

Enabling a clean power system

Clean flexibility will unlock system-wide decarbonisation as more wind and solar is deployed across the EU

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Rapid deployment of clean flexibility will be critical to capturing the security, cost and climate benefits of wind and solar generation. To effectively integrate skyrocketing volumes of renewable generation into Europe's power system, attention must turn to clean flexibility solutions.

Battery storage, demand-side flexibility and grids have important roles to play in balancing periods of variable renewable output. They are all existing and proven technologies, especially for managing minutes and hours of demand-supply mismatches.

Read the [full report here](#).

Key recommendations

Act fast

- Clean flexibility must be added at speed, or periods of electricity price cannibalisation and curtailment of renewable energy will increase as wind and solar are installed.
- A particular focus is needed on battery storage and demand side flexibility, which are well suited to complement wind and solar on a minute and hourly basis.
- The Commission and Member States must acknowledge the importance of clean flexibility, with the May 2024 Energy Council a key opportunity to recognise its crucial role for secure and decarbonized energy supply for the EU.
- The EU should support further research into long duration storage technologies to ensure the most efficient and effective route to the future clean power system.

Better planning for clean flexibility

- System planning must fully incorporate the potential for clean flexibility.
- Countries should provide details of clean flexibility plans in NECPs due in June 2024 and, where this assessment is unavailable, commit to a process that will achieve this as soon as possible.
- Countries should deliver national clean flexibility strategies as soon as possible. Strategies are needed before 2026, when the latest Electricity Market Design reform requires Member States to assess their flexibility needs and set non-fossil flexibility objectives.
- Planning should incorporate the potential for blended assets: increasing co-location of solar with batteries and incorporating clean flexibility into spatial planning when identifying renewable acceleration areas.

Reduce waste of renewable power

- Renewable curtailment is rising, leading to higher costs and wasted clean energy, the EU should introduce curtailment caps for countries where renewable generation accounts for more than 50%.
- Countries should introduce new markets, in particular local constraint markets at distribution level, that can help tackle curtailment. Service management platforms can increase access to and coordination of these new flexibility services.

- Targeted and accelerated grid connection access for batteries or co-located renewables can ease grid congestion.

Level the playing field for clean flexibility

- The power system was designed with large, centralised, fossil-fuel generators in mind. Many frameworks still make it difficult for smaller, distributed sources of flexibility on both the supply and demand side to participate.
- Countries should address the lack of legal frameworks for distributed flexibility sources to participate in energy markets.
- Capacity markets, constraint management and ancillary services such as frequency response should be designed to promote clean flexibility where possible. For example through lowering the carbon cap in capacity mechanisms.
- Power system modelling exercises that underpin system planning and security of supply assessment, at European and national level, including the [ERAA](#) and the [TYNDP](#), should take account of the need to reduce reliance on fossil flexibility and must adequately represent clean flexibility sources, including via better access to open and accurate input data.

Improve data transparency

- Improve poor data and limited visibility on the roll-out of battery storage, demand side response measures and consumer participation, as this helps grid operators, flexibility providers, investors and consumers to maximise efficiency and cost-effectiveness.
- Member States and national regulatory authorities should make data around clean flexibility publicly available, as recommended by the European Commission. This includes data on network congestion, renewable energy curtailment, demand-side flexibility deployment, and installed and planned energy storage capacity.

Bring consumers onboard

- Households and businesses must be incentivised and rewarded for providing flexibility, for example through time-of-use tariffs that lower their bills for electricity used at off-peak times.
- Low-income households, who often have the lowest access to technologies which allow consumer flexibility, must not be left behind or adversely affected.
- As more devices are electrified, it is crucial the surrounding infrastructure and wider environment, particularly lower-voltage distribution grids, enables them to be used flexibly. Ensuring that heat management and EV charging infrastructure are 'smart' as standard ensures that customers can benefit from the possible savings that these technologies provide.

About Ember

Ember is an independent, not-for-profit energy think tank that aims to shift the world to clean electricity using data. It gathers, curates and analyses data on the global power sector and its impact on the climate, using cutting edge technologies and making data and research as open as possible. It uses data-driven insights to shift the conversation towards high impact policies and empower other advocates to do the same. Its team of electricity analysts and other support staff are based around the world in the EU, UK, Turkey, India, China and Indonesia.