



KRAFTBLOCK - ENERGY STORAGE

Scalable | Sustainable | Cost-effective | Durable



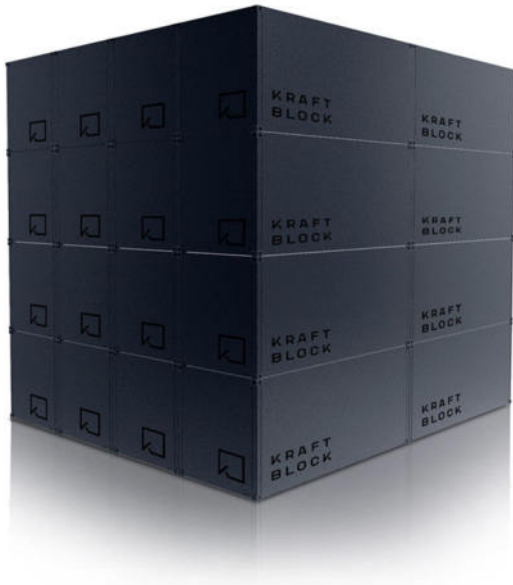
WHY ENERGY STORAGE?

- **Energy storage** is the **key technology** for the **energy transition** and **de-carbonization** of our industries
- **15.000 TWh el storage capacity required** until 2050 for the global energy transition*
- The problem with current energy storage technologies:
not scalable, not economical, not durable (charging cycles)
and **not ecologically sustainable**

*Global Energy System Based on 100% Renewable Energy Power Sector (Lappeenranta University of Technology; 2017)



KRAFTBLOCK ENERGY STORAGE



Modular, scalable energy storage for 30 MWh up to 10,000 MWh



Outstanding **energy density of 1.2 MWh/m³**



No rare earth materials - up to **85% recycled materials**



Infinite lifespan & easily recyclable & eco-friendly



Highly economical with **1-4 cent /kWh energy storage costs***

*4 cent/ kWh - calculation based on 1,000 MWh storage with 50 MWeI capacity | 1 Cent / kWh if excess heat is fed into district heating network in addition to electricity



PATENTED HIGH-TEMPERATURE STORAGE GRANULE



- **High-temperature storage granule**
(1,300°C vs. 400°-600°C with concrete/salt)
- **Energy density 3x higher** compared with competition
- **High-temperature storage** offered **in combination with** state of the art and **long-established solutions** for in- and output of electricity and heat (Power2Heat / Heat2Power)
- KRAFTBLOCK **as system solution provider for storing energy**



1. RENEWABLE ENERGIES

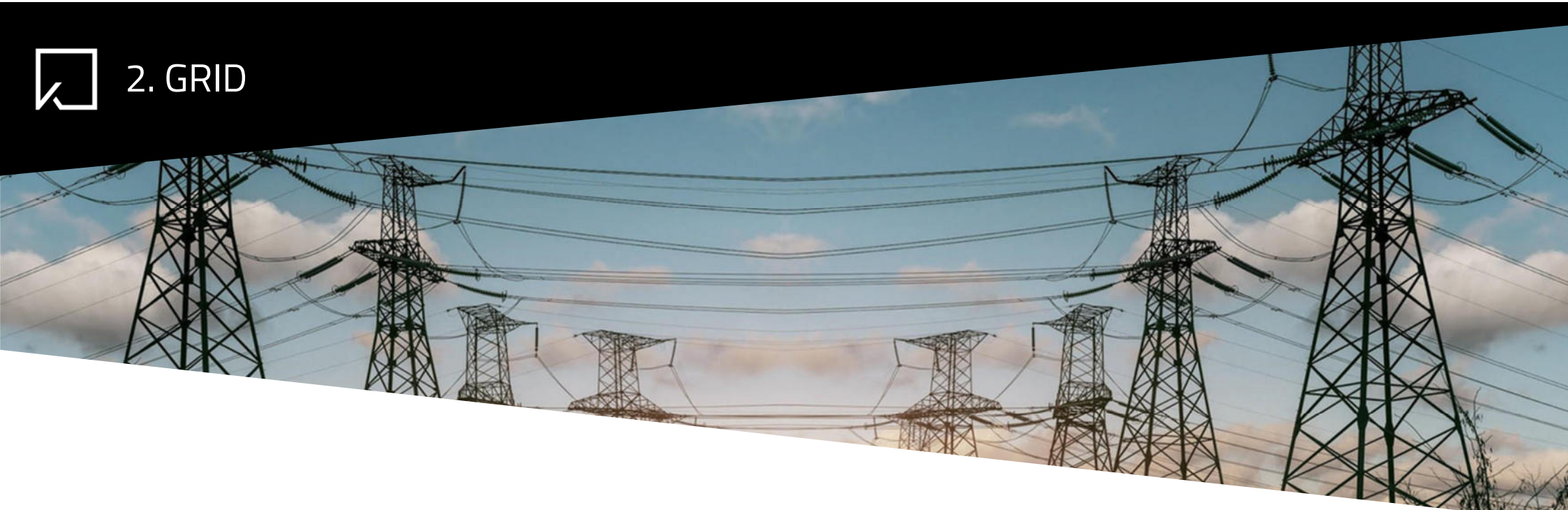


TRANSITION TO RENEWABLE ENERGIES AND LOAD MANAGEMENT

- **KRAFTBLOCK** decouples energy production from energy consumption
- **Volatile production: excess- or lack of energy production** from **fluctuating renewable energies** → in 2017 over 77 TWh could have been stored in Germany alone
- **Cyclic consumption:** increased **power consumption** at certain times of the day and year (e.g. higher demand 6-10pm, fall/winter)



2. GRID



REDUCTION OF GRID INFRASTRUCTURE INVESTMENTS

- **Power grid is not suitable for decentralized production** and integration of renewable energies
- **Investments into grid infrastructure of > 50 bn. € required** in Germany until 2030
- **KRAFTBLOCK as energy buffer** for peak shaving, demand side management and grid stability **reduces grid investments**



3. RE-USAGE OF POWER PLANTS



RE-USE EXISTING POWER PLANTS' HEAT-TO-POWER INFRASTRUCTURE

- By 2038, all coal-fired **power plants in Germany will be shut down** → Future use of billion euro infrastructure is unclear
- With **KRAFTBLOCK**, coal-fired **power plants can be transformed into “storage power plants”**
- **Preservation and re-use of infrastructure** and **sustainable retention of jobs**



4. INDUSTRIAL WASTE HEAT



STORAGE OF PROCESS AND WASTE HEAT FROM HEAVY INDUSTRY

- **Heat $>500^{\circ}\text{C}$** cannot be stored **with today's technology** → >30 TWh unused heat in Germany (2017)
- **KRAFTBLOCK stores & utilizes heat** to preheat ovens or generate steam
- **Reduce CO₂ emissions** and energy consumption



TEAM & INVESTORS

EXPERIENCED
TEAM
BACKED BY
DEEP-TECH
INVESTORS



Martin Schichtel - CEO, PhD in Chemistry

- 20 years of experience in material development, production and sales
- 8 years at Institute for New Materials, Head of the Department of Ceramics
- Head of Department Smart Coatings at ItN Nanovation AG



Susanne König - CFO, PhD in Economics

- CFO and later on CEO of an international trading group at Trucktec International
- Head of corporate management in treasury / accounting and risk controlling at a bank



Freigeist Capital

- Freigeist Capital is a privately-owned investment firm working with visionary founders to fund and build disruptive technology companies
- Freigeist seed invested in Lilium, Neufund, Wunderlist (acquired by Microsoft), MyTaxi (acquired by Daimler) & others



CONTACT DETAILS

MARTIN SCHICHEL

KRAFTBLOCK (formerly Nebuma GmbH)
Campus Geb. A1 2
66123 Saarbrücken

Tel: +49 681 302-64918
martin@kraftblock.com





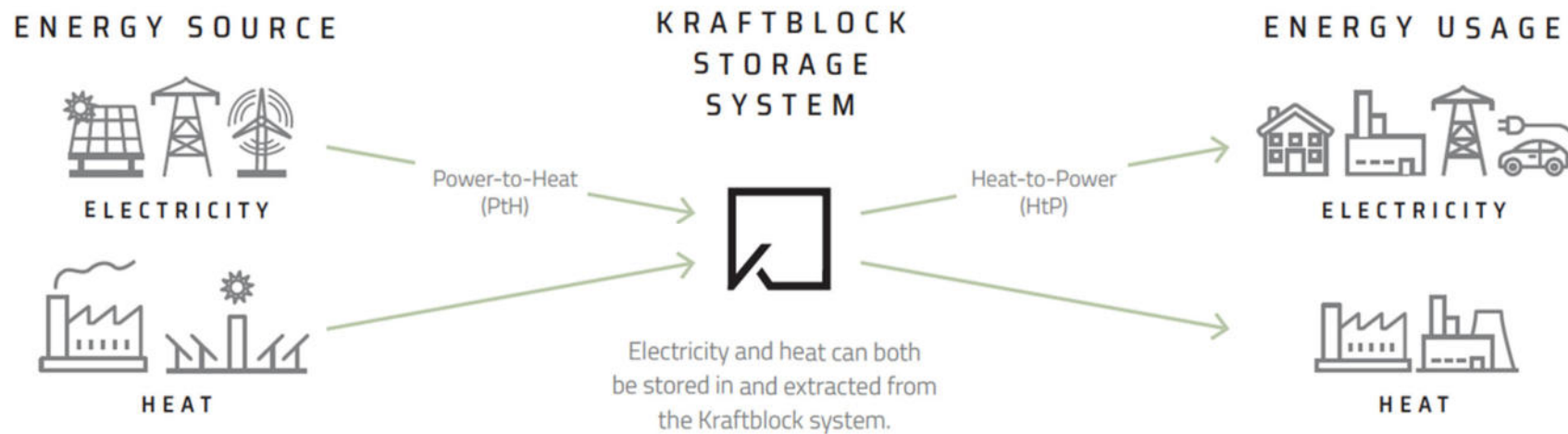
Title

Message

Subtitle



KRAFTBLOCK IS A UNIVERSALLY APPLICABLE STORAGE SYSTEM

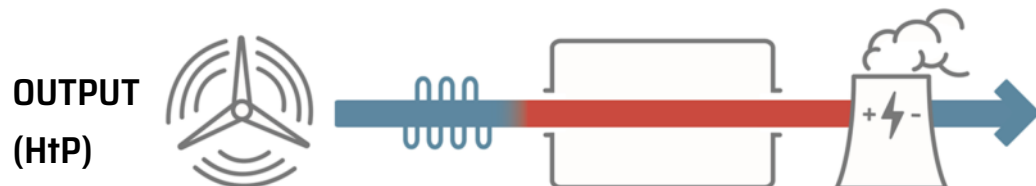
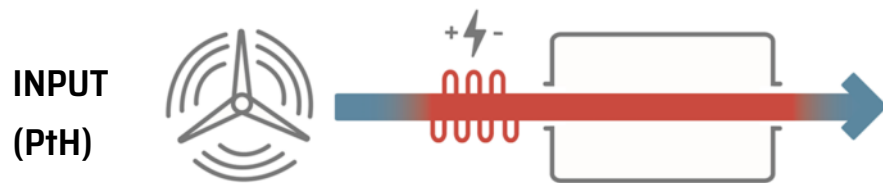


- KRAFTBLOCK is a **universal storage system where both heat and electricity** can be stored and extracted
- Electricity can be converted into heat (PtH) and back from heat to electricity (HtP)



TECHNICAL PROCESS (I/II)

POWER-TO-POWER - PROCESS OVERVIEW



- Air heater transforms **electric energy** into **heat** energy, which is **pumped** as high temperature air **into the storage**
- The KRAFTBLOCK **granule absorbs the energy** and cold air leaves the storage
- **Energy is stored as heat** in KRAFTBLOCK storage
- **Air is pumped into the storage**, absorbs the energy from the granules and **leaves as hot air**
- The hot air is **used in the steam cycle** to **produce electricity** again