Battery energy storage systems and renewable energies are the new dream couple

Battery energy storage systems – the key to security of supply and system stability

Battery energy storage systems are market-ready and don't require any funding. They are the missing piece of the puzzle for ensuring a secure and stable supply of renewable energy in Germany. When supply and demand dynamics fluctuate in the electricity market at different times of the day, they temporarily store "excess" electricity from solar and wind farms. By stabilising the grid, they therefore reduce curtailments. At the same time they bridge gaps between energy production and consumption. Accordingly, battery storage systems play a key role in maintaining a reliable and secure supply for the power grid. By storing electricity and feeding it into the grid, they not only keep the frequency but also the voltage in the power grid stable, thereby reducing system costs. Expanding storage system capacity is essential to transforming the energy system and the logical consequence of expanding renewable energy capacity.

Battery storage systems are mass-produced

The use of battery storage systems is not a new phenomenon. On the contrary, they are already mass-produced, which means that they are already available on a large scale. The process of integrating them is not complicated, but follows a simple principle, with the storage systems consisting of individual battery containers. The nature of the design means that the battery storage power plants can be quickly combined with solar and wind farms (known as co-location) or built as stand-alone units. What's more, the whole system is easily and flexibly scalable.

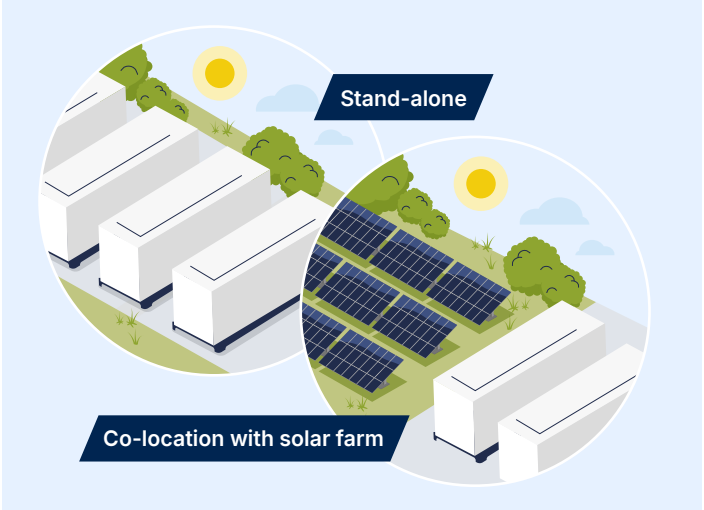
Storage systems complete the energy transition

More than 50% of electricity consumption in Germany[1] is now covered by renewable energies – with a continuing upward trend. The more weather-linked green electricity is fed into the grid, the greater the need for storage solutions to stabilise the grid. The expansion of the storage infrastructure therefore directly tracks the growth in renewable energy capacity, enabling and accelerating the ongoing transformation of the energy system.

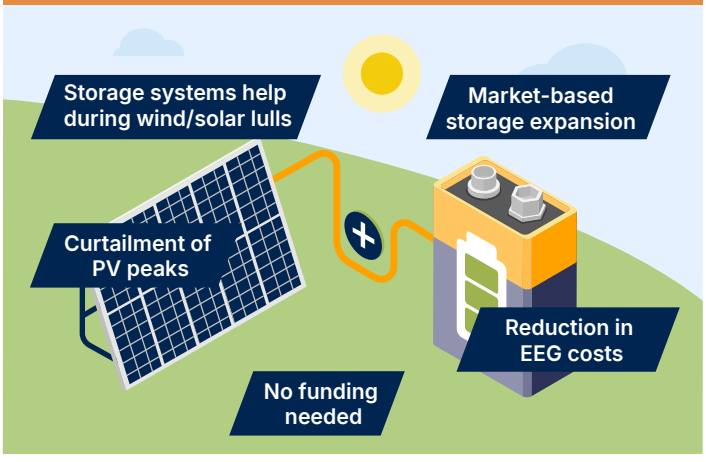
Battery storage expansion: the system is self-financing through market dynamics

State funding for battery storage systems is not necessary and would hold back dynamic storage expansion. The market is already providing the necessary impetus for innovation and investment: if little solar and wind energy is generated, although the price of electricity will rise, it will boost trade in stored electricity. Battery energy storage systems even make yield gaps lucrative because they sell the stored electricity at a profit. Furthermore, variable electricity prices are also conducive to profitable business models such as arbitrage trading[2] or peak shaving[3]. In addition, investing in storage technologies will become more attractive because the better the technology, the more fruitful the trade in electricity from battery storage systems.

Types of battery energy storage systems



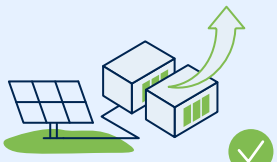
Renewable energies and storage systems – the dream couple get together



[1]Source: https://www.energy-charts.info/charts/renewable_share/chart.htm?l=de&c=DE&share=ren_share_total&interval=year
[2]Arbitrage trading in the electricity market involves taking advantage of price differences for electricity between different markets or points in time to generate a profit.
[3]Peak shaving refers to the targeted reduction of electricity fed into the grid from renewable energy plants in order to avoid grid overload.

"Battery energy storage systems in combination with solar farms represent a major step towards integrating renewable energies in a forward-looking and system-friendly way. They make it possible to store surplus energy and release it during periods of high demand, helping not only to improve grid stability but also reduce price spikes."
Nicola Kleihues, Director of Portfolio & Transactions, Solar & Batteries, Vattenfall.

The benefits of expanding battery storage capacity



Market values rise:

The integration of storage systems increases the market values of electricity from renewable energies, while the number of negative hours on the electricity exchange falls. This ultimately cuts EEG costs.

The cost of electricity falls:

Storage systems avoid expensive peak load subsidies in the industry. Companies can charge their commercial storage systems at no cost during peak PV times and use the electricity later.

The grid infrastructure is improved:

Storage systems provide services that can stabilise the grid within milliseconds. They bridge gaps and prevent curtailments.

Good for the climate:

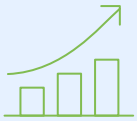
Storing green electricity reduces the need for fossil fuel power plants, which have previously bridged the gaps. This significantly reduces the need for power plants. Battery storage systems make the electricity system climate-neutral.

Expansion of storage system capacity in the fast lane

All signs indicate that the expansion of battery storage system capacity is progressing much more quickly and extensively than forecast by the German government's energy scenarios. That's because current grid connection requests for storage systems alone run to a total capacity of approx. 226 GW[4,5]. Transmission system operators (TSOs) are currently forecasting storage capacity of 32 gigawatts[6] by 2037 – a figure that would be more realistic by 2030. The PV and storage industry is already expecting around 100 gigawatt-hours by 2030 with 3- to 4-hour systems discharging their stored capacity. The new energy industry is taking a dynamic and market-based approach to storage expansion. Storage systems will sustainably stabilise the energy systems of the future. The key lies in removing hurdles when it comes to connecting stand-alone storage systems to the grid and embracing the future standard model: solar farms with storage systems.

[4]Source: https://www.pv-magazine.de/2025/01/13/uebertragungsnetzbetreibern-liegen-zum-jahreswechsel-650-anschlussanfragen-fuer-grosse-batteriespeicher-mit-226-gigawatt-vor/
[5]Note: It is known that due to the processes in need of revision in relation to the reservation of grid connections, multiple registrations are likely to be included here. These can distort the figures.
[6]Source: https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/NEP/DL_Szenariorahmen/SR_Entwurf2025Strom.pdf?__blob=publicationFile&v=2#page=26

Storage systems cut electricity costs

1. 
Rising market values of renewable energy sources
Fewer negative electricity prices + lower EEG costs

2. 
Reduced peak load subsidies
Cheaper electricity contracts for industry and SMEs

3. 
Needs-based energy
Low-cost and stable supply

4. 
Power plants replaced
Fewer reserve power plants needed

bne SONNE SAMMELN
Bundesverband Neue Energiewirtschaft e.V. (bne)
Association of Energy Market Innovators (bne)
Hackescher Markt 4, 10178 Berlin
https://sonne-sammeln.de/en/
info@sonne-sammeln.de

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