

Energy Storage in Germany – Technologies, Business Models and Trends

Seminar: Storage Systems in the Electrical Sector,
Regulation and New Business Models
Santiago de Chile, January 8, 2019



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The German Energy Storage Association (BVES)

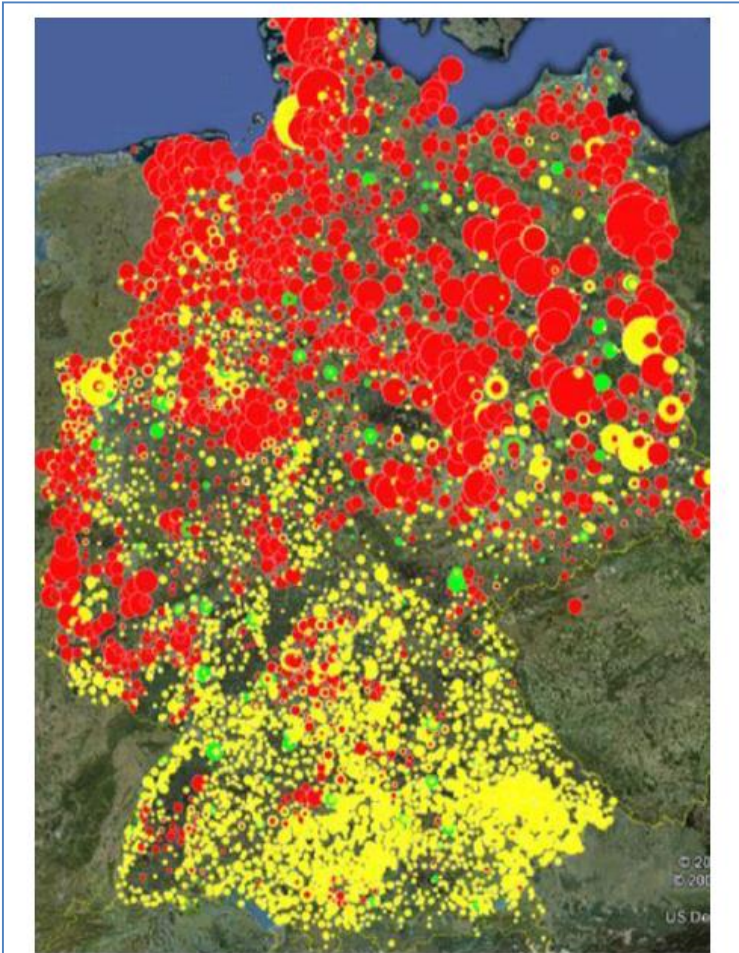
- The BVES is the industrial association of German energy storage companies that is open to all technologies in the areas of electricity, heat and mobility.
- We are a dialogue partner for politics, administration, science and publicity. With targeted lobbying at the interfaces of political decision making we are trying to improve the German regulation and policy framework.
- In addition, the BVES monitors research and development activities and informs members of new results and developments.



Members (extract)



German ‚Energiewende‘ - Challenge No.1



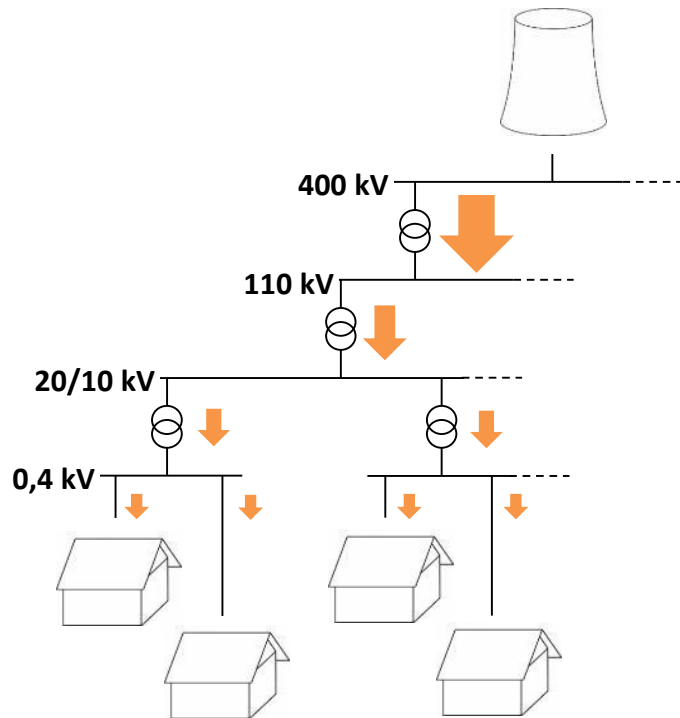
Energyintensive industry
sits mostly in the south of
Germany



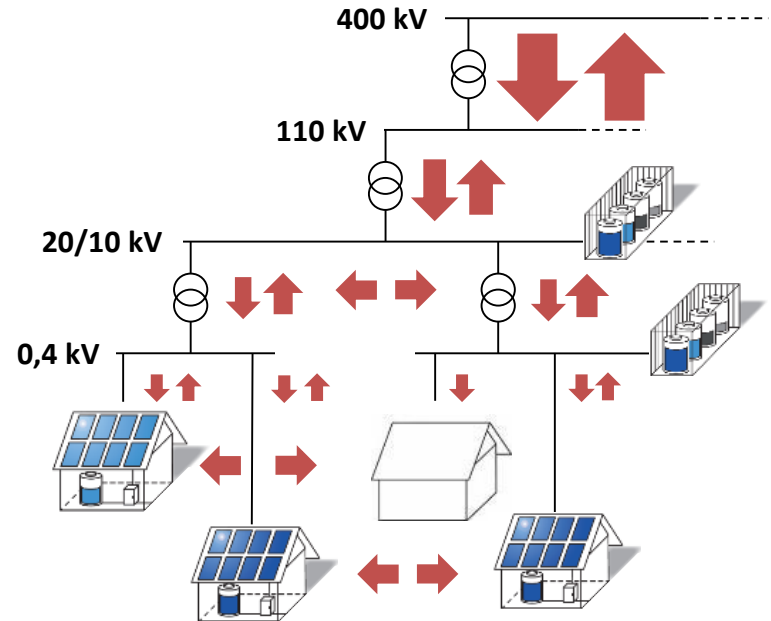
Task is, to bring wind-
energy (onshore and
offshore) from the
north to the south

German ‚Energiewende‘ - Challenge No.2

The Fossil Age



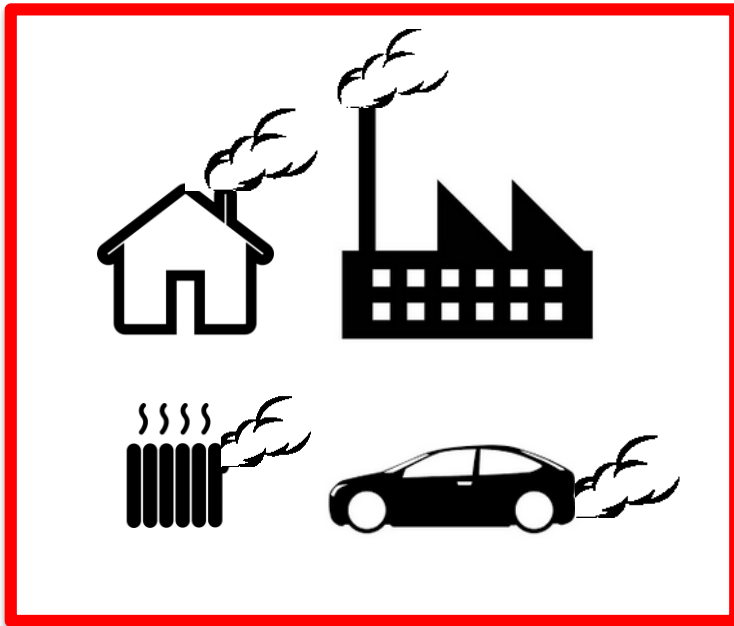
New Electrification Wave



German ‚Energiewende‘ - Challenge No.3

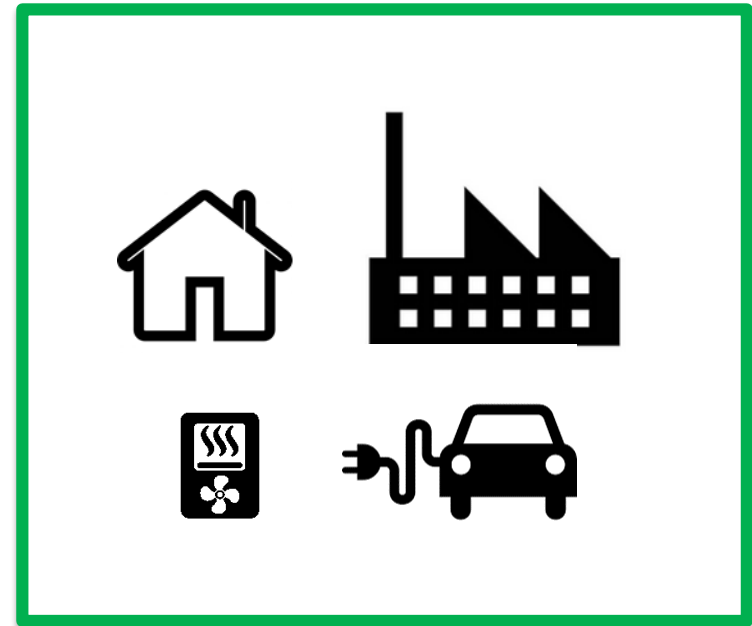
In an all electric world is POWER the essential task, not only energy.

The Fossil Age



ENERGY is sufficient.

New Electrification Wave



POWER is required!

Storage is an ideal tool...

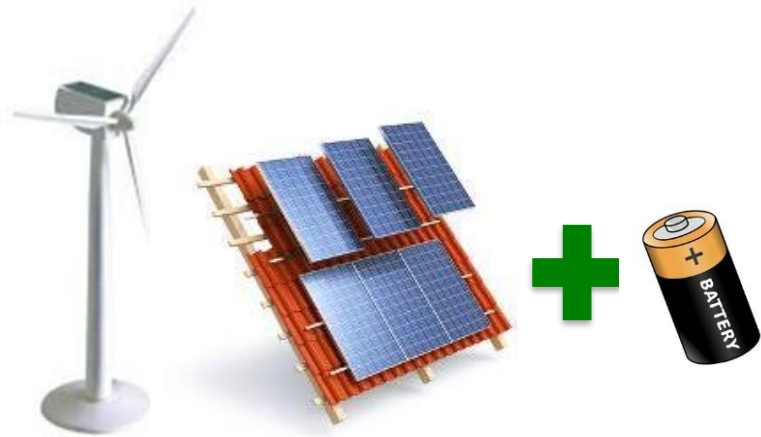
- Optimization of self-consumption
- Peak load smoothing
- Black-Start capability
- Voltage control
- Inertia reserve
- Back up energy
- Positive/negative control energy
- Reactive power compensation
- Off-grid supply
- Shifting excess energy to other sectors



Industrial Storage Market



Self consumption



Self consumption

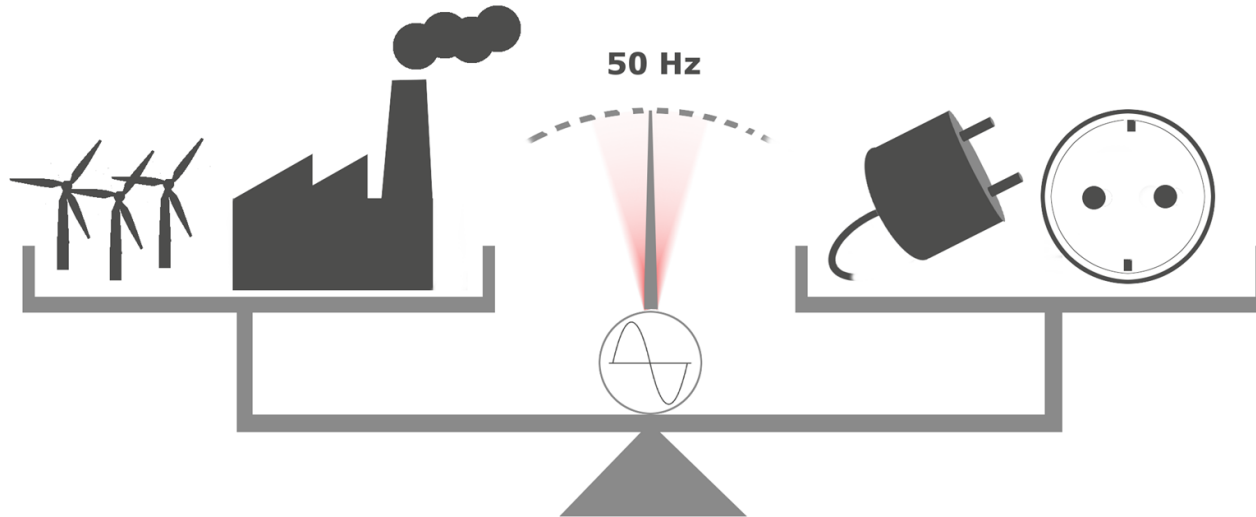
+ UPS + PLS + Backup Power
+ no Diesel

Industrial Storage Market



- ~ 900 projects in Germany. (agriculture, multi-family houses, industry, trade business)
- Subsidies in various federal states (e.g. North Rhine-Westphalia, Thuringia).
- UPS, Backup Power & Peak-load management
- NEW: Combination of PV, Storage and E-mobility (fast charging)

Large Scale Storage Market



Managing and balancing the grid:

- Inertia reserve
- Control energy
- Reactive power
- Blackstart capability
- ...

Large scale storage market



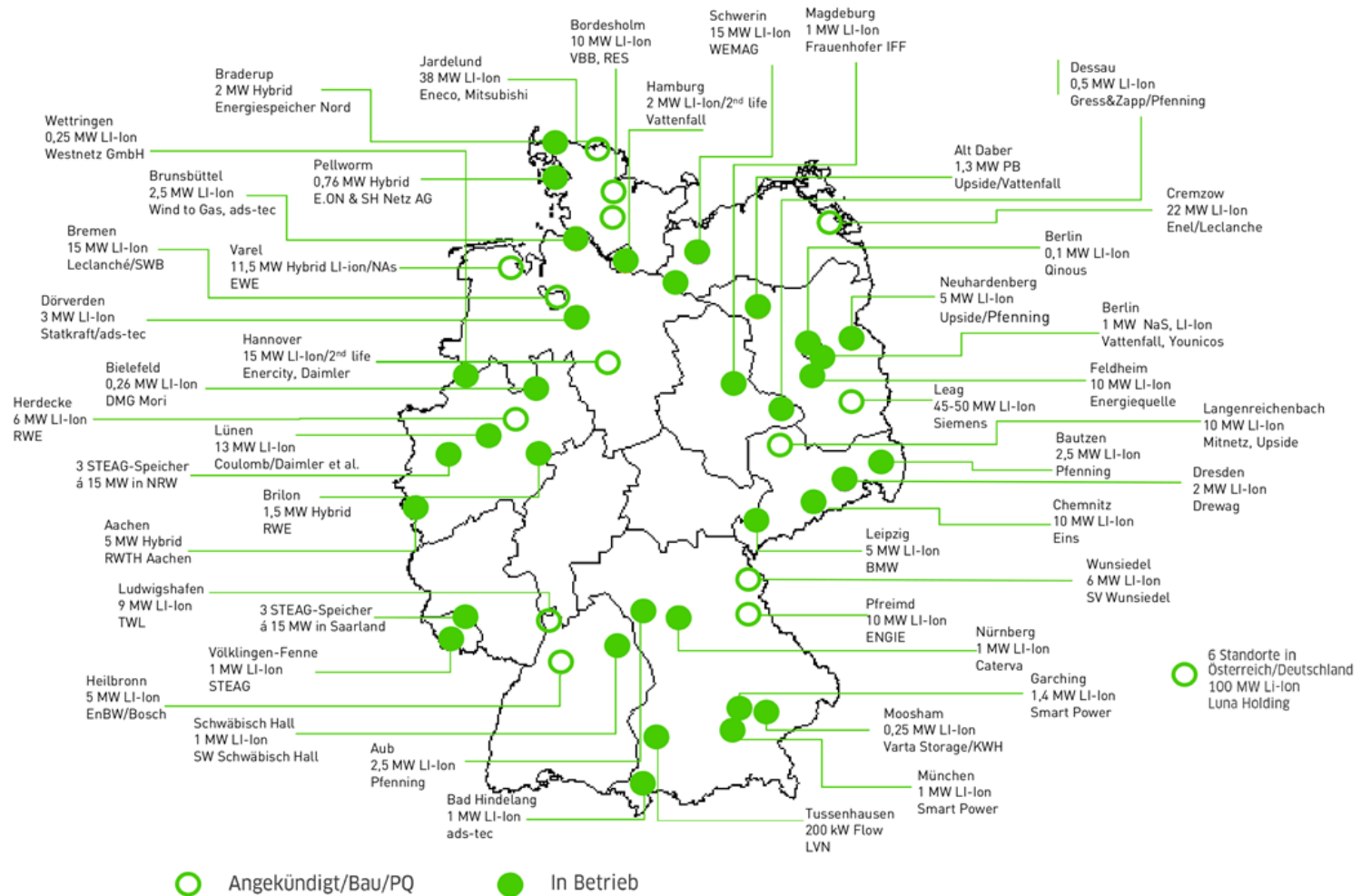
Hidden Champions of the electricity system!

- Crucial for system stability



Source: Vattenfall

Large Scale Storage Market



2017: 180 MW - 2018: ~ 320 MW - 2019: ~ 430 MW

3 existing and fast growing markets for storage technologies...



Current development:

- 1 New technologies
- 2 Storage goes system
- 3 Multi-use models

1 - New technologies are arriving..



- Power to X
- Redox flow

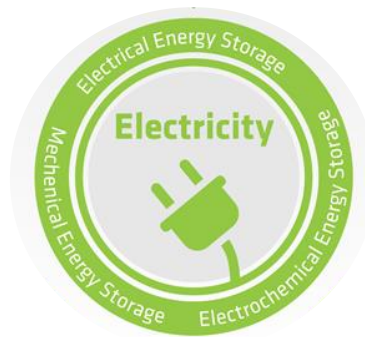
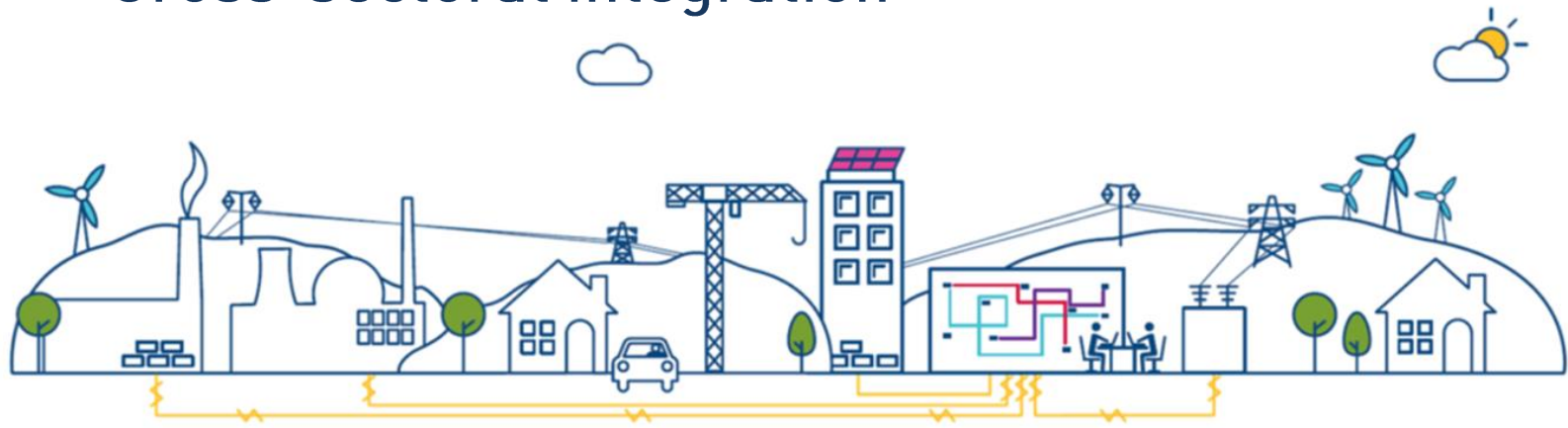


- Super-capacitors
- Fly Wheel



2 - Storage goes system...

- Combination of technologies
- Cross-sectoral integration

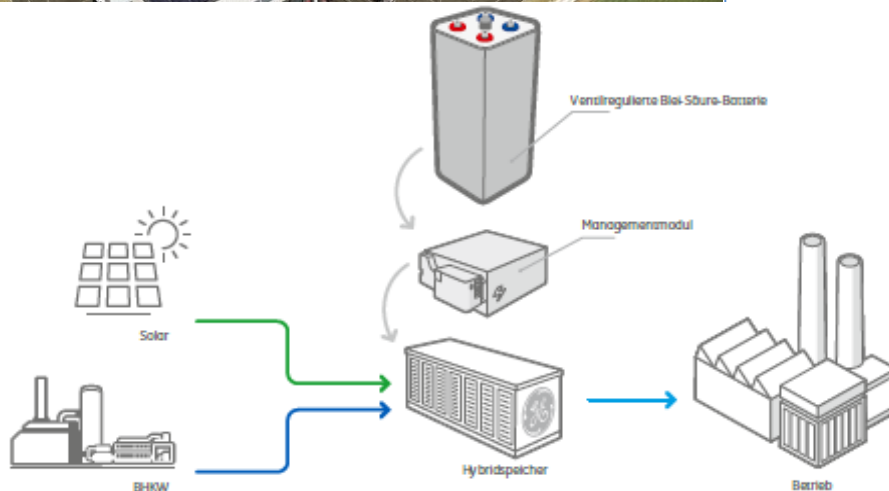


Combination of Technologies and Cross-Sectoral Integration

PV + lead acid battery + combined heat and power plant + heat storage



GE Hybridkraftwerk
Power Conversion
Berlin Marienfelde
Tomorrow is made in Europe



3 - Multi-Use Models

Combination of Applications = Multi-Use Solutions

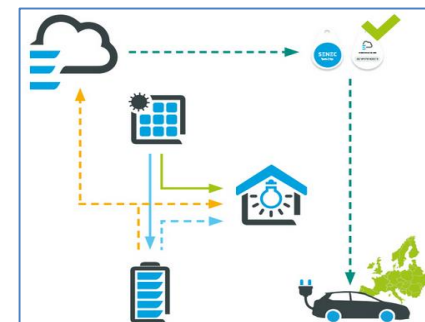
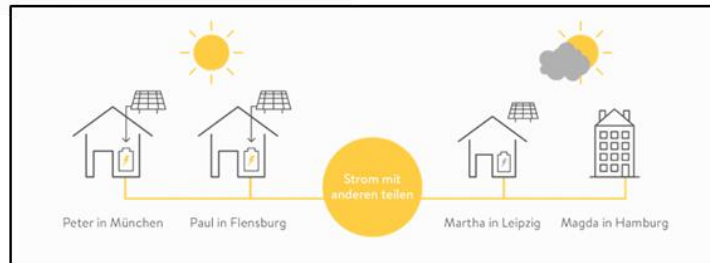
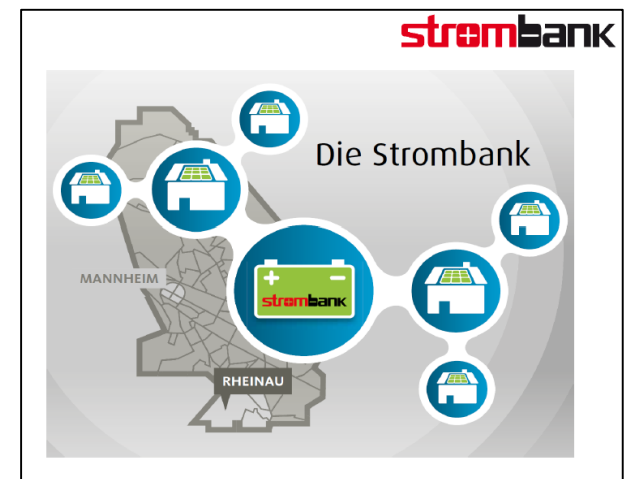
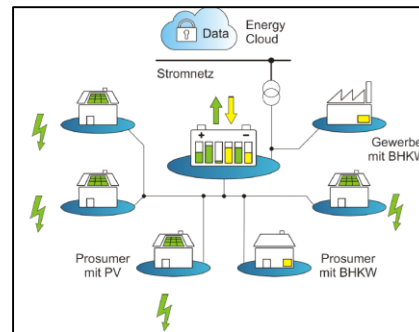
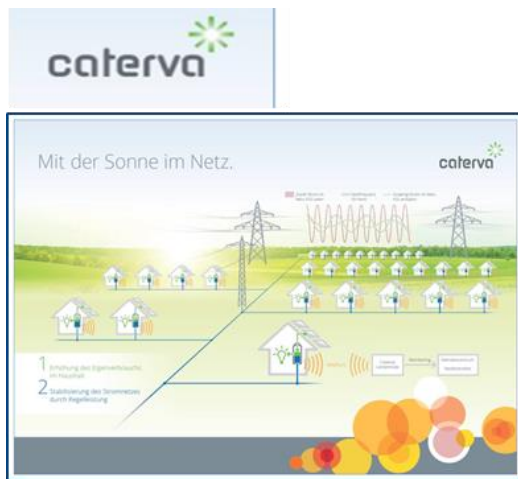
Storage devices get interconnected, rental and leasing models are developing!



3 - Multi-Use Models

Combination of Applications = Multi-Use Solutions

Quarter storage, Swarm storage, Energy communities, Sharing communities, Block-Chain



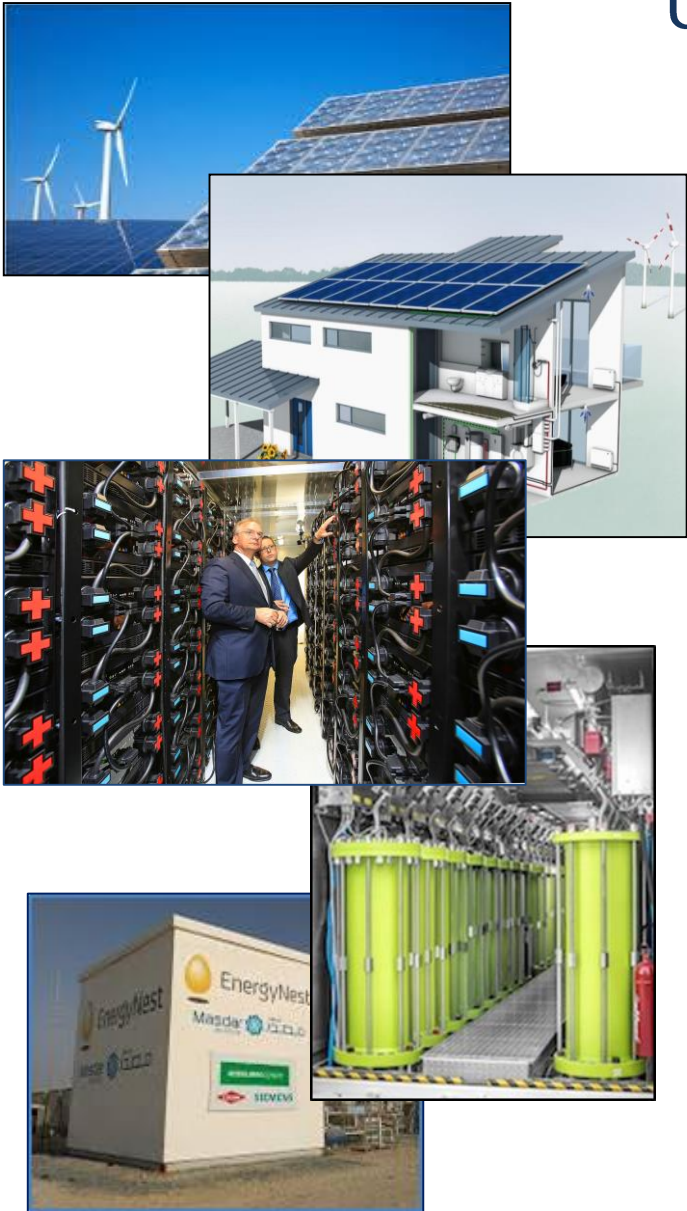
Multi-Use Models – E-Mobility

Combination of applications = multi use solutions

NEW + Additional application: FAST CHARGING INFRASTRUCTURE



Conclusions



- Energy storage = Swiss army knife
- Numerous applications in residential, industrial and large scale applications are in service and economically viable
- Multi-use of storage devices foster efficiency and economic feasibility
 - win-win situation for prosumers, utilities and grid operators
- Cross sectoral integration offers a huge potential of useful applications
- **Energy storage is crucial to offer a POWER-system and not only an electricity-system**

THANK YOU!
... and Save-the-Date!

EXPO AND CONFERENCE

Energy Storage Europe, 12.-14. März 2019

Düsseldorf, Deutschland

www.ESEexpo.de