Boosted Electric Power

The global energy transition
requires high-power storage technologies

We provide one

GREEN TECH
MADE IN
GERMANY

ADAPTIVE
BALANCING POWER

Large scale network case

example Changzhi, China

World's largest' 30MW flywheel energy storage project connects to grid in China

Pictured left, it has a total installed capacity of **30MW** with **120 high-speed** magnetic levitation flywheel units. Every 12 units create an energy storage and frequency regulation unit, with the 12 combining to form an array connected to the grid at a **110 kV** voltage level.
Flywheel energy storage technology works with a large, vacuum structure-encased spinning cylinder. To charge, electricity is used to drive a motor to spin the flywheel, and to discharge the motor acts as a generator to convert the spinning motion's energy back into electricity.

Energy Storage News September 19, 2024

ADAPTIVE BALANCING POWER GmbH

- Kinetic High-Power Storage
- Founded: 2016 by Dr. Hendrik Schaede-Bodenschatz and Nicolai Meder
- Spin-off Technical University Darmstadt
- Own development and manufacturing
- 28 international patent applications
- Grants from EU Horizon 2020 and German Government

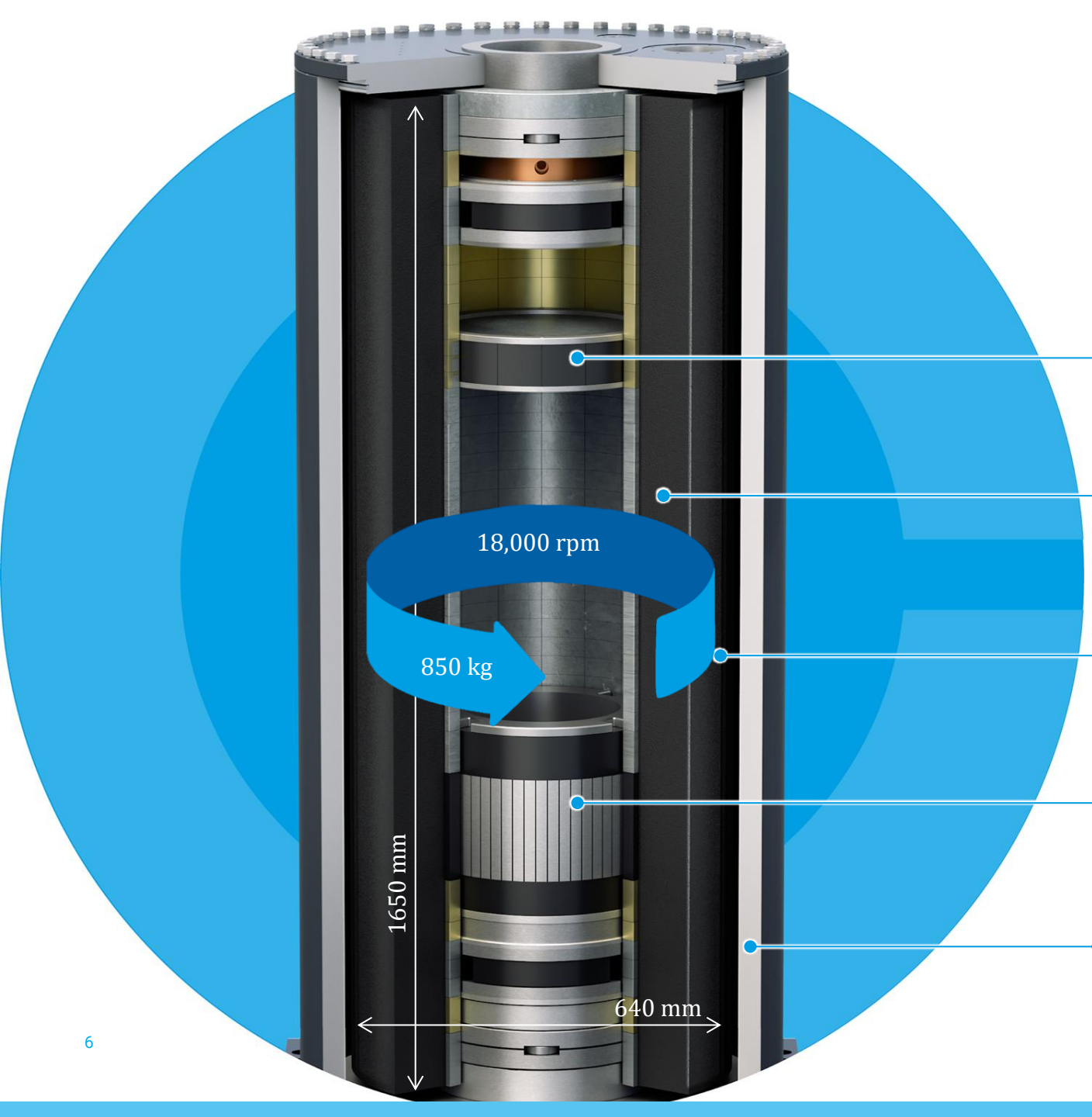
AMPERAGE flywheel

High-power storage based on physics, not chemistry

High power even where the power grid cannot provide it

- **Powerful:** +250 kW/ 500 kW, 20 kWh per unit
- **Built to last:** 1,000,000 charge cycles and 25 years
- **Safe:** non-flammable, operates in very cold and hot climates
- **Sustainable:** product of the circular economy, low CO2 footprint, no critical raw materials
- **Made in Germany:** no dependence on Asian manufacturers; European software
- **Patented** with 28 international patent applications

GREEN TECH MADE IN GERMANY



Globally first ring-type flywheel storage system

Magnetic Bearing System
levitating flywheel rotor – no contact – no friction – no wear

Carbon Fiber flywheel
enables supersonic rotation speed of up to 1.5-times the speed of sounds – for 1,000,000 cycles in 25 years

High-Vacuum – no gas molecules, no friction, highly efficient

Permanent Magnet Synchronous Motor
industry-leading 92% round trip efficiency
5ms for full-power

Containment
ensuring system safety

GREEN TECH MADE IN GERMANY

Modular and scalable:
High-Power Storage

GREEN TECH MADE IN EUROPE

Transport of fully assembled and tested system

Amperage DC + Boosted Charger

AMPERAGE DC

Our Core-Technology 250 kW, 20 kWh per unit

- Scaleable: up to 25 units per cluster
- DC-Bus: 650 - 750V DC
- Modbus TCP
- W x D x H: 1,6 m x 1 m x 2,5 m
- Optional with integrierted energy management

AMPERAGE AC

AMPERAGE with integrated 50 Hz inverter

Boosted Charger

AMPERAGE with CCS-charger

Pantograph Booster

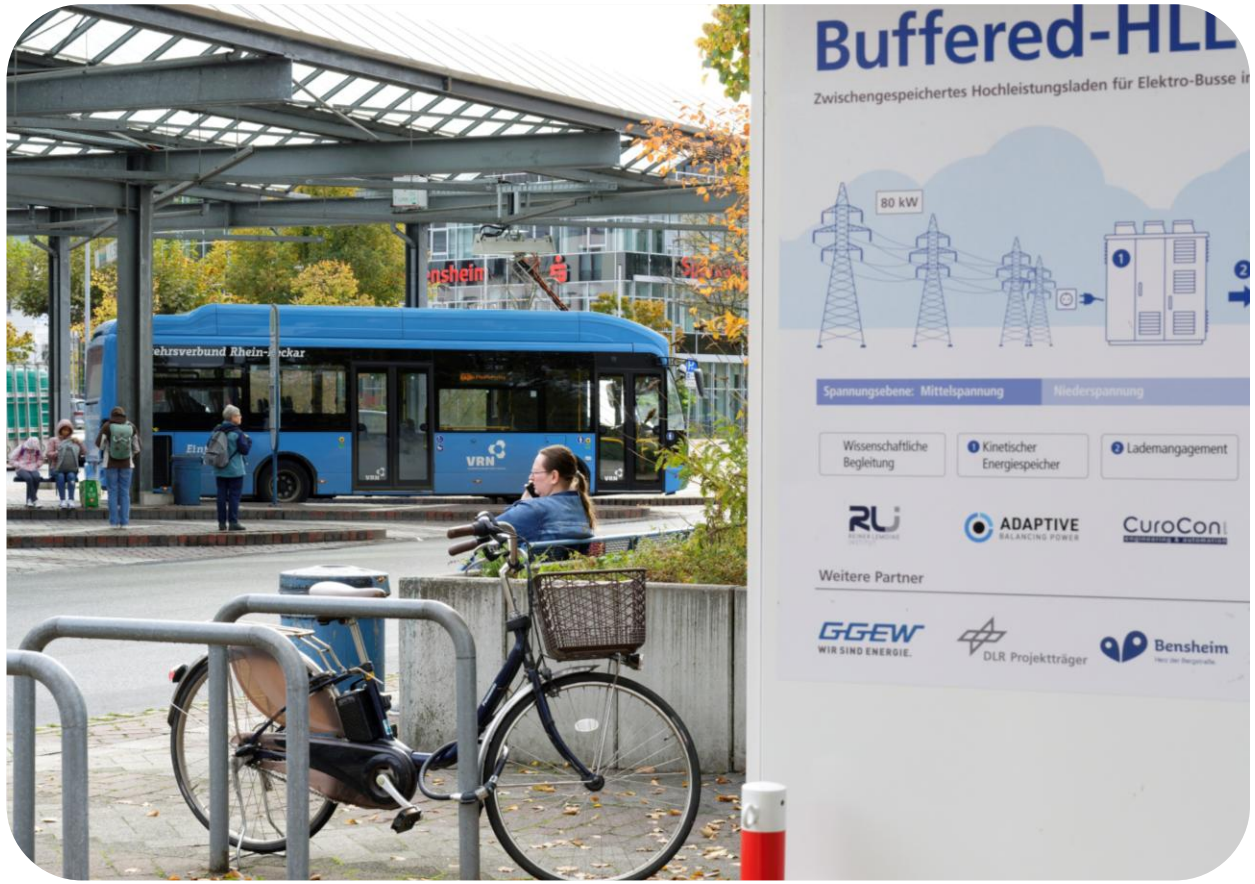
AMPERAGE with CCS-charger with pantograph

Our high-power storage provides outstanding benefits to our customers. We focus on well defined verticals

Vertical		Customer Benefit	Customer and Partner
	Commercial and Manufacturing Power Grids	• Increasing power quality and grid utilization • matching efficiency requirements • SAM: >300 MEUR	• lowest costs of energy stored • 1 order of magnitude below Li-Ion	Audi, GreenTEC CAMPUS, ARPA
	High Power Charging	• Economic fleet electrification • Process integrated charging, 3 shifts, 21 h per day • SAM: > 1.000 MEUR	• 33% lower costs of energy charged to vehicle • Half vehicle downtime	GreenTEC CAMPUS, VARIO PARK, VGG, MEYGO
	Sustainable Mass Transportation	• Enabling increased operating frequency • achieving efficiency requirements • SAM: > 400 MEUR	• 60% less CAPEX • 10-times faster Integration	net powersafe, DB, JUNGFRAU TOP OF EUROPE
	Grid Stability	• Increased utilization of existing grid, peak shaving • Power stabilization • System Services • SAM: > 1.000 MEUR	• Faster GRID enhancement • Increased resilience, avoid power drops	SIEMENS energy, Megger, Master Machinery Test Systems

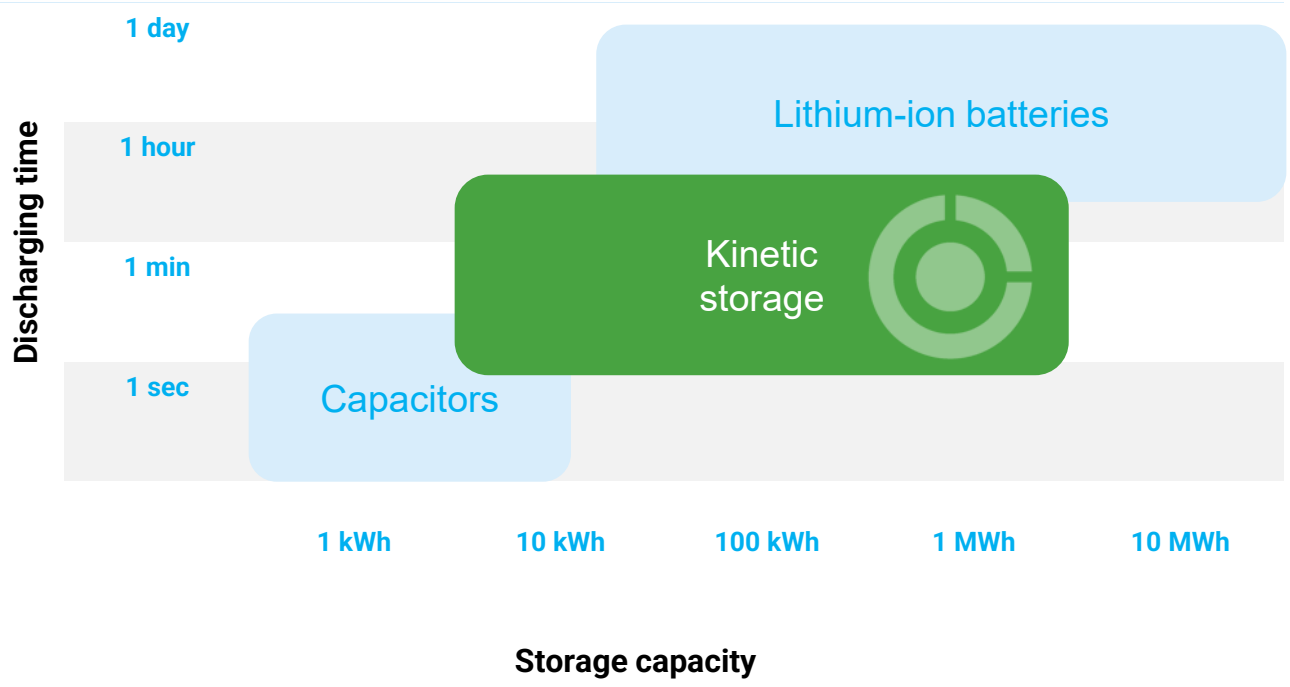
Installation

Bensheim Germany, ÖPNV charging



Bensheim Germany, public charging

Powering the energy and mobility transition
High-Power flywheels storage system



High-Power Storage solutions are key

- They are vital in balancing energy supply and demand
  - response time in milliseconds
  - peak shaving or boosting
  - energy hygiene (flickering, frequency, etc.)
- For crucial applications, energy must be stored and released super fast and in short intervals

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