



Innovationen zu stationären Batteriespeicher

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Robert van Treeck, Product Manager Innovative Use Cases
RWE Global Storage Engineering, Dresden

Innovationen zu stationären Batteriespeicher



RWE Renewables
& Global Storage
Engineering

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Übersicht
aktueller
Innovationen

2

Batteriespeicher
Produkt und
Beispiele

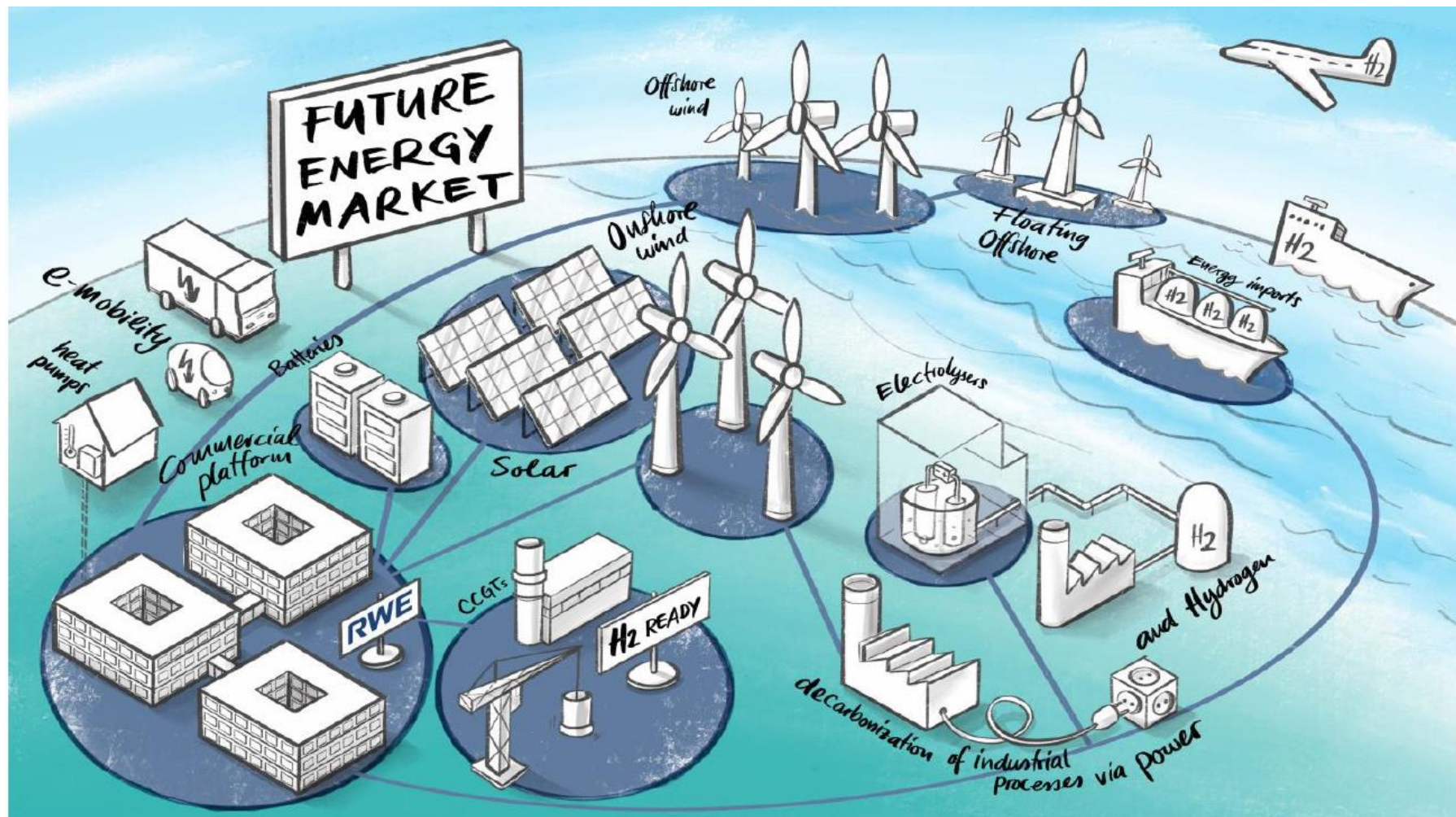
3

Offene
Fragerunde

4



The future energy market is powered by green technologies



Worldwide market

With 10 GW installed capacity



Our growth target

2.1 GW per year
until 2030

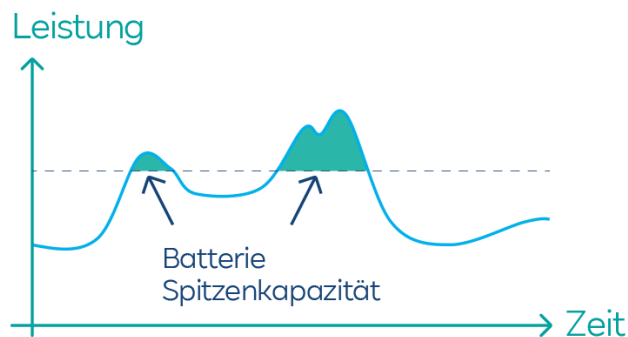


Our Investment

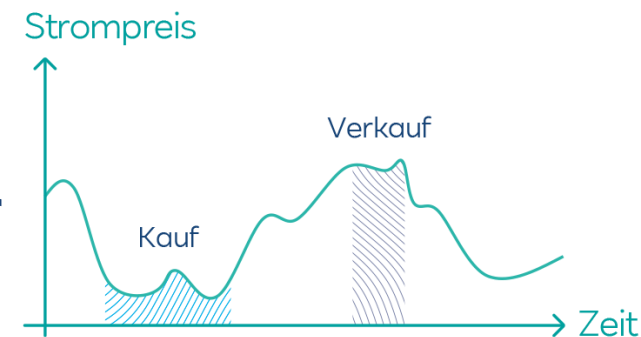
50 billion euros gross
through to 2030

Lithium-Ion-Batteries for the future power grid

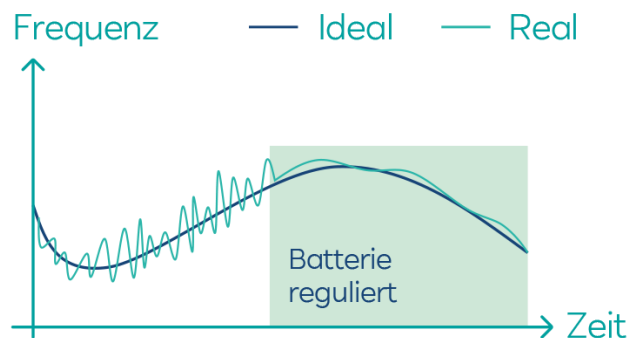
are critical part to ensure the way to a stable 100% renewables grid



Firming local demand or supply peaks

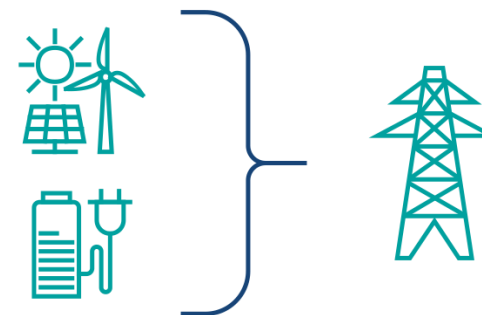


Buffering of renewable energy for later use or sale



Stabilizing the energy grid frequency and voltage

Optimization of the energy supply with battery + X hybrid systems



What we are working on: competitive and state-of-the-art stationary storage solutions for RWE

Triton+ (COD Q4-2022)



Malibu C&I project (under construction, COD Jan-2022)



127MW/127MWh
Standalone energy storage



Lower Saxony
and North Rhine-
Westphalia
(Germany)



5.0 MVA
Standalone energy storage



North Rhine-
Westphalia
(Germany)



What makes this project special?

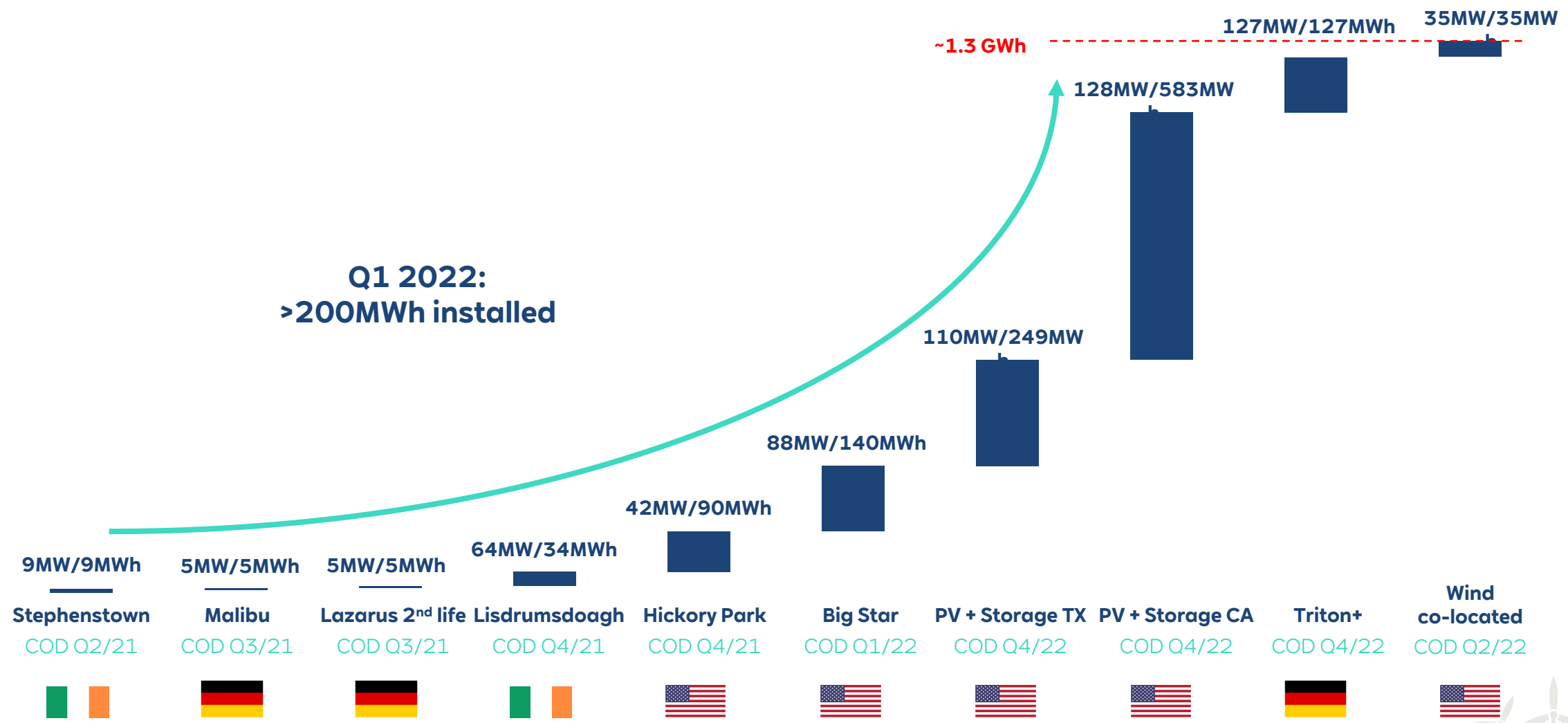
What is special about this project is that the batteries will be virtually coupled with RWE's run-of-river power stations along the river Mosel. By raising or decreasing the flow-through at these power stations, RWE can make additional capacity available, also as balancing energy.



What makes this project special?

Industrial application of energy storage with a focus on peak shaving in combination with gas engines and demand side management. Pending patent application..

RWE is executing 1.3 GWh of battery storage projects

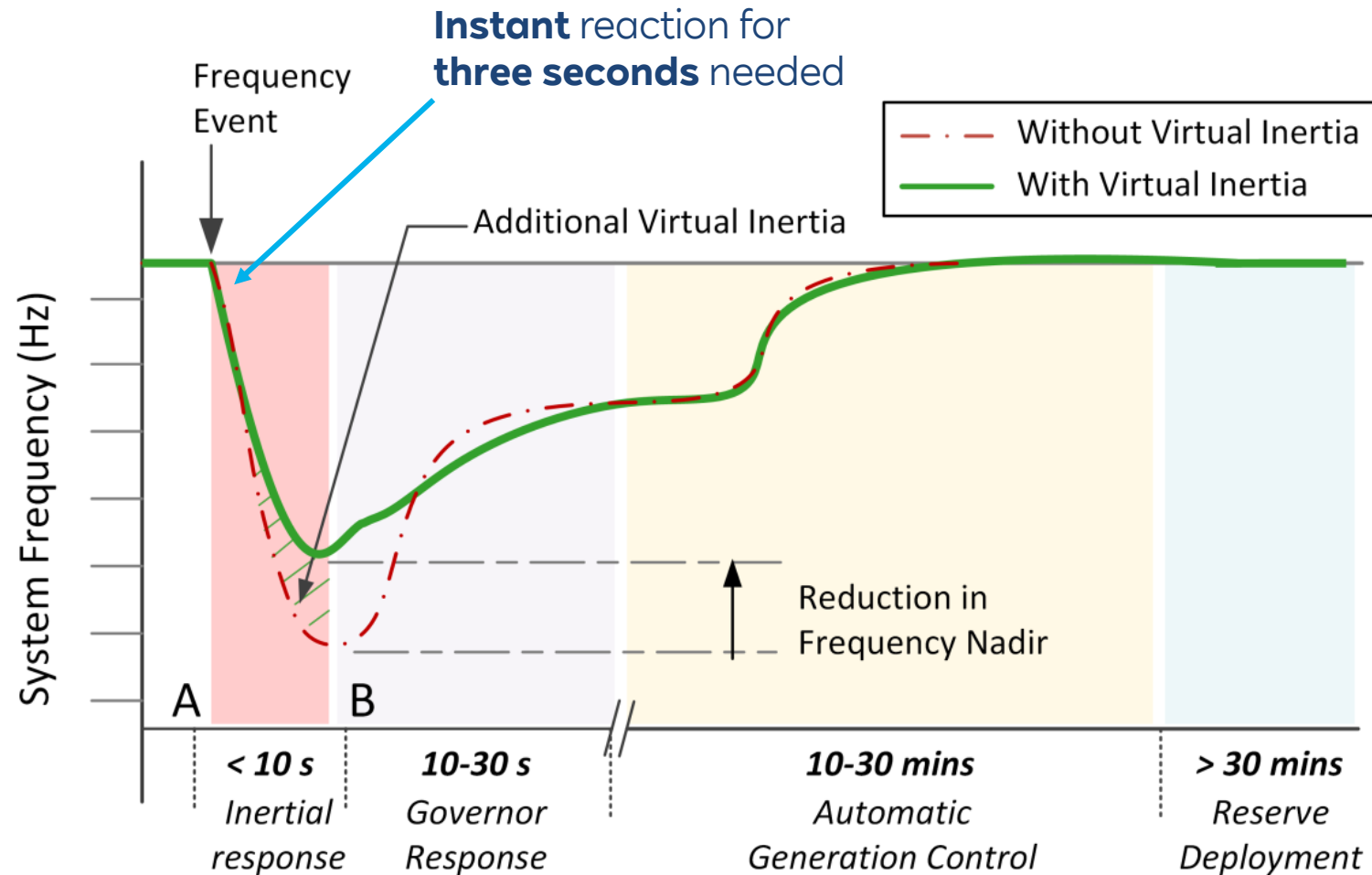


*Battery MW/MWh as MWh-dc installed at Beginning Of Life



Loss of generation power leads to frequency drop

(Virtual) Inertia from GFCs limit the drop till other services take over



Inertia is the tendency of an object in motion to remain in motion. This tendency to remain in motion is the result of stored kinetic energy in the large, rotating turbines of conventional generators. When a disturbance occurs, this stored kinetic energy inherently reacts to temporarily negate the resulting power imbalance.

Source: Tamrakar, U.: „Virtual Inertia: Current Trends and Future Directions“, Appl. Sci 2017, 7, 654; doi:10.3390/app7070654.

Short circuit current and inertia from Grid forming converters

Current controlled converters:

- Grid measurement
- New power command
- delayed grid support

GFCs (voltage controlled):

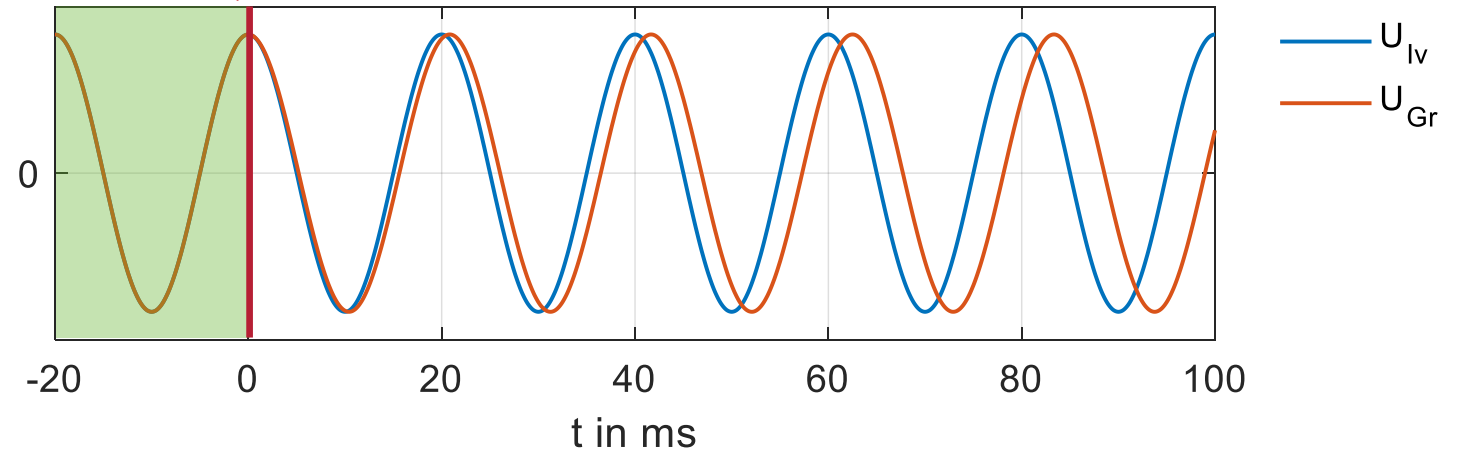
- inherently hold U and f
- immediately react to drops

Market examples:

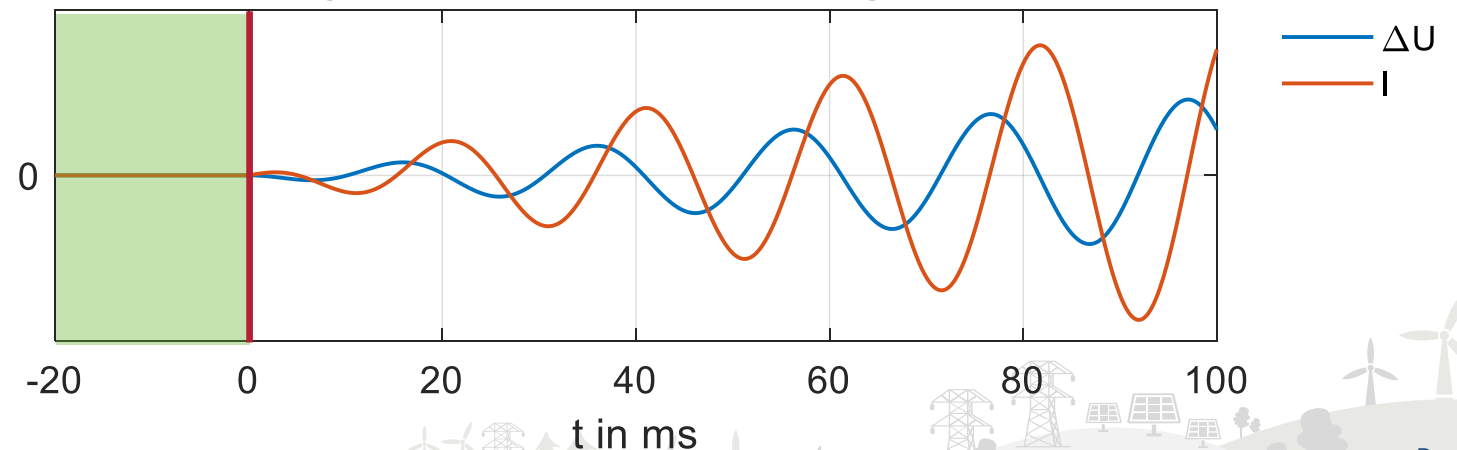
- 200GJ (20GW) gap in 2030 in GER
- Current tenders in UK
- Missing SCL in first EU markets

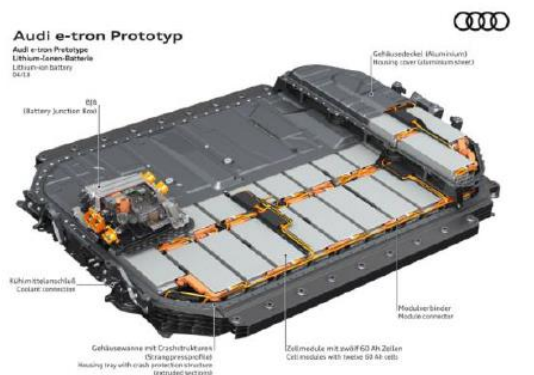
drop to 49 Hz

Voltage of Inverter and Grid

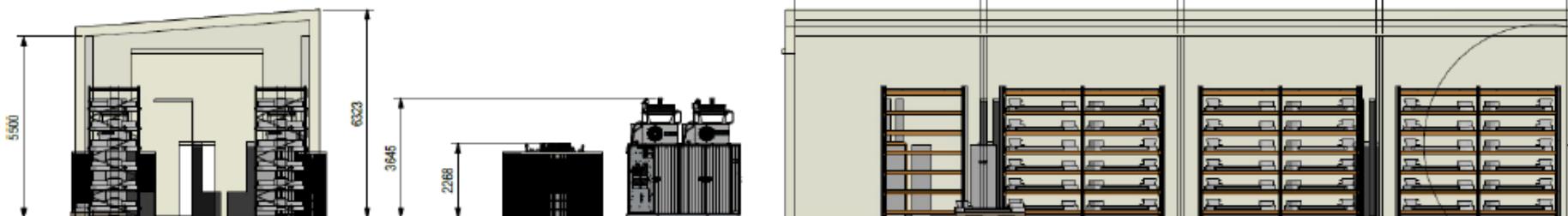


Voltage Difference and Resulting Current





ANSICHT2 (1 : 100)
von rechts nach links



- Residual value
- Ideal repurposing
- Serial integration to 1500V
- Initial sorting of R and C
- Optimized service
- Aging prediction
- Hazard mitigation
- Fire protection
- Certification
- Battery communication

All that in strong price competition to 1st life



Overview of innovation topics

Innovative Use Cases



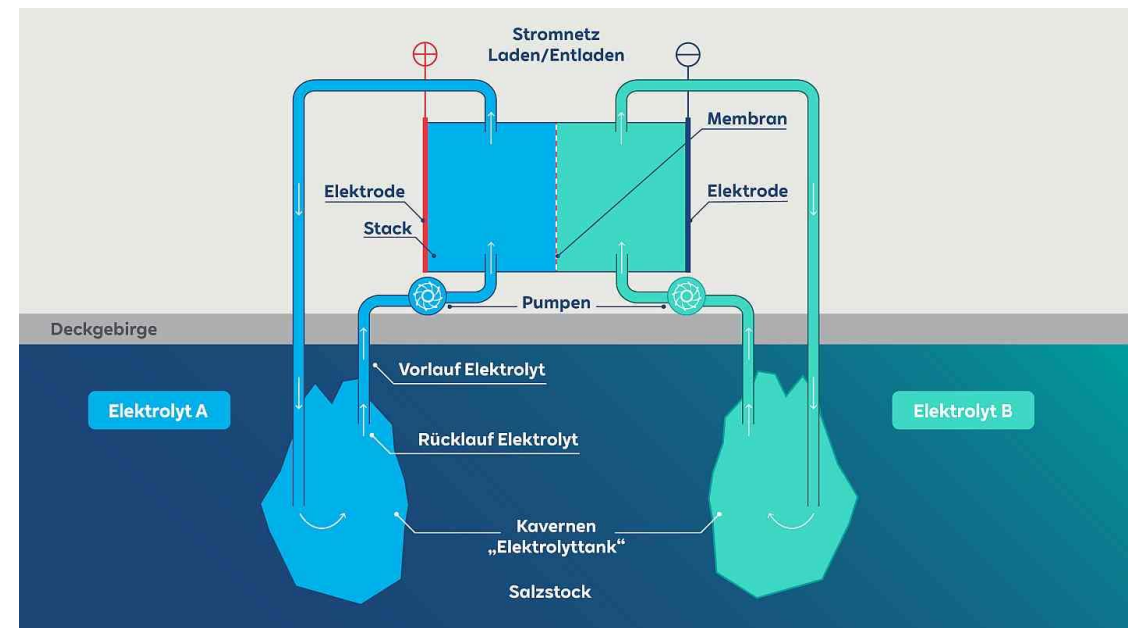
- Grid forming: from demonstration to utility scale application.
- EV Batteries & 2nd Life
- Aging Analysis
- C&I Applications

Future Storage Technologies

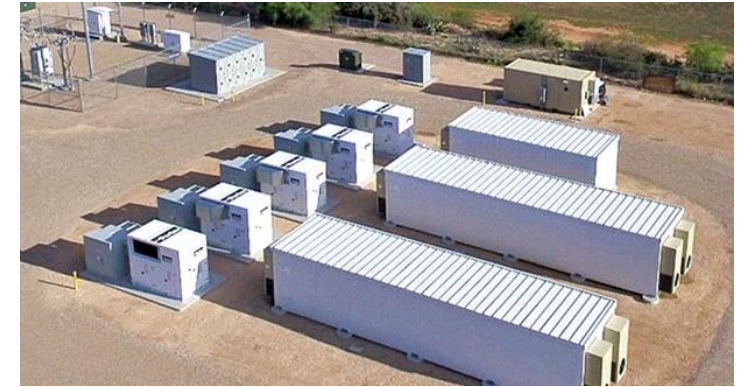


- Redox Flow
- Bipolar batteries
- Sodium-Ion
- Solid state batteries
- Iron-Air
- Li-Ion Capacitor

Example of redox-flow storage with CMBlu using organic electrolyte



Q & A and impressions from our projects around the globe



Get in touch with our ambitious, international, diverse and experienced leadership team



Andrea.Bianco@rwe.com

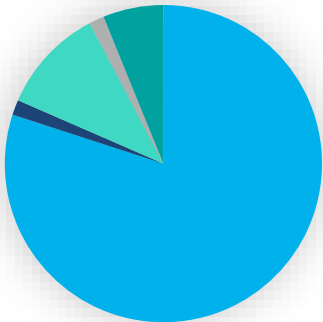


+1 312 478 9161



Andrea Hu-Bianco
Global Head
Los Angeles, US

65 FTEs in four countries



- Germany, Dresden
- Germany, Essen
- US
- UK
- Australia



Chris Abell
Technology Development
Middlesbrough, UK



Chris.Abell@rwe.com



+44 ??? ???



Rahul Ramanan
Applied Technology
Chicago, US



Rahul.Ramanan@rwe.com



+1 909 800 5576



Saioa Burutxaga
Software
Dresden, Germany



Saioa.Burutxaga@rwe.com



+49 ?????



Samuel Wiggins
System Integration
Dresden, Germany



Samuel.Wiggins@rwe.com



+49 152 579 125 39



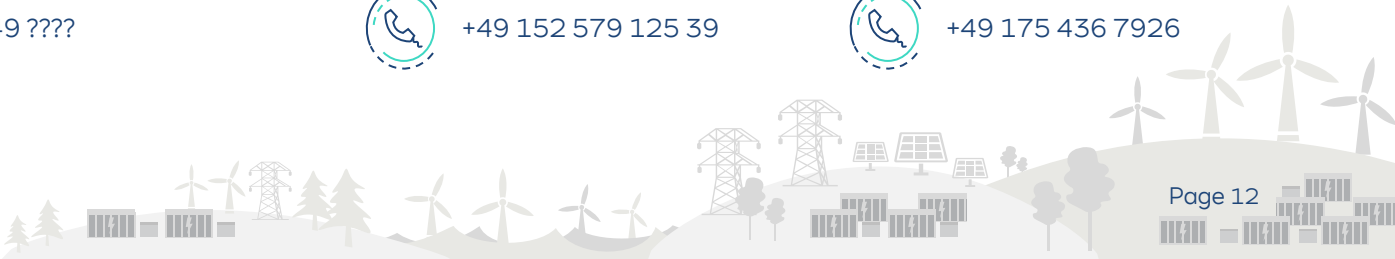
Marie-Kathryn Kaiser
Operation & Maintenance
Dresden, Germany



Marie.Kaiser@rwe.com



+49 175 436 7926



RWE

