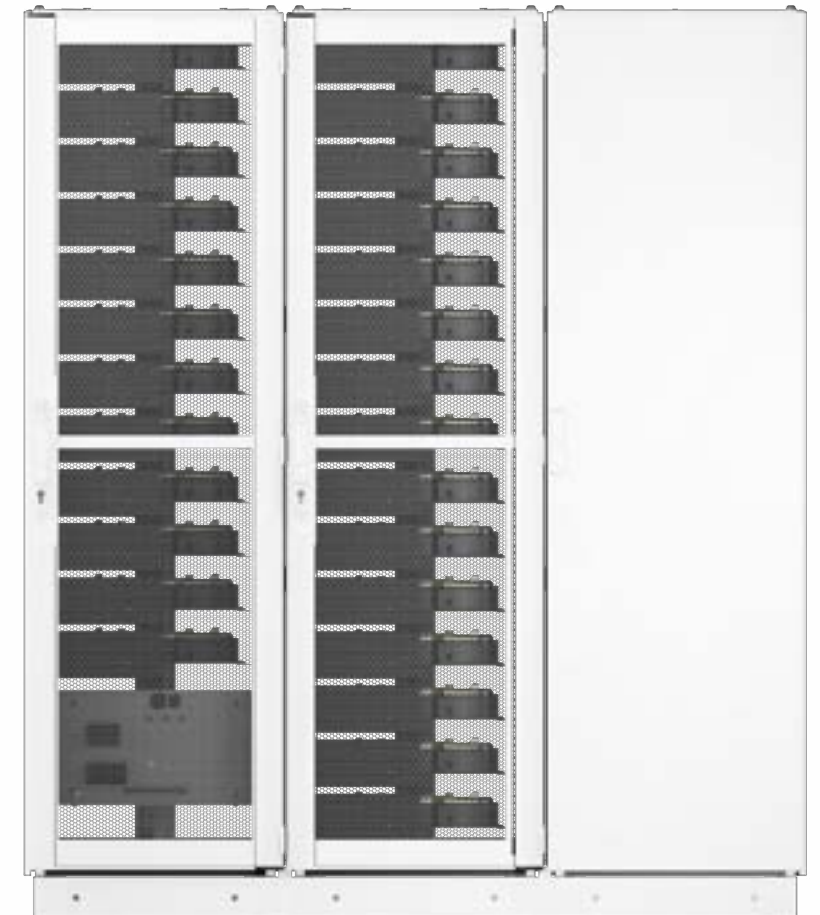
Power-intensive processes are distributed over the day if possible. If the demand for electricity is too high, loads are scaled back or switched off based on their priority.

→ **Monitoring & consumption recording:**

The energy management measures the controlled electricity as well as the water and heat consumption in real time and displays its consumption graphically in an app. The cloud-based data acquisition enables the monitoring of the entire building.

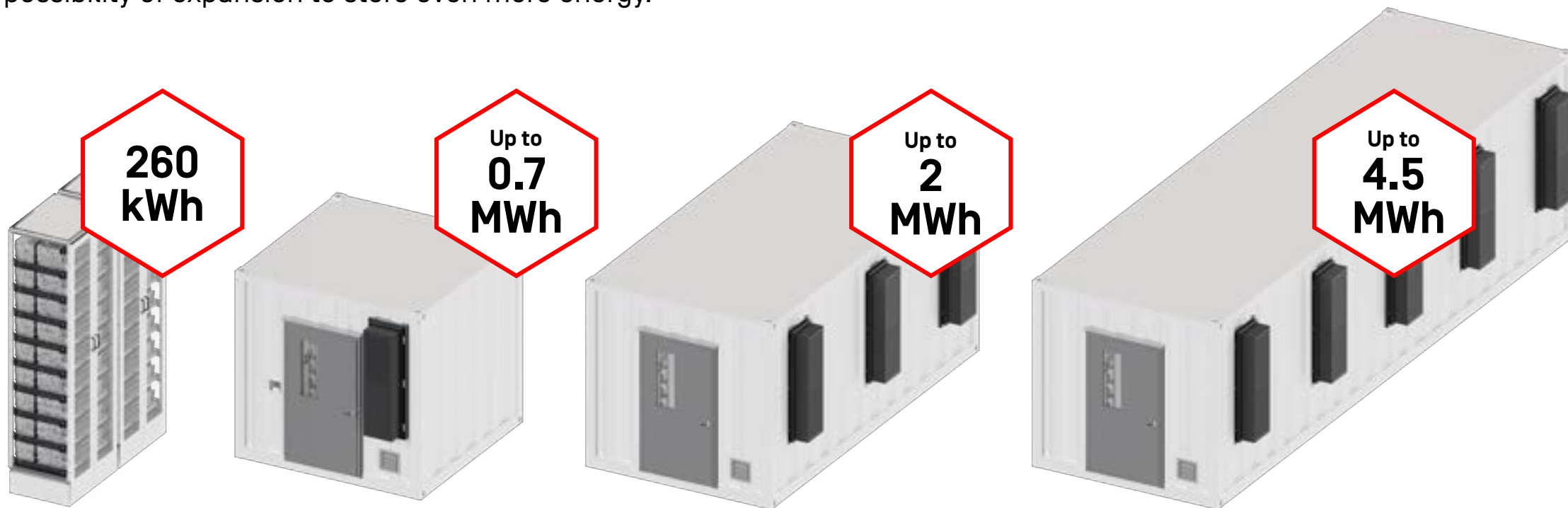


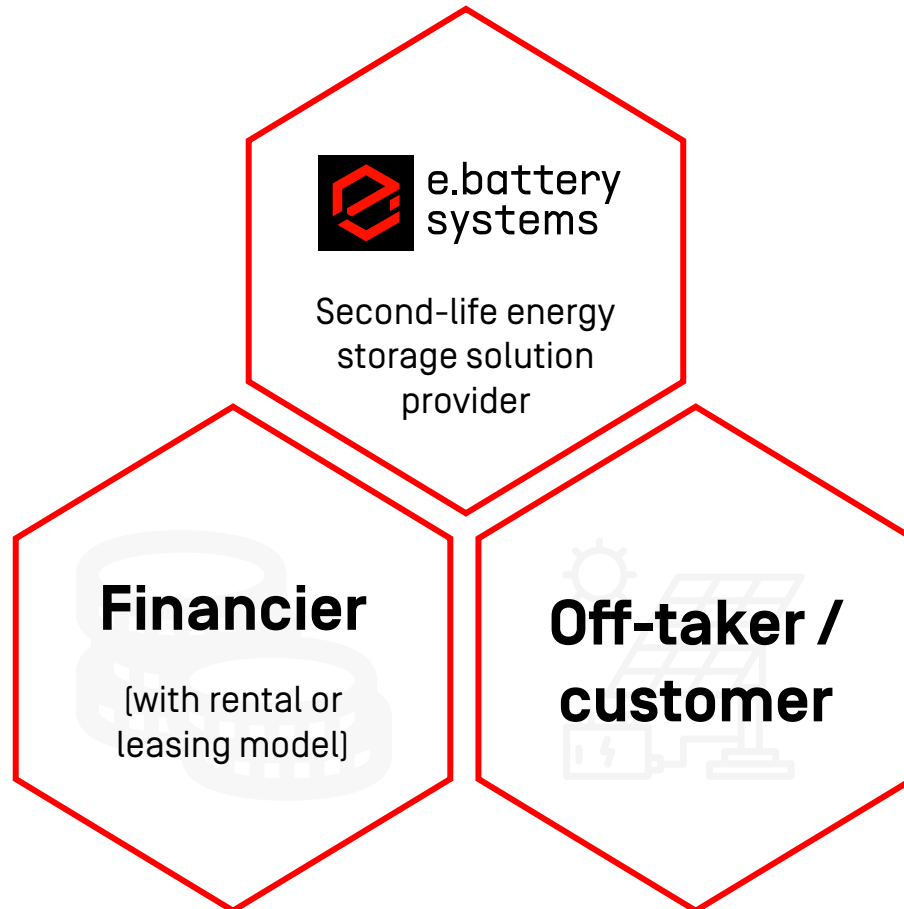
Housing	500x500x210mm
Connection	▪ Digital Input 8-channel ▪ RS485 ▪ Floating Contact / SG ready, 2-channel
Functionality	▪ Monitoring and Verbrauchserfassung, Download via CSV ▪ Peakshaving ▪ Optimization for Selfconsumption ▪ Consolidation of houses and apartments for central ESS
Optional Interfaces	▪ 0-10 V Signal (Analog Output) ▪ PT 1000 Input, 4-channel ▪ Digital Output 24 V DC, 8-channel ▪ Ethernet ▪ M-Bus; Nom.Voltage: max. 40 Standard-Power with 1.5mA
Optional Intercafes Charging Managment	▪ Modbus TCP ▪ Modbus UDP ▪ Modbus RTU
Norms	CE
Control, Monitoring and Visualisation	Via App (Browser und Mobile)
Certification Minergie	Minergie Modul Monitoring



Our standalone solution starting from 260 kWh fits perfect for indoor applications.

For large-scale or outdoor projects we offer three different container-sizes of up to 4.5 MWh with the possibility of expansion to store even more energy.





“energy storage-as-a-service” maximizing efficiency and minimizing risk and upfront investment.

- **Energy Storage-as-a-Service (ESaaS)** removes customer hurdles like project financing, management incl. integration, installation, procurement, Operations & Maintenance and market risks.
- Given these current restrictions and pain points on the customer side, e.-bs offers an **asset-light energy storage rental solution**.
- Customer access to the benefits of e.battery systems second life energy storage solutions **without high upfront investment** while offering an **"all-round carefree package"** [incl. all relevant insurances and services] with flexible terms and runtimes to best fit customers expectations.

First commercialized 2nd life ESS already installed.

Storage size	1,232 kWh
Storage size [usable]	1,170 kWh
Extension	ca. 350 kWh in the same container
Battery provider	Mercedes Benz
Location	Sennwald, Switzerland 1 x 20" Container (air-conditioned)
Monitoring	Cell voltage, cell temperature, current and passive balancing
Purpose	Self-consumption optimization and emergency power function
Degree of self-sufficiency	~2 days



First commercialized 2nd life ESS already installed.

Storage size	261 kWh
Storage size [usable]	247 kWh
Extension	ca. 520 kWh in the same container
Battery provider	Mercedes Benz
Location	Götzis, Austria 1 x 10“ Container (air-conditioned)
Monitoring	Cell voltage, cell temperature, current and passive balancing
Purpose	Self-consumption optimization and EV charging infrastructure
Degree of self-sufficiency	~1 day

**ZM3**

First commercialized 2nd life ESS already installed.

Storage size	261 kWh
Storage size [usable]	247 kWh
Extension	limited by customer's available space only
Battery provider	Mercedes Benz
Location	Schlins, Austria; Stand Alone within customer's property
Monitoring	Cell voltage, cell temperature, current and passive balancing
Purpose neighboring	Emergency power function and power supply for facilities, energy supplied by hydropower
Degree of self-sufficiency	~1 day

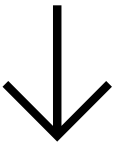


**Kleinwasserkraftwerk
Martina Walch**



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