



FLOW
BATTERIES
EUROPE

A united voice for flow batteries

THE EU'S INDUSTRIAL POLICY ON BATTERIES

POSITION PAPER



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Flow Batteries Europe Position Paper – August 2023

Introduction

In June 2023 the European Court of Auditors (ECA) published a special report titled “The EU’s Industrial Policy on Batteries – New Strategic Impetus Needed.”¹ The document emphasized the significance of batteries in facilitating the clean energy transition and enhancing the competitiveness of the automotive sector. In 2018, the European Commission recognised batteries as a crucial element in the EU’s clean energy transition and initiated an action plan of Sustainable Mobility for Europe² with the aim of establishing Europe as a global leader in sustainable battery production and utilisation. The report conducted an assessment of the original plan’s relevance, its execution, and the outcomes achieved thus far.

We wish to comment on the ECA’s report, highlighting that the document offers valuable insights into the current status and strategic outlook of batteries for electric mobility. **We also anticipate a similar report addressing batteries within the context of the stationary energy storage sector.**

Effectiveness of the EU industrial policy on batteries

The ECA discusses the overall effectiveness of the Commission’s efforts in promoting an EU industrial policy on batteries. While acknowledging areas for improvement in monitoring, coordination and targeting, the report notes that the Commission’s achievements are significant. Notably, the Commission successfully executed key actions outlined in its action plan, such as establishing inclusive stakeholder platforms spanning the entire value chain, proposing new regulations for batteries, and enhancing financial support for research, innovation, and manufacturing endeavours within the electric vehicles (EV) battery sector.

We welcome the positive outcome of the Commission’s action plan on EV batteries. Within the EU, the transport sector stands as the second-largest contributor to greenhouse gas emissions.³ Driven by the electrification of transport the global demand for batteries is projected to surge 14 times by 2030. Within this landscape, the EU has the potential to contribute to 17% of this heightened demand.⁴

However, as mentioned in the report, the EU still heavily depends on imports of raw materials for production of batteries and energy storage: 87% of its raw lithium imports come from

¹ [Special Report. The EU’s industrial policy on batteries – New strategic impetus needed | European Court of Auditors](#)

² [Sustainable Mobility for Europe: safe, connected, and clean | European Commission](#)

³ [Europe: CO₂ emissions by sector 2021 | Statista](#)

⁴ [Towards a sustainable batteries industry in the EU | European Economic and Social Committee](#)

Australia, 80% of manganese imports from South Africa and Gabon, 68% of raw cobalt imports from the Democratic Republic of Congo, and 40% of raw natural graphite imports from China.⁵ Projections indicate an increasing disparity between worldwide demand and supply for these essential battery components. In contrast, flow batteries⁶ have low investment costs, use abundant raw materials and can be manufactured rapidly. It's imperative to strategically diversify energy storage technologies to ensure a sustainable allocation of resources, thereby preserving a substantial reserve of raw materials for lithium-ion batteries in the mobility sector.

The ECA Report lists five recommendations, the first one being a recommendation for the European Commission to update its strategy for a sustainable and competitive European battery value chain. A comprehensive strategy for the battery value chain should include a strategy for batteries used for energy storage. The EU strategy should be to use lithium-ion battery cells in those applications where weight and energy density are critical and to build up an industry to manufacture and deploy flow batteries (or other battery types) for applications, such as bulk energy storage to be used alongside renewable generation or for grid balancing or ancillary services. **The EU deserves an energy storage strategy that has security from diversity.**

The second recommendation in the report is to strengthen monitoring with regular, up-to-date and comprehensive data. FBE calls on the Commission, and other EU bodies like Eurostat and the Joint Research Centre (JRC) to cover the wide spectrum of battery types in their monitoring activities, including flow batteries.

Encourage diversification through better coordination of EU funding

The third and fourth recommendations of the ECA report target EU funding, encouraging a better overview in Europe and improvement of the coordination and targeting.

Referencing the previous Court of Auditors paper – “EU Support for Energy Storage”, it was pointed out that under the Horizon 2020 framework, a substantial €315 million was designated for battery research initiatives. Notably, more than half of this funding was allocated to projects centred around lithium-ion batteries. However, only 3% of these funds were dedicated to the advancement of flow battery technologies.⁷ When considering the broader spectrum of the EU's public support for various battery technology projects, the picture improves slightly. Nonetheless, it's worth noting that flow batteries, along with sodium-ion and lead-acid battery types, remain among the less supported options.

⁵ [NEWS-SR-2023-15 | European Court of Auditors](#)

⁶ Flow batteries, may also be referred to as "redox flow batteries", or "redox flow technologies." Throughout this paper, we use the term "flow batteries."

⁷ [Briefing Paper. EU support for energy storage | European Court of Auditors](#)

Table 1. EU public funding of battery R&I in years 2014-2021

Technology or application	Public funding (million EUR)	Public funding (% of total)	Number of projects
Li-ion (including solid-state)	295.2	72.8	114
Lithium-sulfur (Li-S)	33.3	8.2	8
Sodium-ion (Na-ion)	10.2	2.5	11
Redox-flow (RFB)	51.4	12.7	23
Lead-acid (Pb-A)	15.2	3.7	12
Mobility applications	294.9	72.7	90
Stationary applications	214.4	52.9	80

Source: JRC analysis based on CORDIS data⁸

The EU is underspending on flow batteries in comparison with other parts of the world, as global trends in battery R&I show a general shift to new chemistries and an increased interest in flow batteries for stationary energy storage. In the past decade, Europe has accounted for a mere 7% of global flow battery projects, while North America and Asia have been more active in terms of research, development, and support.⁹ The JRC in its report “Batteries for Energy Storage in the European Union”, released in November 2022, made it clear that **while the EU is making swift strides in the Li-ion battery value chain, the progress has been too slow in the realm of stationary battery technologies that are based on abundant raw materials, such as flow batteries.**

Supporting local manufacturing of flow battery technology in Europe goes beyond industry growth and sustainability; it has the potential to significantly bolster the EU's energy security and economic prosperity. Developing a robust local supply chain is a fundamental step towards ensuring the long-term success of the flow battery sector. By producing key components and systems within the region, the EU can reduce its reliance on international suppliers and mitigate risks associated with supply chain disruptions. Moreover, this localized approach offers a strategic advantage by reducing transportation costs, cutting down on carbon emissions linked to long-distance shipping, and enhancing the resilience of regional economies. As Europe advances its capabilities in flow battery manufacturing, it not only drives technological innovation but also strengthens its position in the global energy landscape, fostering energy security and reinforcing economic growth. Furthermore, the establishment of local

⁸ [Clean Energy Technology Observatory: Batteries for Energy Storage in the European Union – 2022 Status Report on Technology Development, Trends, Value Chains and Markets | JRC](#)

⁹ Ibid.

manufacturing facilities creates job opportunities, stimulating employment growth and enhancing the skilled workforce, thereby contributing to the overall economic vitality of the EU.

If the current funding trends don't shift, the EU risks on missing out being competitive in the field of stationary battery market. More investment in flow battery technologies will benefit the EU longer term targets for decarbonisation, allowing for better integration of renewable integration in the grid. Pushing the various flow battery technologies up the TRL-scale will also contribute to European strategic autonomy.

Pathway to sustainability

Our association, Flow Batteries Europe, represents many flow battery manufacturers, suppliers and developers. Flow batteries have attractive, and strategically important benefits. One of the unique advantages of flow batteries is the decoupling of the battery power (measured in kW, contingent on stack size) from energy capacity (measured in kWh, determined by electrolyte tank volume). This flexibility allows for tailored designs encompassing various combinations of energy and power. Additionally, flow batteries exhibit significantly extended cycle lifespans in comparison to Li-ion or Pb-A batteries. This technology also presents notable benefits in material reclamation and recycling. Up to 95% of flow battery components are recyclable, including the vanadium sulphate electrolytes used in vanadium flow batteries that can be easily recovered and reused.¹⁰

Exploration of flow battery technologies encompasses a range of chemical compositions, including those that depend on non-critical raw materials. The technology readiness levels (TRLs) of these variations span from 4 to 9, varying based on the particular chemistry employed. The most developed technology is based on vanadium. With a low environmental impact, long lifetimes and easily and virtually completely recyclable features, **flow batteries are a key technology on the pathway to sustainability.**

Conclusions

The EU has great potential to drive sustainable battery innovation. However, while lauding the Commission's achievements in Li-ion battery production capacity, the strategic imperative may be overlooked – **the EU needs to amplify support for diverse battery technologies beyond Li-ion.** This shift can pave the way for robust advancements, ensuring a sustainable and resilient energy future by increasing the security of supply of the raw materials for the automotive industry and enhancing the diverse energy storage strategy.

Flow batteries stand out from other technologies due to their numerous sustainability and reliability advantages. The availability of materials and the scalability of the basic technology mean that they can be easily expanded to meet changing energy storage needs. We are convinced

¹⁰ [Flow Batteries Sustainability Story | Flow Batteries Europe](#)

that although Li-ion is currently seen as the dominant modern battery for energy storage, the role of flow batteries will significantly increase in the future.¹¹

The ECA report should be seen as an opportunity to realign the European priorities for the battery value chain and an updated Strategic Action Plan for Batteries should include battery solutions for stationary storage. The EU should use this opportunity step up its technological capability in affordable and longer-term storage solutions in order to meet its ambitious climate goals.

¹¹ [Clean Energy Technology Observatory: Batteries for Energy Storage in the European Union – 2022 Status Report on Technology Development, Trends, Value Chains and Markets | JRC](#)

ABOUT FLOW BATTERIES EUROPE

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.

FOR FURTHER INFORMATION

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