



FLOW
BATTERIES
EUROPE

A united voice for flow batteries



Activity Report 2022

Acknowledgment

Special acknowledgement to the FBE members who helped make this publication possible.

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Welcome by FBE President Kees van de Kerk



Kees van de Kerk
Flow Batteries Europe
President

The worldwide need for energy storage continues to grow. Recent national and international events have made significant impacts on the world's energy supplies raising the importance of energy security to the highest political level. Yet, alongside security of supply, the pressing need to expand our sustainable energy sources and the importance of an economical supply of energy means that the whole energy infrastructure needs to be reviewed.

The European Commission has set ambitious targets for decarbonising our energy supplies, and this relies as much on increasing the supply of energy produced from renewable and sustainable resources as well as storing it at times of oversupply and making it available when needed.

The electricity sector bears much of the responsibility for delivering clean and reliable power. There are huge requirements to move electricity production to meet times of electricity demand, and only low cost, bulk energy storage will achieve this.

To reach the cost targets, a storage technology must be of low initial cost, have low maintenance requirements, have a very long operational life, without undue degradation of performance, and have a low environmental impact at its end of life, by being close to 100% recyclable.

This is a great challenge to us in the FBE community, but many types of flow

batteries can achieve this. The first large scale, multi-MWh flow battery storage systems are being announced, small home storage systems are being built in Europe and middle-sized flow batteries for companies and distributed installations are already being deployed.

Flow batteries are one of the leading technologies for long-term duration storage and they will play a key role in reducing our reliance on imported fossil fuels. Europe's increasing electrification of energy systems and the development of renewables through the REPowerEU plan will require stationary energy storage solutions with long cycle life and low environmental impact.

In its second year of existence, FBE has confirmed the role of flow batteries as a key energy storage solution through its increasing activities and political recognition. Over the last year, FBE successfully achieved the inclusion of flow batteries in the EU Batteries Regulation from the European Commission.

FBE will continue collaborating with the EC's Joint Research Centre to establish the methodology for assessing the carbon footprint performance of flow batteries. FBE took measures to integrate flow batteries into crucial sustainability provisions of the Battery Passport so they can be adequately compared to other battery technologies.

We will be working on the development and use of European standards, which are crucial to raising the visibility and trust in flow batteries. Standard methods of assessment will increase the visibility of the durability of flow battery components and the reliable long-term storage capacity they provide.

Shortly before the publication of this report, FBE's Technology Committee finalised a Sustainability Story report, detailing the various sustainability advantages of flow batteries. The paper emphasised flow batteries' technical lead and the role they will take in decarbonising energy systems.

As the deployment of flow batteries expands around the globe, we believe that European companies should be part of the commercial development of this crucial energy storage technology.

Short duration energy storage is no longer sufficient and long duration solutions are required to ensure the development of renewables as well as the stability of electrical grids. Flow batteries offer one of the most reliable and affordable solutions for consistent and economical renewable energy supply in Europe.

We will continue to argue for support from the European Commission and join with our members to seek support from national and regional governments to ensure the commercial success of flow battery technology and market penetration.

This will have an impact on the environment, energy security policy as well as employment and the economic growth within Europe.

Our association, Flow Batteries Europe, seeks to promote the value and benefits of flow battery technology.

Our members include manufacturers, developers, academic and other research institutions, suppliers to the industry, and users of flow batteries. Their interest is not only for business reasons but also because they see the value to society of improving our electrical infrastructure by installing the best forms of energy storage that are available.

We have grown in membership, as actors in the flow battery value chain progressively decide to come together, with six new members joining over the past year. The association's membership grew from 18 to 25, and continuous expansion is expected.

We are very pleased that membership includes companies with significant operations outside Europe. This is a truly international business. Flow battery technologies are growing in visibility and their necessity for Europe's energy transition is undeniable.

I want to thank the FBE staff, Patrick Clerens, our Secretary General Anthony Price and last but not least all our members as the contributions of our three committees is only made possible through time generously invested by them.

This review of our work over the past year highlights our achievements, records our successes and looks forward to our future work.

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Our association, Flow Batteries Europe, seeks to promote the value and benefits of flow battery technology.



About Flow Batteries Europe

Flow Batteries Europe represents flow battery stakeholders with a united voice to shape a long-term strategy for the flow battery sector.

We help shape the legal framework for flow batteries at the EU level, contribute to the EU decision-making process, as well as help define R&D priorities.

Flow Batteries Europe is working to create and reinforce networks between key stakeholders in the flow battery industry.

This report looks at the past year and some of our key achievements.

FBE aims to accelerate decarbonisation in Europe and beyond by increasing the deployment of energy storage and flexibility solutions through flow battery applications.

The association gathers interested stakeholders to advance research, commercialisation and deployment of flow batteries.

To achieve this, FBE engages and promotes flow batteries with European and other relevant organisations.

FBE's Priorities



Unite flow battery stakeholders to speak with a powerful and unified voice.



Advocate for more lighthouse projects in the EU and update members on funding opportunities at the EU level.



Identify key business cases and contexts where flow batteries tend to do better than other technologies.



Showcase flow battery projects and success stories. Promote flow battery advantages.



Advocate for harmonised legal framework at the EU level and implementation in the Member States.



FBE Structure

President

Kees van de Kerk (Volterion)

Vice-Presidents

Alexander Schönfeldt (CellCube)

Tobias Janoschka (CERQ)

Francesco D'Alessio (Largo Clean Energy)

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Recap of the year

April

FBE celebrated its one-year anniversary.



May

FBE signed a joint statement with 11 other organisations calling policymakers to reaffirm their commitment to the European Green Deal, in view of the vote on the Fit for 55 package and the publication of the REPowerEU Action Plan.



June

FBE together with other 16 clean-tech investors and civil society organisations, addressed an open letter to Commissioner Gabriel and Director-General Paquet, asking to prioritise climate and energy security in the 2023-24 Horizon Europe Work Programme.



FBE supported the International Flow Batteries Forum conference which took place in Brussels.



September

FBE policy officer spoke at the FLORES - Network of Flow Battery Research Initiatives workshop on digital twins for flow batteries: a roadmap toward redox flow battery passport.



FBE was a media partner of the Battery Innovation Days 2022. Our member Peter Fischer from CENELEST spoke at the event defending our call for a technological-neutral batteries regulation.



FBE organised the session "Making the sunshine at night: What is needed to build a 100% renewable-based energy system?" during the policy conference of the European Sustainable Energy Week 2022.



October

KTH and WEVO CHEMIE joined FBE.





FBE was represented at the Energy Storage Global Conference 2022 by FBE Secretary-General Anthony Price and Juan-Carlos Mejia Pinto from CellCube. They spoke about the key role flow batteries play in Europe's energy transition.



FBE had an exhibition stand at the Energy Storage Pavilion at ENLIT Europe. Anthony Price, FBE Secretary General, spoke at the session "Energy Storage - Role, Products and Applications".



FBE opened its General Assembly with an "Afternoon Tea with FBE", there was a session open to non-members where Alexander Schoenfeldt from CellCube gave a keynote speech on flow batteries targets.



EU policymakers reached an agreement on the Batteries Regulation and flow batteries were included in the scope of key sustainability provisions of the Battery Passport.



November

December

January 2023

February 2023

March 2023

April 2023

May 2023

Redox One joined FBE



FBE published its position paper on Flow Battery Targets, outlining how much flow batteries storage is needed at a global level.

FBE published its position paper on capacity markets.



izM joined FBE.



FBE hold a Webinar on the topic "Batteries Regulation - Implications for flow batteries stakeholders."

Norge Mining and XL Batteries joined FBE.



Norge Mining

FBE released the publication "Sustainability Story", which highlights the many advantages of flow batteries for the resilience of future energy networks.



FBE published the document titled "Business Cases."

Stolthaven Terminals joined FBE.

Stolthaven Terminals 

Advocacy work

A story of successful advocacy – Batteries Regulation

After two years of negotiations, in December 2022, EU institutions reached an agreement on the Batteries Regulation. New rules will cover the entire battery life cycle, from design to end-of-life and apply to all types of batteries, including flow batteries.

The inclusion of flow batteries in the Batteries Regulation will allow for a more comprehensive comparison of energy storage technologies without disincentivising the use of flow batteries for energy storage applications.

Flow batteries are a safe, cost-effective and sustainable technology. It is therefore reassuring to know that customers will be able to compare the benefits against other batteries based on objective and standardised criteria across the EU.

Throughout 2022, FBE invested significant effort into ensuring that flow batteries were encompassed by crucial sustainability provisions of the Battery Passport.

These efforts involved numerous meetings with policymakers, speeches at conferences and workshops, social media campaigns, as well as the release of position papers.

The Batteries Regulation shall enter into force in the third quarter of 2023. Whereas the obligation for each flow battery to have a Battery Passport will apply as of 2027, and the carbon footprint declaration requirement will apply as of 2030.

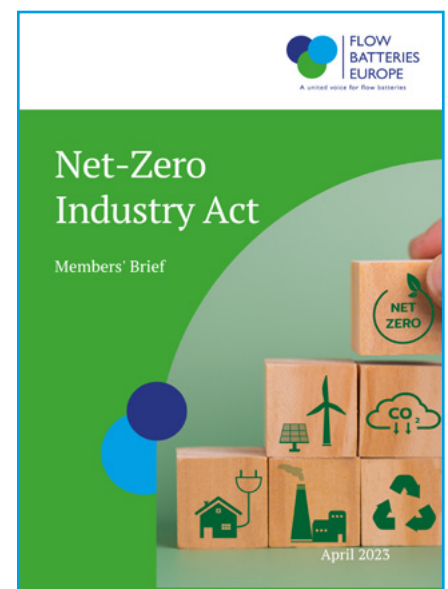
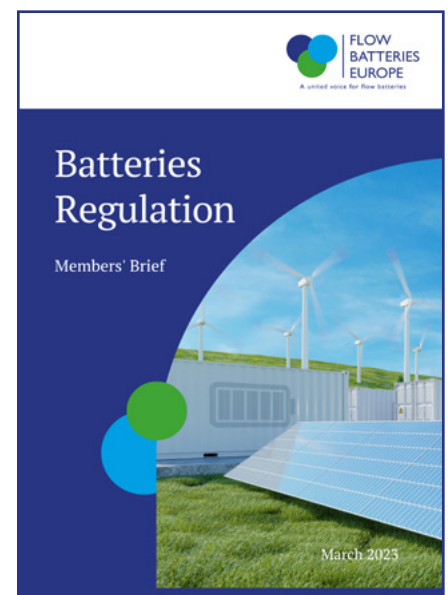
FBE is closely following the work of the Joint Research Center on the methodology for the calculation of the carbon footprint.

By providing regular feedback and holding meetings with the scientific body of the European Commission, we are able to guarantee that the newly adopted methodology will be feasible for the flow batteries industry.

We keep our members well informed about the new rules and implications for their business. FBE prepared a comprehensive overview of the new Regulation and organised a webinar in April 2023.

Additionally, another workshop is planned for June 2023. The upcoming event will focus on the technical side of the Battery Passport to provide further information and clarification.

Flow batteries inclusion into Batteries Regulation is a success for FBE and the thriving flow battery industry!





EU Green Deal Industrial Plan

FBE was following the development of the Green Deal Industrial Plan that aims to enhance competitiveness of Europe's net-zero industry and accelerate the shift towards climate neutrality.

Specifically, FBE was focused on the Critical Raw Materials Act (CRMA) and the Net-Zero Industry Act (NZIA).

1. Critical raw materials are essential for the construction and operation of energy storage systems, and ensuring their secure and sustainable supply will support the deployment of energy storage at scale. The CRMA will enhance the EU's monitoring capabilities as well as strengthen the EU value chain by identifying and prioritising resources and projects that align with strategic interests, environmental protection goals, and external policies.

Together with our members, we have identified relevant critical raw materials for the flow batteries industry, that will help us follow policy developments and ensure that the needs of the flow battery industry are considered at the highest level of the EU.

2. The NZIA aims to develop a framework strengthening the production of clean technologies in the EU, in line with its 2030 decarbonisation objectives. It notably sets the EU target for manufacturing capacity of strategic net-zero technologies: 40% by 2030. Although batteries are included on the list of strategic net-zero technologies, determining a common goal for eight

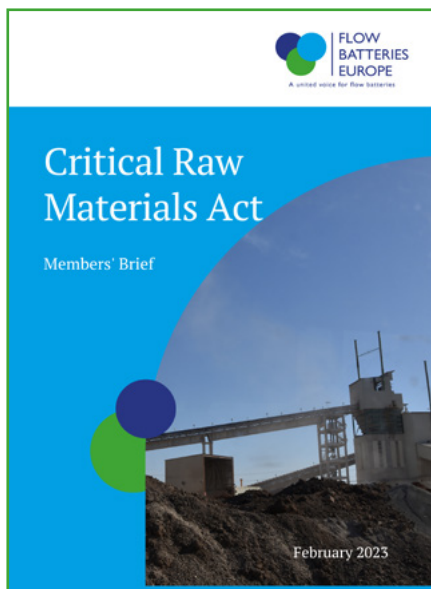
different types of technologies (from solar photovoltaic or carbon capture technologies to energy storage and grid technologies) seems to bring little value. It may not be feasible for the EU or Member States to allocate resources to all technologies simultaneously, and some may end up being neglected or underfunded.

The flow batteries industry will mostly benefit from the NZIA if it can attract investment for manufacturing projects within the EU. A 2030 flow battery manufacturing target should be endorsed by the Commission in order to provide a stable foundation for this sustainable energy storage solution that is still at an early market creation stage.

FBE welcomed other proposed by the NZIA rules. The establishment of Net-Zero Industry Academies will encourage projects in the EU by expanding the qualified workforce through increasing training opportunities.

Certain flow battery technologies could also benefit from the creation of net-zero regulatory sandboxes to allow for testing before they can be deployed on markets.

FBE updated members on the recent regulatory developments of the Critical Raw Materials Act and the Net-Zero Industry Act by providing a detailed assessment of published proposals.



Energy storage targets & flow battery targets

FBE published a position paper on Flow Battery Targets, outlining an ambitious goal of achieving 20 GW and 200 GWh of flow batteries globally by 2030, which is a key step towards meeting the European Green Deal's renewable energy goals.

The flow battery target serves as a powerful message to both private actors and EU policymakers. 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 support, flow batteries can become a European clean tech success story.

The endorsement of any target at the European level provides a clear and consistent indication of the direction and ambition of EU energy policy.

It provides a sense of stability and predictability that encourages private sector investments in associated supply chains. By endorsing our flow battery target, policymakers would signal an increasing need for this type of energy storage, which attracts investment, incentivises innovation and stabilises the market.

The paper highlights how long-duration energy storage (LDES) is vital to guarantee energy security in Europe and identifies flow batteries as an essential solution to mitigate the variable supply of renewables and stabilise electricity grids.

It also reiterates the importance of LDES to ensure a stable and continuous supply of energy to communities, cities, and countries over long periods of time.





Capacity Markets

In the context of the electricity market design reform in the European Union and the United Kingdom, FBE released a position paper highlighting how flow batteries may help to stabilise power systems based on renewable energy generation.

Capacity markets play a crucial role in ensuring the reliability and stability of power systems, particularly those with renewable generation.

Sustainable and reliable technologies such as flow batteries are needed to help balance the demand and supply of electricity in the grid.

Flow batteries are a cost-effective energy storage solution that offers the benefits of scalability, long-duration discharge and high round-trip efficiency.

By enhancing the reliability and resilience of power systems based on renewable generation, flow batteries can support and accelerate the transition away from fossil fuels.

We therefore encourage the European Commission to support flow battery deployment.

EU funding advocacy

FBE has not only provided recommendations for funding research and manufacturing projects, but we also actively advocated to unlock new funds.

We co-signed an open letter to European R&I Commissioner Gabriel and Director-General Paquet, asking to prioritise climate and energy security in the 2023-24 Horizon Europe Work Programme.

With a budget of €95.5 billion, including 35% reserved for climate objectives, Horizon Europe is the central EU R&I funding programme.

In January 2023, FBE became a member of Batteries Europe, the European Technology and Innovation Platform.

This collaboration aims to foster connections and provide support to research and innovation stakeholders throughout the entire European Battery Value chain.

It is crucial to ensure that stakeholders involved in flow batteries are well-represented alongside other battery technologies within this initiative.

FBE engaged in developing a common Strategic R&I Agenda on redox flow batteries. Based on this document, the European Commission will be deciding on future funding opportunities.



Visibility and Events

International Flow Battery Forum (IFBF) - June 2022

FBE's second year kickstarted with a successful edition of the IFBF in Brussels during which flow battery projects from around the globe were presented. As a partner of the conference, FBE contributed to the program and diversity of speakers. Discussions partly emphasised the EU Batteries Regulation, funding opportunities for the sector and performance comparisons between battery models. Karlis Goldstein, Policy Assistant to the European Energy Commissioner also led a session on energy security in Europe.



Battery Innovation Days - September 2022

The association was a partner of the Battery Innovation Days' second edition discussing the key role of battery technologies in the energy transition. It was an opportunity to discuss the EU Batteries Regulation and promote the inclusion of flow batteries in its Battery Passport. The importance of flow batteries in the decarbonisation of European energy grids was particularly emphasised.

EU Sustainable Energy Week (EUSEW) - September 2022

FBE hosted the panel discussion 'Making the sun shine at night: what is needed to build a 100% renewable-based energy system' during the ESEW 2022. The debate focused on the need for long-duration energy storage for the EU energy transition and possible market incentives. Deputy Director-General at DG Energy Łukasz Koliński notably highlighted the importance of energy storage for the European Commission and the promises of flow battery technologies. The discussion was one of the most popular sessions of the ESEW with gathered over 500 attendees.





Energy Storage Global Conference (ESGC) - October 2022

The association was represented at two sessions at the ESGC 2022, to debate on European energy independence and the competitiveness of long-duration energy storage. The need for further political incentives and funding opportunities were important topics of conversation.



Enlit Europe 2022 – November 2022

FBE participated in a session promoting long-term energy storage at the Energy Storage Hub of Enlit Europe, in Frankfurt. The importance of flow batteries in the security of energy supply was an important part of the discussion. An afternoon tea on flow batteries allowed for further debates on the sector.

The year has been full of opportunities to promote flow batteries and discuss the future of long-duration energy storage.

FBE aims to organise and participate in even more events during these upcoming months to provide additional opportunities for connection and conversation around flow batteries.

Summer 2023 will immediately be eventful with 2 major moments happening in June:

1. FBE will attend the **Electrical Energy Storage (EES) Europe** exhibition in Munich to represent flow batteries alongside other energy storage technologies.
2. The 2023 edition of the **International Flow Battery Forum**, supported by FBE, will take place in Prague from 27-29 June immediately after the EES Europe and will bring up a variety of topics ranging from energy infrastructures to regulatory support.

Working Programme

In 2022, FBE had three active Committees: Business Development, Technology and Communications.

While the Communications Committee was working on facilitating information sharing among members, FBE's website improvement and promotion of the industry through various channels, the Technology and Business Development Committees were focused on finalising two comprehensive publications: Sustainability Story and Flow Batteries Business Cases.

1. Sustainability Story

FBE's Sustainability Story presents the various sustainability advantages of flow batteries as energy storage technologies particularly suited for long-duration and large-scale applications.

FBE's Technology Committee worked on this publication to highlight the strengths contributing to the efficiency as well as the sustainability of flow batteries such as their safety with low flammability risks and their durability considering they have low maintenance requirements.

The Technology Committee also sets forth the abundance and recyclability of materials used in flow battery technologies.

Hence, the circularity of flow batteries, combined with their long-term performances, demonstrates the sustainability of flow batteries.

Flow batteries' technical benefits and their potential in creating green jobs while supporting the development of renewables make for a compelling sustainability story.

2. Flow Batteries Business Cases

The Business Development Committee launched this paper to explain the crucial role of flow batteries in sustainable energy infrastructure.

The long duration and scalability of flow batteries make them the best energy storage technology to manage the variability of renewable energy and thus an essential technology for the energy transition.

Additionally, the safety and cost-efficiency of flow batteries are detailed to justify the market uptake of flow batteries in Europe.

Flow batteries' major advantage emphasised in the paper is their ability to charge and discharge for extended periods of time without losing capacity or degrading performance.

Their flexibility makes flow batteries ideal for high-scale applications and their efficiency will only increase as their commercialisation expands.





Closing by FBE Secretary General Anthony Price



Anthony Price
Flow Batteries Europe
Secretary General

This has been an exciting year as FBE has benefitted from the increased interest in energy storage in general, and flow batteries in particular.

We have been able to bring together companies and institutions from across the flow battery value chain and building on this we have created additional political attention in just 2 years.

We have held several events this year to show the increasing importance of flow batteries and been able to take our message to the heart of the European Commission.

Our session during the European Sustainable Energy Week included a keynote speech from Lukasz Koliński, Deputy Director-General at DG ENER, which secured a much-raised profile for us.

The association will keep organising and participating in events to expand the reach and visibility of flow batteries over the upcoming year.

FBE supports Europe's efforts to transition toward carbon-free power sources and hopes to gain more support to encourage the development of flow batteries in expanding electrical networks.

Ambitious renewable energy targets have been set by the EU and the rapid changes they involve require a massive uptake of long-term energy storage technologies to guarantee the flexibility and stability of energy grids.

The necessity and effectiveness of flow batteries have been proven at the technical level and now require market recognition at the European level.

The number and scale of flow battery projects need to be accelerated; we need to highlight the need for investment to enable manufacturing capacity in Europe.

Our position paper on capacity markets suggests financial support to incentivise flow battery energy storage capacity.

As FBE expands and consolidates its work, our ambitions must rise. Our association will keep promoting the interests of flow battery stakeholders while advancing concrete commercial projects and ambitious political targets.

The energy transition is a key priority for Europe and FBE will ensure flow batteries play their role in this shift.

Come and join us!

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2023 is the year when we pay more attention to the energystorage supply chain and its own sustainability index. Energy security needs energy storage, and we will need the security of energy storage.

FBE Members

FBE now brings together 25 members interested in the flow battery value chain!

6 new members joined the association over the last year. We look forward to welcoming many more!



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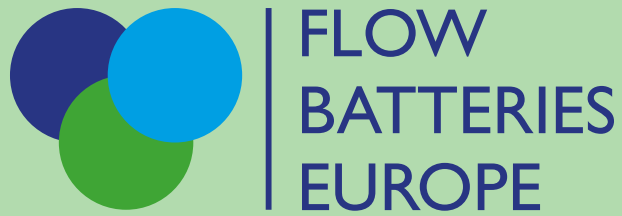
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