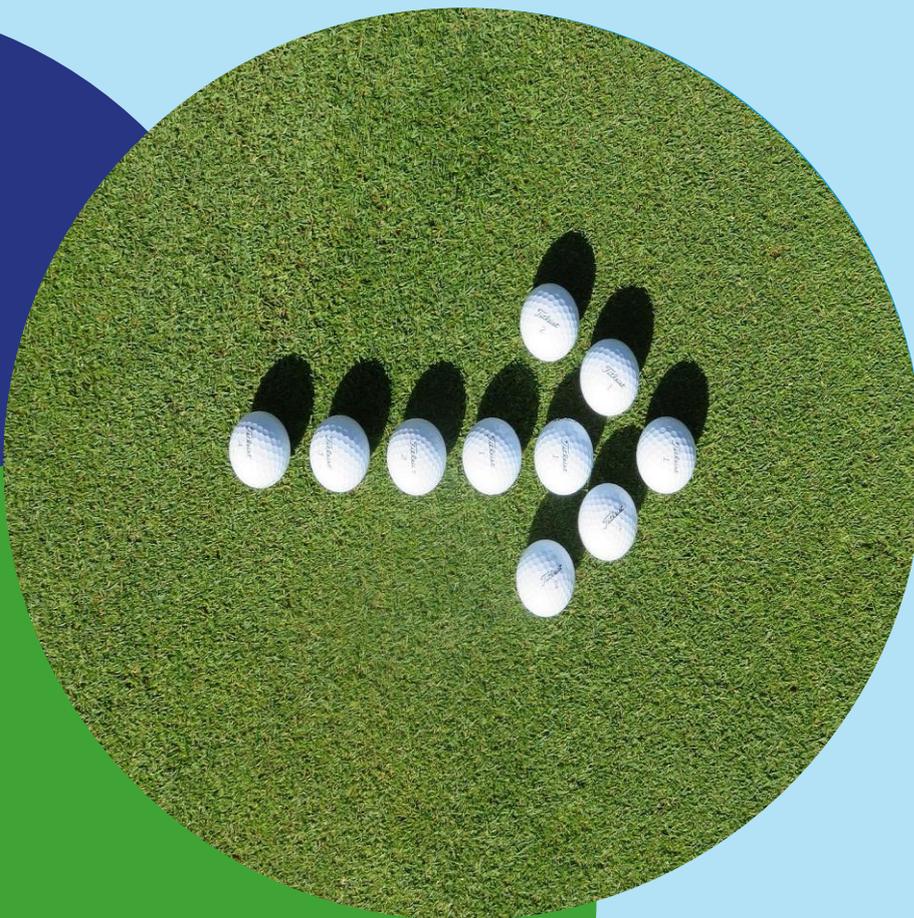


# FLOW BATTERY TARGETS

*The road to 20 GW and 200 GWh by 2030*



## FLOW BATTERY TARGETS

### The road to 20 GW and 200 GWh by 2030

The European Union (EU) must achieve energy independence without neglecting its carbon neutrality targets. A 100% renewable energy system is needed, and with it sufficient energy storage to match supply and demand. Long-duration energy storage in particular is vital to guarantee both the availability of reliable energy as well as energy security in Europe. Within this context, flow batteries are an essential solution to mitigate the variable supply of renewables and stabilise electricity grids. However, the widespread deployment of flow batteries requires ambition and deserves stronger support from the EU.

#### 1. Why flow batteries?

The process of decarbonising the energy system involves incorporating a greater share of renewables into the grid. However, renewable energy sources such as wind and solar power are intermittent; these may not always be available when demand is high, which leads to energy losses when demand is lower. Excess energy generated during peak times is often discarded, a practice referred to as *curtailment*. Curtailment occurs when the grid cannot handle surplus energy, effectively wasting energy that could have otherwise been used. In 2020, Germany alone curtailed 5 900 GWh of wind energy, equivalent to EUR 730 million.<sup>1</sup>

Energy storage avoids curtailment by safeguarding excess energy generated during periods of low demand. The excess energy can then be dispatched in times of peak electricity consumption. Energy storage balances the intermittency of renewables, making them a reliable source of power and increasing the efficiency of energy systems. Although many energy storage options are commercially available, they are most suitable for short-term energy storage of up to 4 hours.<sup>2</sup> Such short-duration storage technologies are used in electric vehicles or to provide frequency regulation in a matter of seconds and minutes. They cannot ensure a stable and continuous supply of energy to communities, cities and countries over long periods of time.<sup>3</sup>

Decarbonising entire energy systems requires storage that can support long-term security of supply. The European Association for the Storage of Energy (EASE) estimates that 200 GW of energy storage must be deployed regionally by 2030 to meet the Green Deal's ambitious renewable energy targets.<sup>4</sup> Approximately half of this target should be long-duration energy storage (LDES). LDES technologies offer higher energy capacities and longer discharge times, thereby reducing curtailment and maximizing the use of

---

<sup>1</sup> [Monitoring report 2021 | Bundesnetzagentur](#)

<sup>2</sup> [Net-zero power: Long-duration energy storage for a renewable grid | Sustainability Insights | McKinsey & Company](#)

<sup>3</sup> [Can flow batteries supercharge the energy transition? | Energy Monitor](#)

<sup>4</sup> [Energy Storage Targets 2030 and 2050 | EASE: Why Energy Storage? | EASE \(ease-storage.eu\)](#)

renewable power. This makes LDES indispensable to support the integration of renewable energy into the grid. At present, fossil fuel-intensive peaking power plants primarily support long-term security of energy supply.<sup>5</sup>

Flow batteries are a key LDES technology that offers the advantages of scalability, low environmental impact, safety and low operating costs. In flow batteries, power capacity depends on the cell stack, while energy capacity depends on the size of the external tanks where the electrolyte solutions are stored. Power and energy are thus independent (decoupled) from one another, meaning that storage capacity can be scaled by adjusting the size of the electrolyte tanks. This distinct feature gives flow batteries their primary advantage: scalability. Flow batteries can easily be adjusted to meet specific storage requirements, making them flexible and cost-effective. Flow batteries are best suited for large-scale and long-duration energy storage.

Flow batteries also have environmental and safety advantages over alternative LDES technologies. They have long life cycles of around 20 years, reducing replacement and maintenance costs. Flow batteries can moreover be built using low-cost, non-corrosive and readily-available materials. Their design is highly modular, and their parts can be almost entirely reused or repurposed. Moreover, flow batteries can charge and discharge more efficiently than comparable LDES solutions. They experience little to no degradation, giving them a long operational lifetime with minimal energy storage losses. Flow batteries are also safer than comparable technologies given that the liquid electrolytes are chemically stable. Finally, flow batteries are an easy fit with existing renewable energy infrastructure; they are often designed to work with renewable energy systems and can be easily controlled through energy management systems.

In summary, flow batteries offer a combination of scalability, flexibility and sustainability benefits that make them suited to support the integration of renewable energy sources into power systems. With the right vision and with the right support, flow batteries can become a European clean tech success story.

## **2. Flow battery target: 20 GW and 200 GWh worldwide by 2030**

Flow batteries represent approximately 3-5% of the LDES market today, while the largest installed flow battery has 100 MW and 400 MWh of storage capacity. Based on this figure, 8 GW of flow batteries are projected to be installed globally by 2030 without additional policy support. However, announcements by a few known vendors alone simultaneously indicate that 2.5 GW of flow batteries can already be installed by 2027. This means that global flow battery capacity has the potential to be much higher by 2030, especially with further support from policymakers.

---

<sup>5</sup> [Fossil fuels surpass renewables as EU's top power source - Eurostat | Reuters](#)

Flow Batteries Europe is the key body representing the flow battery value chain in the EU. Together with our Members, we discussed current and future scenarios of LDES deployment. Our aim was to identify a realistic yet ambitious flow battery target to send a strong signal to EU policymakers and private actors. We settled on the **ambitious goal of achieving 20 GW and 200 GWh of flow batteries globally by 2030**. Specifying the target in terms of both GW and GWh provides a more complete picture because the two units respectively indicate the power output of flow batteries and the amount of energy they can store. For instance, 1 GWh can fulfil the energy demand of approximately 130,000 homes in Europe for a full day of operation.<sup>6</sup> A flow battery target of 200 GWh by 2030 is therefore equivalent to providing energy to 26 million homes – enough to provide energy to every household in Italy, or to all homes in Belgium and Spain combined.<sup>7</sup>

Renewable energy sources alone cannot ensure security of supply due to their inherently variable nature. LDES options such as flow batteries are increasingly necessary to ensure a steady flow of energy is available as back-up power supplies from gas-powered plants are phased out.

### 3. What we ask of policymakers

Given the numerous advantages of flow batteries for LDES applications, we encourage the European Commission to acknowledge and endorse our flow battery target.

In general, the endorsement of any target at the European level provides a clear and consistent indication of the direction and ambition of EU energy policy. Targets signal consistency of future demand in the market. They provide a sense of stability and predictability that encourages private sector investments in associated supply chains. Such stable foundations are necessary for flow batteries as they are still at an early market creation stage. **By endorsing our flow battery target, policymakers signal an increasing need for this type of energy storage, which attracts investment, incentivises innovation and stabilises the market.**

To further incentivise the development and deployment of flow batteries, we recommend that the EU endorse our target while implementing policy tools. The policy tools we recommend fall into two broad categories: **revenue mechanisms** and **direct technology enabling measures**.<sup>8</sup>

- *Revenue mechanisms* support new technologies by boosting expected returns and reducing the variability of those returns. Examples include long-term bilateral contracts for balancing, ancillary services or capacity markets.<sup>9</sup>

---

<sup>6</sup> Calculations based on average electricity consumption per year in the Netherlands in 2021: [Energy consumption private dwellings; type of dwelling and regions \(cbs.nl\)](#)

<sup>7</sup> [EU number of households by country 2021 | Statista](#)

<sup>8</sup> [The journey to net-zero: An action plan to unlock a secure, net-zero power system | LDES Council, p. 30](#)

<sup>9</sup> [The journey to net-zero: An action plan to unlock a secure, net-zero power system | LDES Council, p. 26](#)

- *Direct technology support and enabling measures* remove obstacles or lower barriers to new technology adoption. Both foster favourable conditions for the deployment of emerging technologies. Grants and tax credits directly support deployment, while adaptations to market rules or to definitions of technological standards act as enabling measures.<sup>10</sup>

We would like to highlight one revenue mechanism and one direct technology enabling measure as policy recommendations: **capacity markets** and **defining energy storage as its own asset class**. With regards to revenue mechanisms, capacity markets in particular could incentivise the deployment of flow batteries by offering financial incentives for the long-term, continuous availability of the energy storage capacity they provide, allowing them to compete with traditional forms of generation such as gas or coal-fired power plants. Capacity markets could likewise support flow batteries by implementing performance-based standards with criteria regarding discharge duration. Finally, flow batteries have the capability to balance power in both directions by absorbing and discharging energy. This adds to their role as system capacity providers through 24/7 Clean Energy PPAs.

Additionally, we believe energy storage should be considered its own asset class. Energy storage, in particular flow batteries, can provide a range of slow and fast services to the grid. Slow services include time shifting, peak shaving, power balancing or investment deferral, while fast services include sag compensation, power smoothing or grid stabilisation. Designating energy storage as its own asset class, separate from consumption and generation, would therefore allow for better identification of the specific value and revenues that such storage systems bring. It would also provide a way for regulators and market participants to design rules and tariffs that specifically consider the unique characteristics of energy storage systems.

In summary, endorsing a flow battery target signals a need for this type of energy storage, thereby creating a stable and predictable market. Alongside adequate policy tools, a flow battery target can attract investment and drive innovation. This will, in turn, accelerate the transition towards a more sustainable and resilient energy system.

#### **4. A great first step for flow batteries**

We extend our congratulations to European policymakers for embracing one of our advocacy priorities: including flow batteries in the crucial sustainability provisions of the Batteries Regulation, such as the Battery Passport and the declaration of carbon footprint calculation.

The inclusion of flow batteries in the Battery Passport will allow industrial actors to provide valuable information on the environmental impact of production and use, including carbon footprints. It ensures that the Batteries Regulation is neutral towards

---

<sup>10</sup> [The journey to net-zero: An action plan to unlock a secure, net-zero power system | LDES Council, p. 31](#)

different technologies while providing a more comprehensive comparison of energy storage technologies that does not discourage the use of flow batteries.

To conclude, we call on the Commission to continue supporting the flow battery industry – a leading example of clean tech – as a way to meet the Green Deal objectives.

#### **FOR FURTHER INFORMATION**

Beata Viršumirska  
Policy Officer

[b.virsumirska@flowbatterieseurope.eu](mailto:b.virsumirska@flowbatterieseurope.eu)

#### **ABOUT FLOW BATTERIES EUROPE (FBE)**

Flow Batteries Europe (FBE) represents flow battery stakeholders with a united voice to shape a long-term strategy for the flow battery sector. We aim to provide help to shape the legal framework for flow batteries at the EU level, contribute to the EU decision-making process as well as help to define R&D priorities. Flow Batteries Europe is working to create and reinforce networks between key stakeholders in the flow battery industry.

[www.flowbatterieseurope.eu](http://www.flowbatterieseurope.eu)