Integration of Flexibility through Energy Storage

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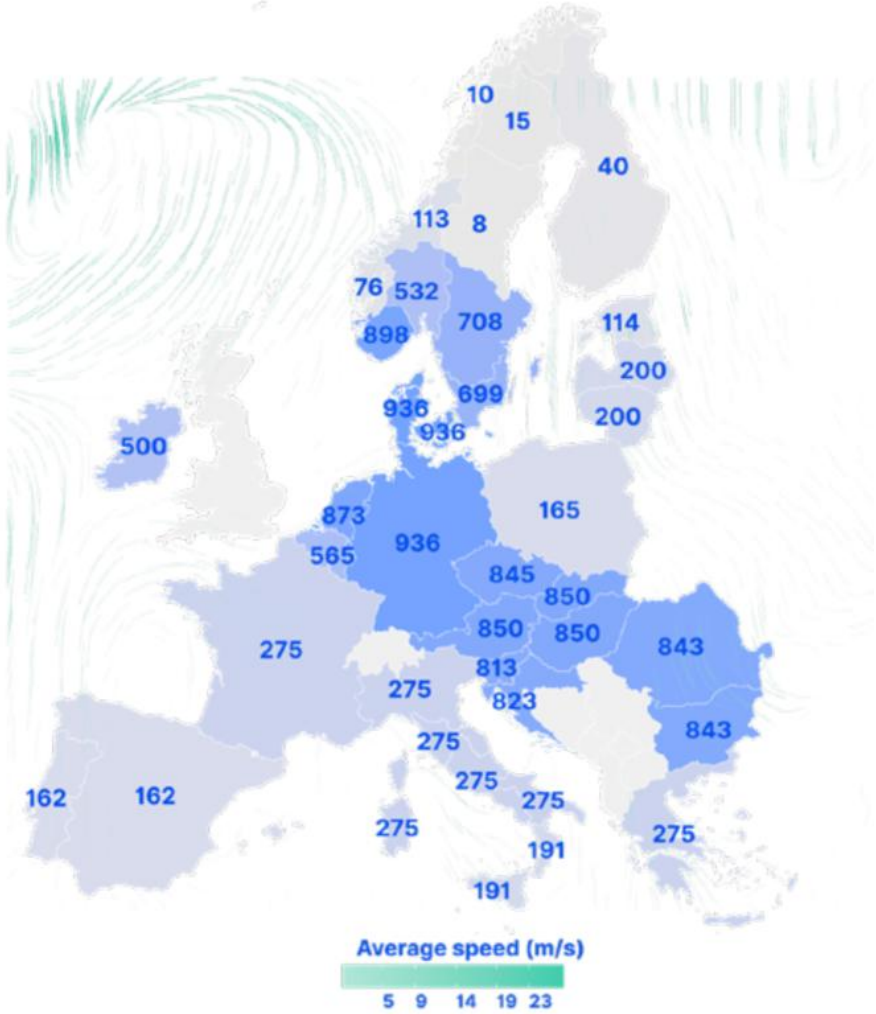
There is something wrong in Europe…

…and the energy prices show it!

- On 12 December 2024, a Dunkelflaute (*period of low wind and high demand*) drove price **averaging 227 EUR/MWh** - twice the monthly average.
- South East Europe saw peaks nearing **1000 EUR/MWh,** during hot evenings in the summer of 2024.
- ACER: high demand, low RES, insufficient cross-border flows, limited storage played a central role.

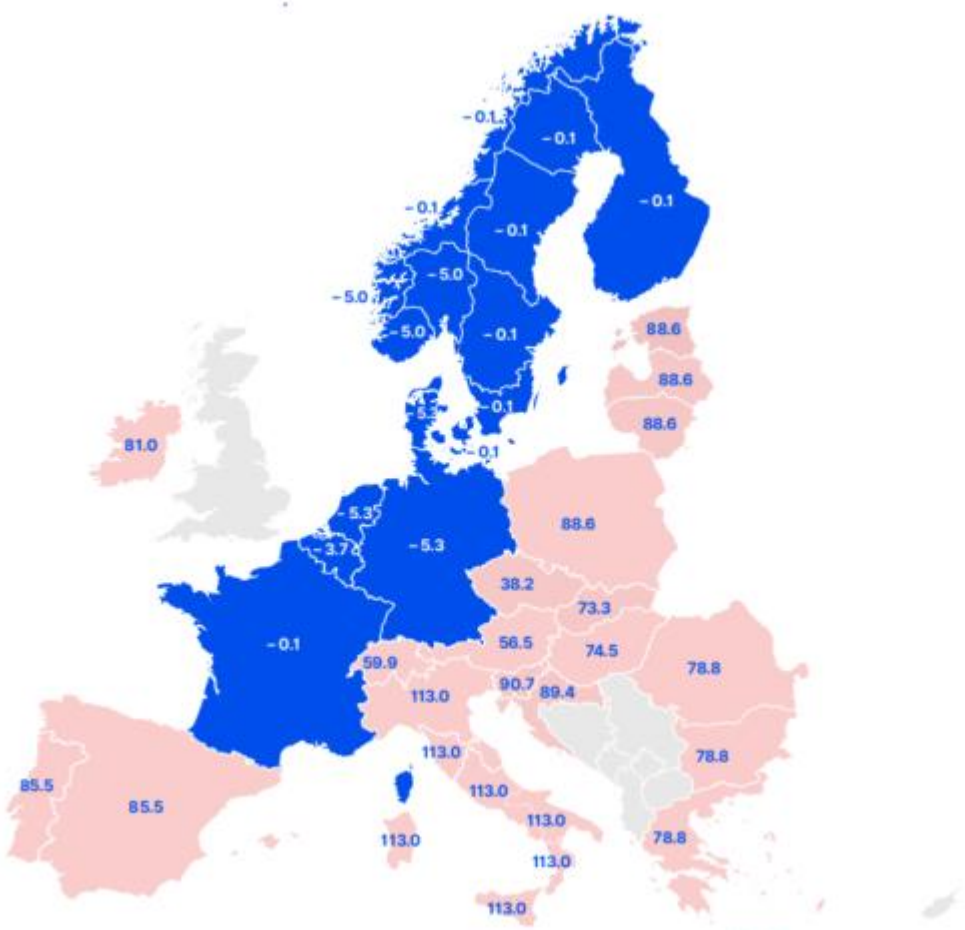


Day-ahead prices and wind speed in the EU and Norway, 12 December 2024 at 17:00 CET (EUR/MWh) - ACER

There is something wrong in Europe…

…and the negative energy prices also show it!

- More **renewable energy** leads to greater and **more frequent volatility**
- Energy can be **stored, or demand increased when prices are low**.
- At high prices, demand can be reduced or stored energy can be supplied, for example with batteries.
- Price swings create ideal **arbitrage opportunities** for demand response and storage.



Day-ahead prices in the EU-27/EEA(Norway), and Switzerland, as at 20 September 2023, at 11:00 (EUR/MWh) –ACER

How to have cheaper (and more stable) energy prices?

By adding more flexibility to the system.

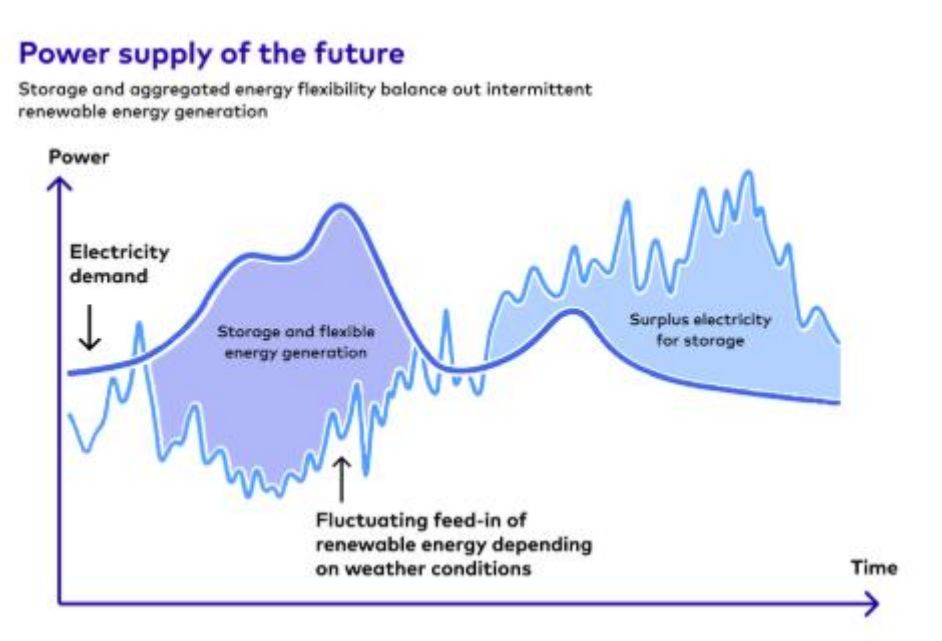
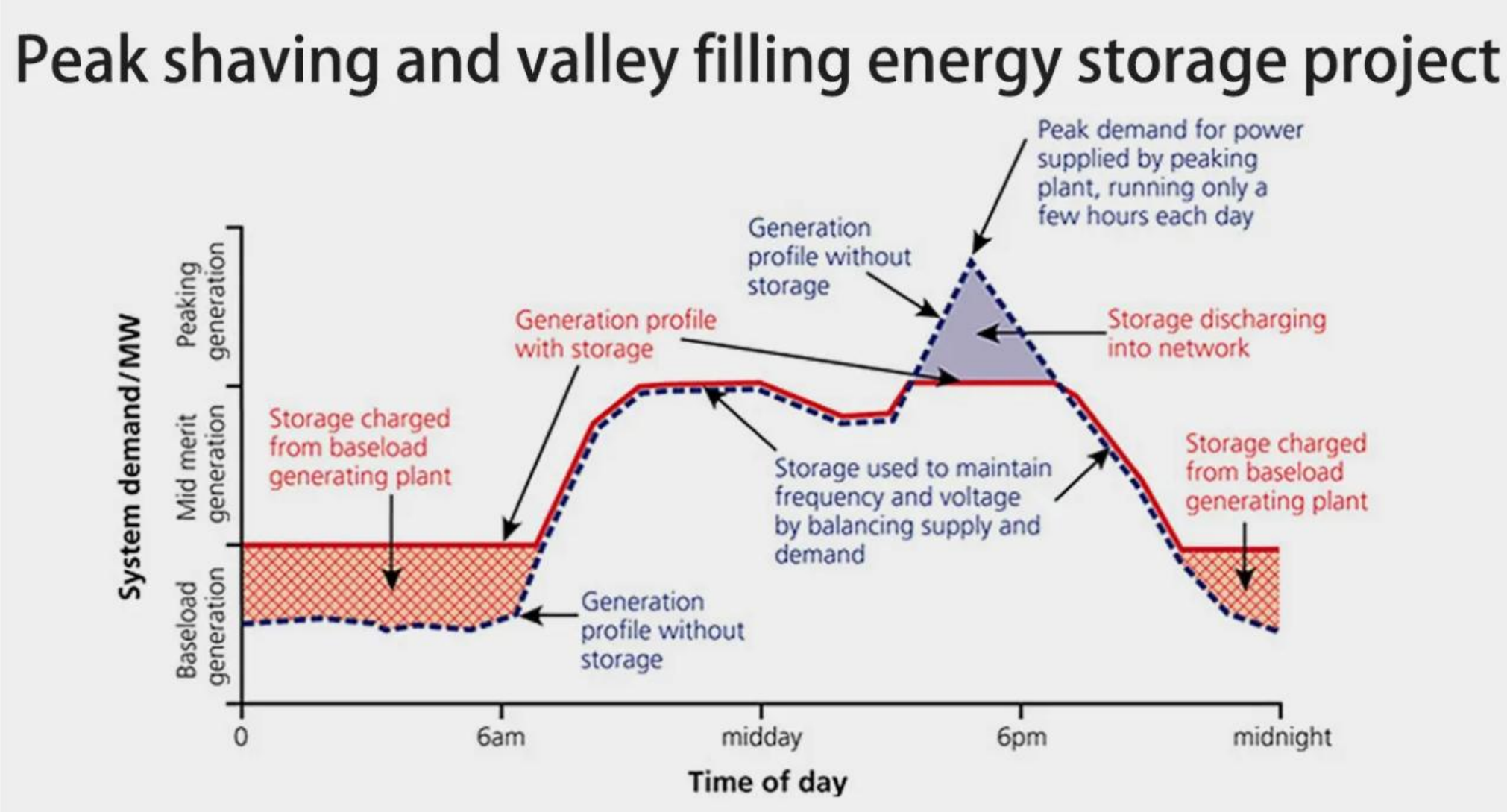


Illustration of how flexibility's service could affect future energy systems (Source: LichtBlick AG)

- **Shift energy over time:**
  - Charge at low prices; discharge at peaks
  - Peak-shaving & valley-filling (intra-day to multi-hour)
  - Day-ahead & intraday arbitrage
- **But also..**
  - Balance supply & demand in real time (e.g. frequency services)
  - Behind-the-Meter (BtM) storage for demand-side flexibility
  - Lower redispatch and balancing costs
  - And many more capabilities…

How does energy storage provide flex?



Source: https://www.huntkeyenergystorage.com/portfolio/peak-shaving-and-valley-filling-energy-storage-project/

The key bottleneck for integrating flexibility through storage?

Grid Connections

- 1,700 GW of renewable/hybrid projects wait connections
- 50% of reserved capacity goes unused in Slovakia
- 70% of projects fail to connect in the UK

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- **In the EU (generally) the timing of the connection counts.**

- **What doesn't count?**
  - **If an asset provides flexibility**
  - **If an asset helps the system**
  - **If an asset lowers prices**

The first question is…

How to clear up the queue held by Stalled or Inactive projects?

- Many projects don’t connect
- Many projects are not serious
- These alter the real queue

- **Implement project development milestones:**
  - Securing land rights
  - Obtain permits
  - Finalise Financing
- **Use-it-or-lose it:**
  - After 24-36 months projects loose connection right.
- **Financial guarantees:**
  - Projects lose the guarantee if not using the connection.

How to reform queue processes and create priority lanes?

- Benefits to the system isn't looked at
- Goals for the EU and Member State are disregarded

- **SOs and MSs signals should count**
  - System-supportive projects should receive priority.
  - System impact assessments should be transparent and…
  - Receive priority if respected!

How to make fit-for-purpose FCAs?

- FCAs are often too rigid
- FCAs lack necessary regulatory oversight

- **FCAs should be continuously revised**
  - They should have better regulatory oversight
  - Congestion should be monitored (and FCAs revised accordingly).
- **FCAs and redispatch**
  - FCAs shouldn’t substitute market-based redispatch
- **FCAs shouldn’t be the end goal of itself**
  - While it’s a “safe” choice for SOs, they should become firm as soon as possible

In conclusion…

Flexibility is key for stable prices

- Europe needs **more flexible capacity** to manage growing RES.
- Storage reduces **system costs**, price volatility, and peak stress.
- Targeted reforms can unlock **faster grid connections** for flexible assets.

Sources

Further information and sources

- *ACER elaboration based on ENTSO–E Transparency Platform data and Copernicus data – ERA5*
- https://www.huntkeyenergystorage.com/portfolio/peak-shaving-and-valley-filling-energy-storage-project/
- https://www.gridx.ai/knowledge/what-is-energy-flexibility
- https://beyondfossilfuels.org/2025/05/13/how-europes-grid-operators-are-preparing-for-the-energy-transition-a-snapshot-of-electricity-transmission-system-operator-practices-and-plans/
- https://www.eurelectric.org/blog/gridlock-to-grid-growth/
- https://energystorageeurope.eu/wp-content/uploads/2022/07/2022.07.07_The-Way-Forward-for-Energy-Storage-Grid-Fees_EASE.pdf
- https://www.acer.europa.eu/monitoring/MMR/electricity-market-integration-2025

“The renewables are cheap, they are home-grown, they make us independent.” – UvL

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The Energy Storage Europea Association

Leading member-supported organisation in Europe representing stakeholders active across the entire energy storage value chain.

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