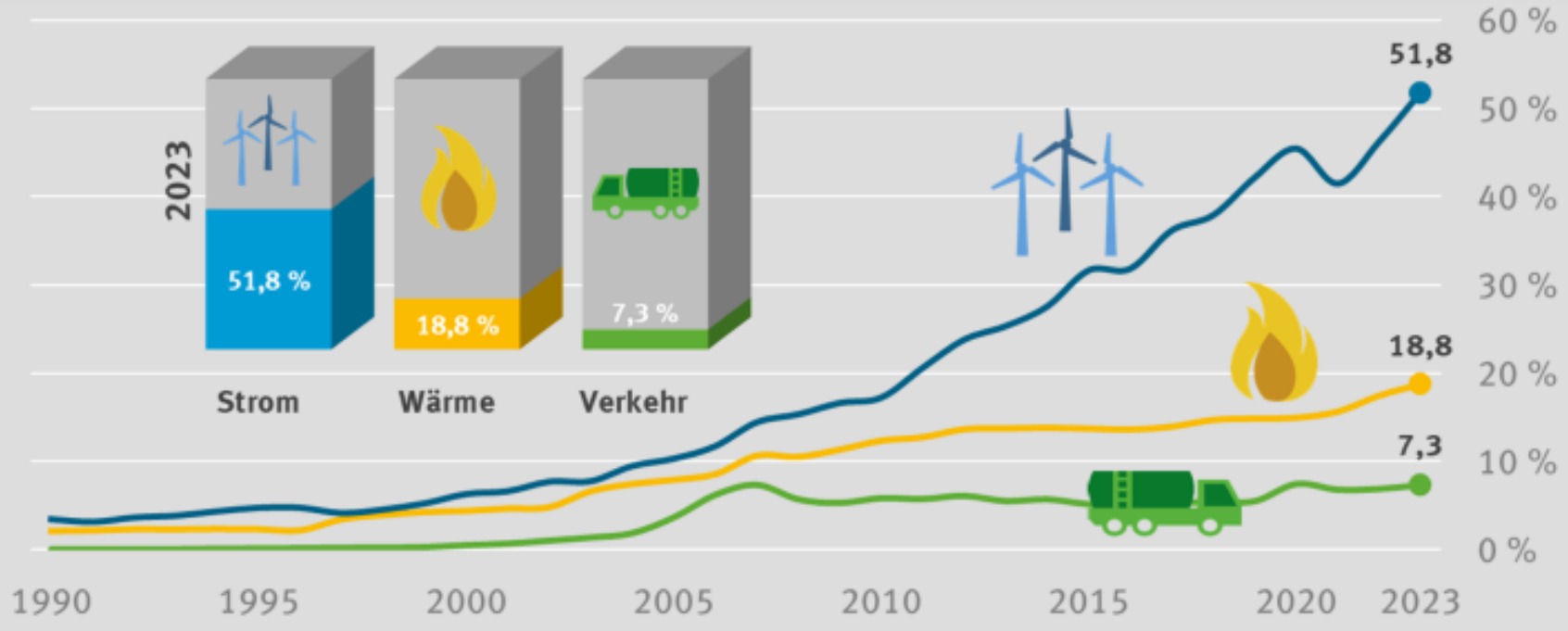
CO-LOCATION OF ENERGY STORAGE

THE GERMAN ENERGY STORAGE SYSTEMS ASSOCIATION

- The BVES is the industrial association of energy storage companies that is open to all technologies in the areas of electricity, heat and mobility.
- More than 400 international member organisations. We are a dialogue partner for politics, administration, science and publicity. With targeted lobbying at the interfaces of political decision making, we are working for the improvement of the regulation and policy framework for energy storage.
- In addition, the BVES monitors research and development activities and informs members of new results and developments.

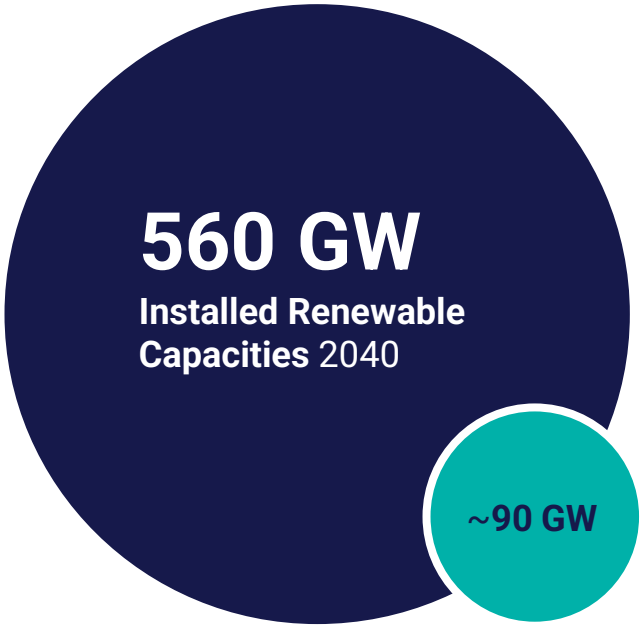
ON THE WAY TO 100% RENEWABLES

RENEWABLES SHARE IN ELECTRICITY, HEATING AND MOBILITY



Quelle: Umweltbundesamt auf Basis Arbeitsgruppe Erneuerbare Energien-Statistik (AGEE-Stat)
Datenstand: 02/2024

SUCCESS OF RES LEADS TO A GROWING CHALLENGE



Electric Load (Use of Energy)
in the German Energy System

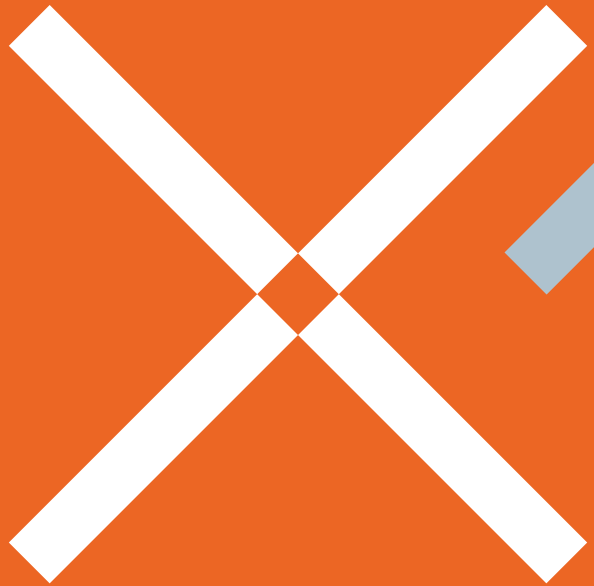
10 TWh
Curtailment of Renewables in 2023

= 3 - 5 %
of renewable energy portfolio in Germany

> 500 hours
with negative energy prices (2024)

3.5-4 Billion €
Costs for Redispatch (annual)

ENERGY STORAGE MARKET TRENDS FOR CO-LOCATION IN GERMANY



HOME GENERATION AND CONSUMPTION OF ELECTRICITY AND HEAT + E-MOBILITY

RESIDENTIAL

- 1.800.000 battery systems installed
- 10 GW, 16 GWh
- Installations mostly incl. Heat pumps + Charging station
- Huge retrofit potential of existing Rooftop-PV

ELECTRICITY, POWER, HEATING, COOLING + MOBILITY

INDUSTRY:
>12.000 PROJECTS IN GERMANY
MOSTLY BATTERIES
AT THE MOMENT

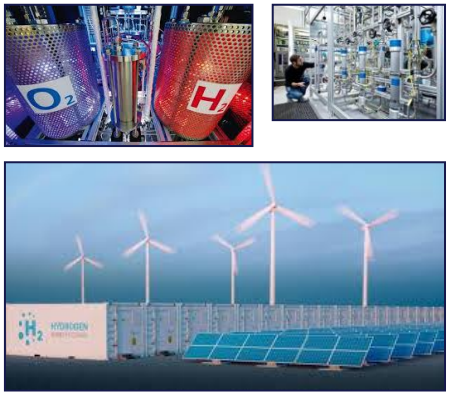
- OFTEN BUT NOT ALWAYS WITH PV GENERATION ON-SITE

UTILITY/LARGE STORAGE MARKET FOR ELECTRICITY INFRASTRUCTURE

CONTROL ENERGY | SYSTEM SERVICES | FLEXIBILITY

PUMPED HYDRO STORAGE CA. 9 GW

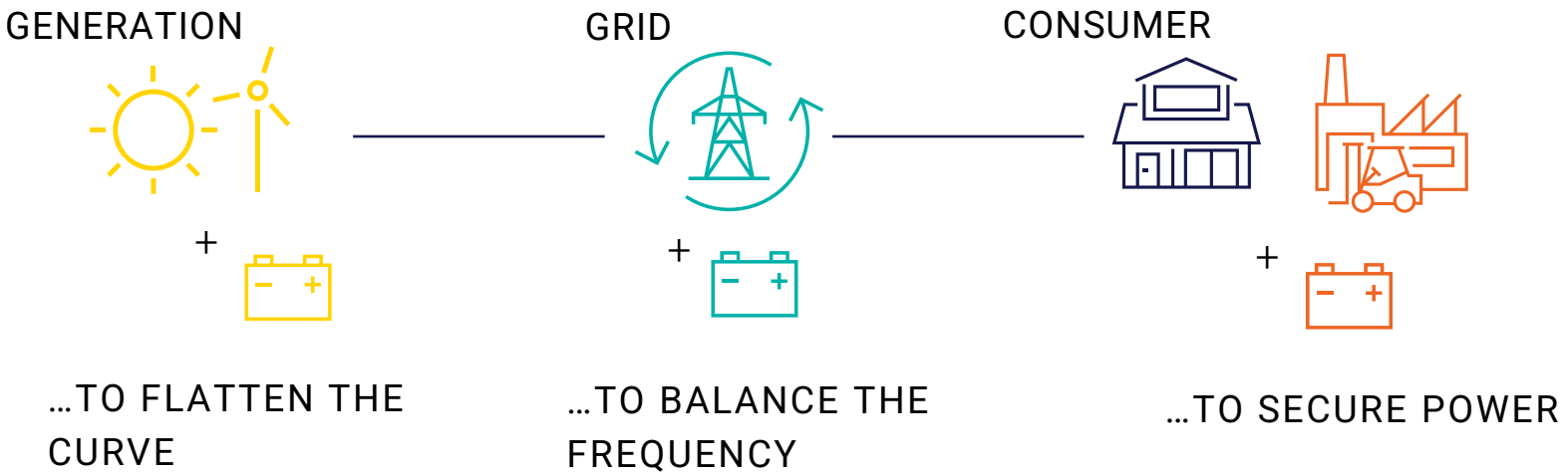
BATTERY STORAGE CA. 1,8 GW



HYDROGEN/ PTX

FLEXIBILITY

TO SECURE A RENWABLES-BASED ENERGY SYSTEM AND THE ENERGY DEMAND – FLEXIBILITY IS NEEDED



MULTI TOOL ENERGY STORAGE

APPLICATIONS & TECHNOLOGIES

REVENUE STACKING IS ONE OF THE KEYS TO A VIABLE BUSINESS CASE

	Generation Support Services and Bulk Storage Services	Services to Support Transmission Infrastructure	Services to Support Distribution Infrastructure	Ancillary Services	Services to Support Behind the Meter Customer Energy Management
minimum technical requirements	storage duration of minutes to several hours	ramp-up within miliseconds or minutes	storage duration of one or more hours	no special requirements	power installed capacity starting from 100 kW
PHS, PHES					
CAES, LAES					
Flywheel					
Stationary batteries					
Batteries (vehicle to grid)					
Superconducting Magnetic Energy Storage (SMES)					
Supercapacitor					
Power-to-Gas / Power-to-Liquids					
Thermal storage					

Source: graph by Fraunhofer ISE

Legend:

- TSO
- DSO
- Energy supplier
- Industrial actors
- Industrial clients
- Private actors
- Aggregator
- Power plant operator
- Power plant operator including PtX

MULTI TOOL ENERGY STORAGE

APPLICATIONS & TECHNOLOGIES

DIFFERENT TECHNOLOGY OPTIONS FOR DIFFERENT APPLICATIONS

	Generation Support Services and Bulk Storage Services	Services to Support Transmission Infrastructure	Services to Support Distribution Infrastructure	Ancillary Services	Services to Support Behind the Meter Customer Energy Management
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GRID-SCALE BESS – CONFIGURATIONS
C RATE – CHARGE AND DISCHARGE RATE

GRID-SCALE BESS – CONFIGURATIONS
C RATE – CHARGE AND DISCHARGE RATE

MOST PROJECTS IN GERMANY IN THE PAST

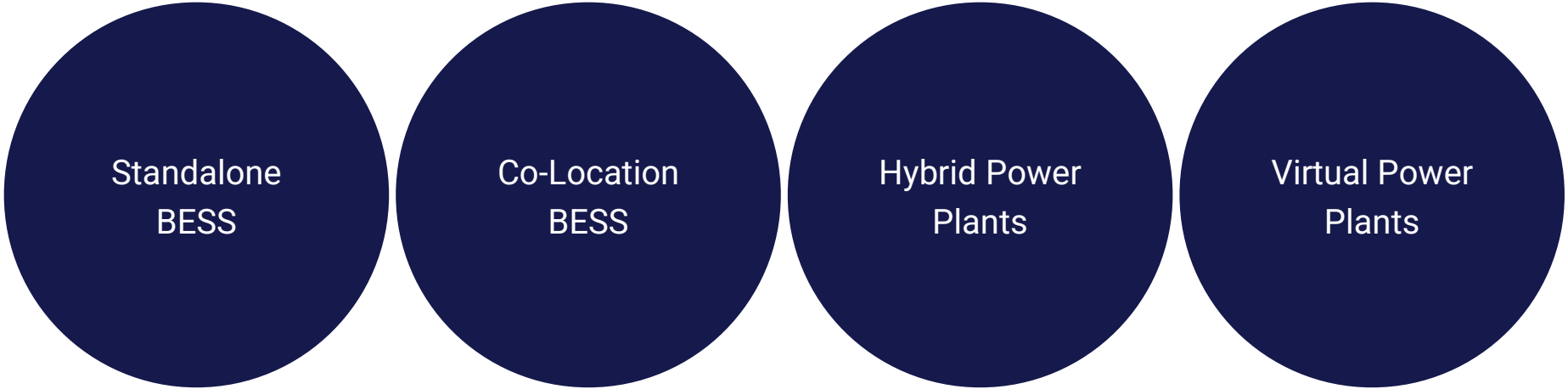
GRID-SCALE BESS – CONFIGURATIONS
C RATE – CHARGE AND DISCHARGE RATE

MOST PROJECTS IN GERMANY TODAY

GRID-SCALE BESS – CONFIGURATIONS
C RATE – CHARGE AND DISCHARGE RATE

MOST PROJECTS IN GERMANY IN THE FUTURE

GRID-SCALE BESS – CONFIGURATIONS



(one) battery storage asset

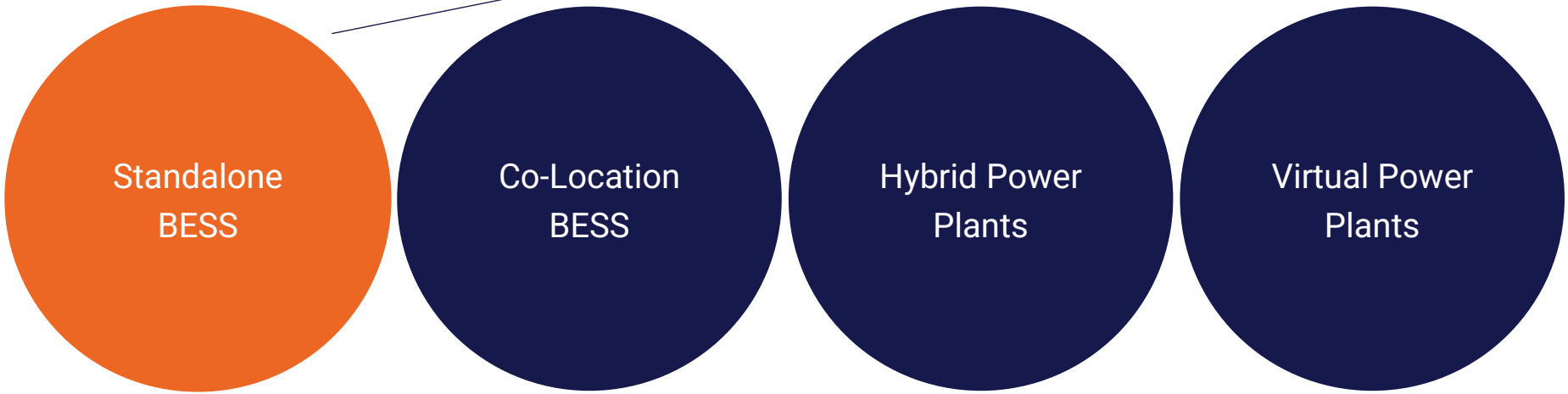
battery storage asset + generation (mostly PV)
*business model can be seperated

battery storage asset + generation (mostly PV)
*integrated business model

multiple (decentralized) bundled energy storage + generation assets

GRID-SCALE BESS – CONFIGURATIONS

highest share of BESS projects in Germany
WHY?



(one) battery storage asset

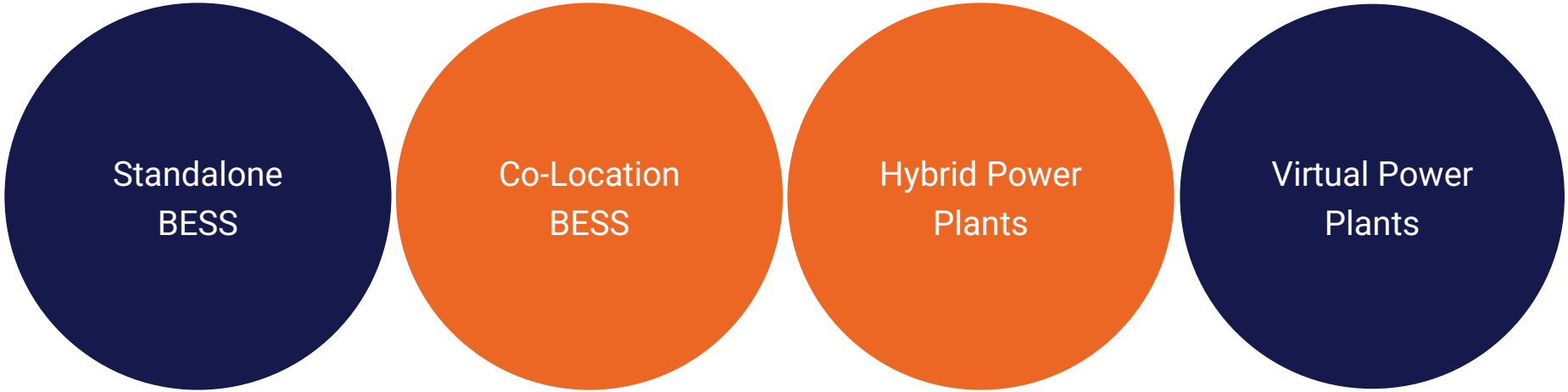
battery storage asset + generation (mostly PV/Wind)
*business model can be seperated

battery storage asset + generation (mostly PV/Wind)
*integrated business model

multiple (decentralized) bundled energy storage + generation assets

GRID-SCALE BESS – CONFIGURATIONS

new market opportuninties



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FLEXIBILITY

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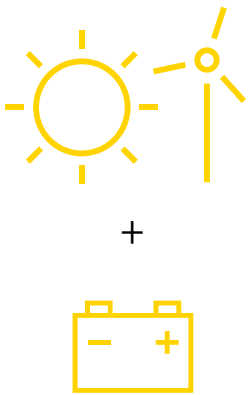
GENERATION

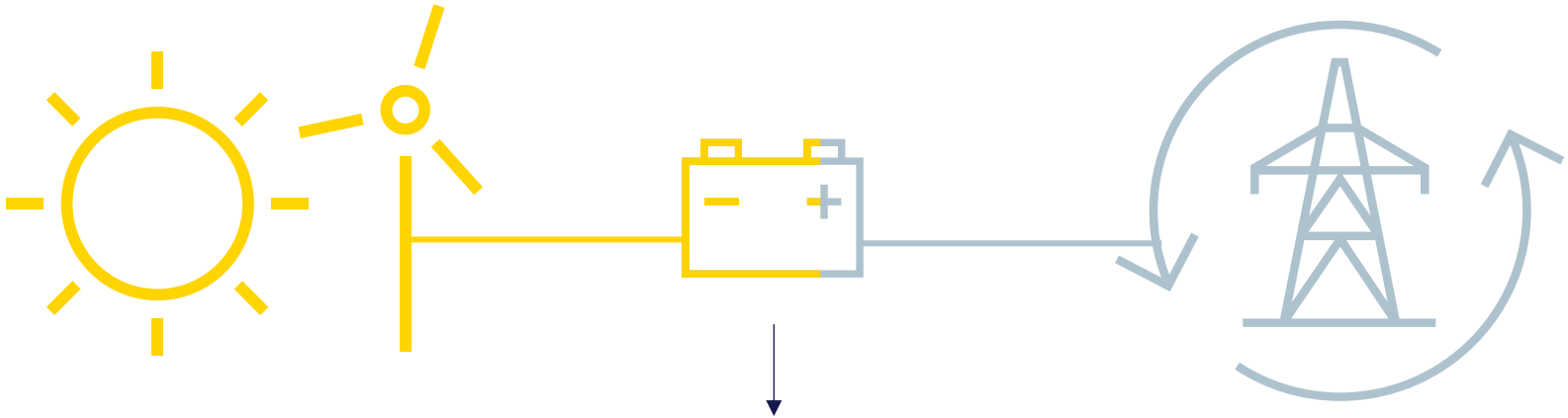


Perspectives for Growth for Co-Location Projects:

- discontinuation of EEG funding in hours with negative prices
- allowance for overbuilding of grid connections
- mid-term: solution for „Ausschließlichkeitsprinzip“
- continuation of huge price spreads for arbitrage and trading opportunities for storage
- Easier grid connection procedures – cable pooling and overbuilding of grid connections, flexible connection agreements
- Innovation auctions will be phased out after 2028

-> Integration of energy storage to create a stable business case for renewable energy plants

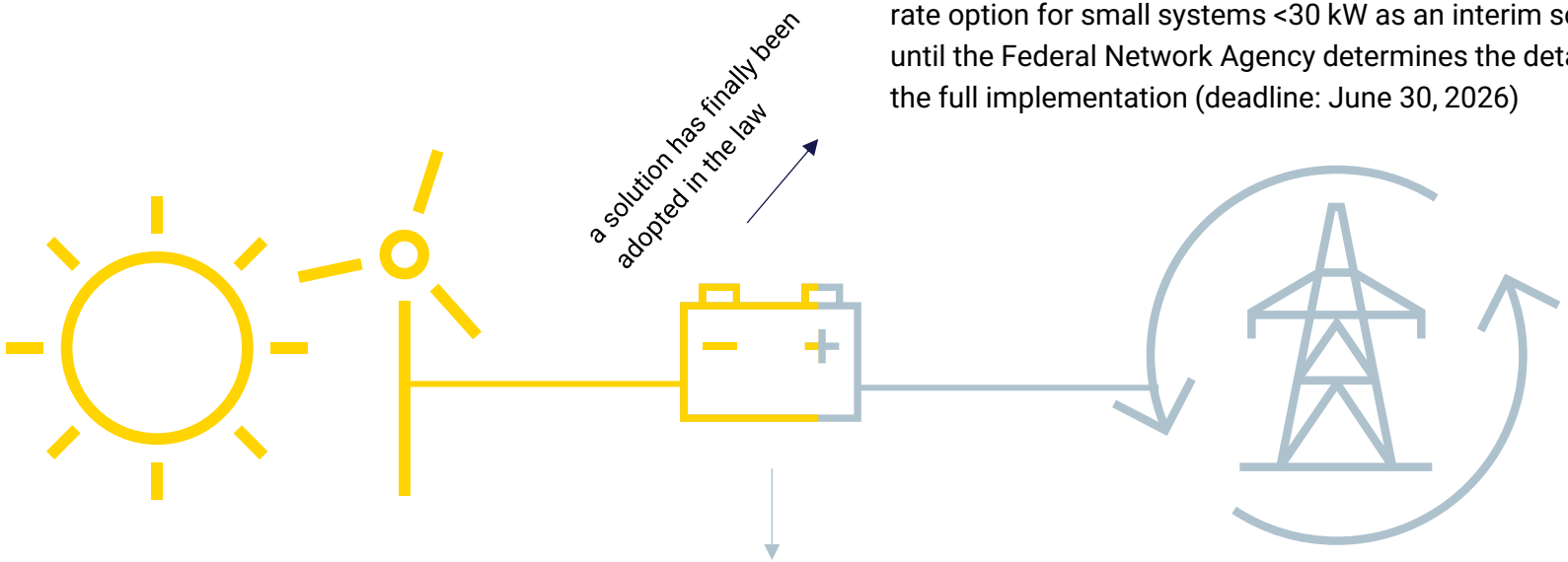
WHAT IS AUSSCHLIEßLICHKEITSPRINZIP?



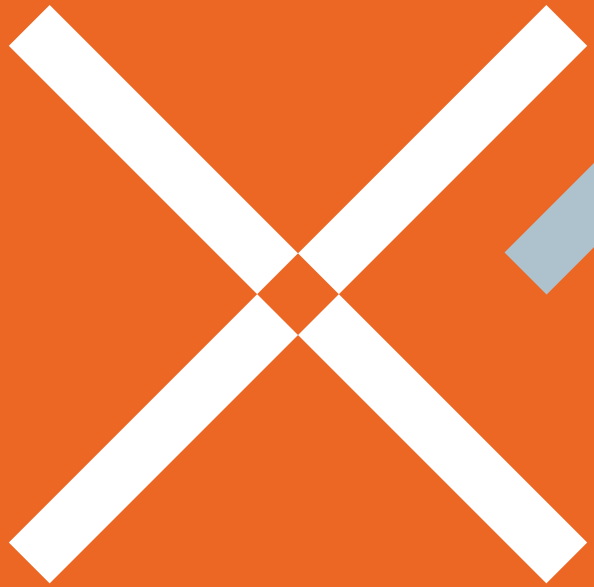
Is it green or grey energy?
It can not be both. =
Ausschließlichkeitsprinzip

WHAT IS AUSSCHLIEßLICHKEITSPRINZIP?

It will be possible to divide green and grey per law - Flat-rate option for small systems <30 kW as an interim solution until the Federal Network Agency determines the details of the full implementation (deadline: June 30, 2026)



PROJECT EXAMPLES IN GERMANY



2023 – ENBW ANNOUNCES THAT THEIR PV-PARKS WILL FROM NOW ON BE PLANNED WITH BATTERY STORAGE SYSTEMS AS THE NEW STANDARD

13.10.2023 | Pressemitteilung

Als erstes deutsches Energieunternehmen plant die EnBW grundsätzlich Batteriespeicher in ihren Solarparks ein

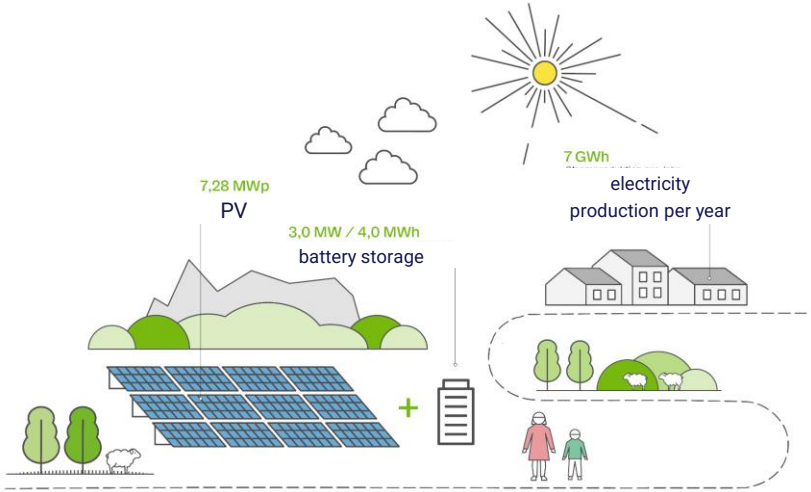
Leistung von Anlagen für Erneuerbare Energie lässt sich so besser nutzen / Solarpark in Bruchsal erhält einen Batteriespeicher / Vorangegangene Batterieprojekte der EnBW haben die Grundlage geschaffen

Drucken

Der Batteriespeicher für den Solarpark Bruchsal wird angeliefert und mit einem Schwerlastkran auf das Fundament gehoben. (Quelle: EnBW)

Bild herunterladen

CO-LOCATION PROJECTS WITH PV AND BATTERIES
ELECTRICITY GENERATION AND SYSTEM INFRASTRUCTURE



BATTERY STORAGE SYSTEM
LI-ION BATTERY
3.0 MW
4.0 MWH

- Project Solarpark Spitalhöfe, BayWa r.e.
- PV & battery storage combination in Baden-Württemberg
- power purchase agreement contract – 5 years
- built under innovation auction (§ 39 EEG)
- start of operation: 2022

CO-LOCATION PROJECTS WITH PV AND BATTERIES
ELECTRICITY GENERATION AND SYSTEM INFRASTRUCTURE

- Project in Nordrhein-Westfalen, Euskirchen, ABO Energy
- PV & battery storage combination
- built under innovation auction (§ 39 EEG)
- 7th Co-Location project of ABO Energy in Germany
- start of operation: 2024

BATTERY STORAGE SYSTEM

LI-ION BATTERY

3.5 MW

7.0 MWH

10,5 MW PV ~ 11,3 Mio. kwh/ year

CO-LOCATION PROJECTS WITH PV AND BATTERIES
ELECTRICITY GENERATION AND SYSTEM INFRASTRUCTURE

- Bedburg, Nordrhein-Westfalen
- PV & Batteriespeicher Jackerath, RWE
- PV production 12.1 MW
- built under innovation auction (§ 39 EEG)
- start of operation: 2023

BATTERY STORAGE SYSTEM
LI-ION BATTERY
4,1 MW
8,1 MWH

CO-LOCATION PROJECTS WITH PV AND BATTERIES
ELECTRICITY GENERATION AND SYSTEM INFRASTRUCTURE

- Zerbst, Sachsen-Anhalt, Statkraft
- built under innovation auction (§ 39 EEG)
- solar modules will provide up to 47 MW of power
- to be completed by end of 2025 on a 41-hectare former gravel pit site.

BATTERY STORAGE SYSTEM
LI-ION BATTERY
16 MW
32 MWH

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