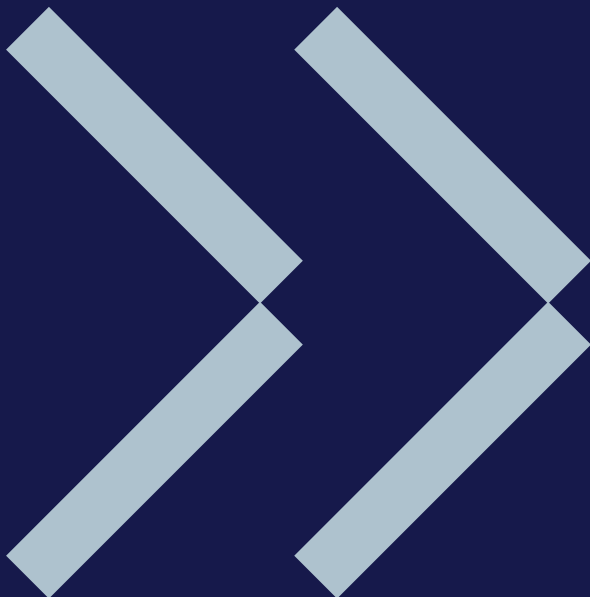


BVES POSITION PAPER ON

**PROPOSED BAN ON PERFLUORINATED
AND POLYFLUORINATED CHEMICALS
(PFAS)**

IMPLICATIONS FOR THE ENERGY STORAGE INDUSTRY

**ENERGY STORAGE SYSTEMS ASSOCIATION BVES E. V.
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BACKGROUND

What are per- and polyfluorinated chemicals - PFAS?

PFAS is a chemical substance group with approx. 10,000 different compounds that are used in all phase states solid, liquid and gaseous. These substances can be found in almost all industrially manufactured products. Their broad application is based on their thermal and chemical stability, which makes them known as "eternity chemicals". PFAS are also used as surfactants and repel water, oils and fats.

Where and how are PFAS used in the energy storage sector?

PFAS play a central role in the energy sector including energy storage systems. PFAS are often used in battery cells as well as in the membranes for electrolyzers and flow batteries and, for example, in components of wind turbines and PV modules. PFAS are therefore central components of the technologies that are to enable the energy transition.

Examples of the use of PFAS in batteries

1. Usage as a binder for the metal oxide coating of the cathode, e.g. PVDF, PTFE

The use enables a mechanically, thermally and chemically stable connection and is designed for a battery service life of approx. 20 years. PFAS emissions into the environment can be eliminated along the battery value chain, from production to recycling, as processing takes place in closed plants or the materials are encapsulated. Substitutes for PFAS for this application are currently being investigated.

2. Usage of PFAS as an additive or component of the electrolyte to improve the service life and function of the battery, e.g. Li-triflate, LiTFSI, LiBETI, additives such as F-EPE

The additives or lithium salts used enable a stable electrolyte and good transport of the lithium ions. The application is also designed for the service life of the battery and emissions can be eliminated with proper operation.

3. Usage for valves, seals, washers, diaphragms and separator coatings, e.g. PTFE, FEP, FKM, PVDF, PFSA

Depending on the type of battery, PFAS are used to ensure the tightness of the cell and for insulation between the poles inside the cells. PFAS are also used in separators or ion exchange membranes (PFSA membranes). Conditions for service life and emissions are also as described above.

This position paper gives an overview of the current state of the PFAS ban and the discussed derogation options of the Restriction Proposal by ECHA and gives policy recommendations for dealing with the topic of PFAS from the perspective of the energy storage sector. We are committed to ensuring that protecting people and the environment from harmful substances is our top priority. Replacing PFAS compounds with harmless alternatives in the short and medium term is the right way forward. In the field of energy storage, however, it will need some time before technically functioning and marketable alternatives for PFAS are available for all applications.

Why is a ban on PFAS compounds proposed?

PFAS substances are suspected of being harmful to health. The economic damage to health caused by PFAS in the EU is estimated at 50-80 billion euros estimated. The substances are now found everywhere, in drinking water, food, soil, etc. Emissions occur in all phases of use: in the production, use and wear of products use and wear of products as well as disposal. Therefore, a general ban on this group of substances is being proposed at EU level. The „[Proposal for a restriction](#)“ of per- and polyfluoroalkyl substances (PFAS) from the European Chemicals Agency ECHA is intended to assess the impact of a ban on various industrial sectors. Authorities from Germany, the Netherlands, Denmark, Norway and Sweden have collaborated on this document. In Germany, the Federal Institute for Occupational Safety and Health (BAuA), the German Environment Agency (UBA) and the Federal Institute for Risk Assessment (BfR) were involved.

Assessment of the economic consequences of the proposed PFAS ban within the Restriction Proposal by ECHA

Section 2.4 of the [Restriction Proposal](#) contains the chapter "Assessment of Restriction Options" (page 78 ff.). The comments on the energy sector can be read from page 105 onwards. Here it becomes clear that the technical impact assessment is still more than incomplete and that the conclusions drawn from it do not correspond to the market. At an economic and political level, the far-reaching significance of the regulation is only now being realised. From both an economic and climate policy perspective, this would be a clear failure, particularly because it can be assumed that environmental emissions from PFAS are avoidable to a large degree in these applications. Therefore, release into the environment is very unlikely and direct contact with humans is avoidable. Due to the current lack of alternatives, a ban without exemptions would come close to shutting down the entire supply chain for certain technologies.

Current status of the process and next steps

Authorities from Germany, the Netherlands, Denmark, Norway and Sweden were involved in drafting the proposal for a ban on the manufacture, use and placing on the market (including import) of PFAS as part of the EU chemicals regulation REACH. On the German side, the Federal Institute for Occupational Safety and Health (BAuA), the Federal Environment Agency (UBA) and the Federal Institute for Risk Assessment (BfR) were involved in the drafting process¹. This was followed by a scientific evaluation by the EU Chemicals Agency ECHA's committees for risk assessment (RAC) and socio-economic analysis (SEAC).

This has resulted in a Restriction Proposal, according to which it can be assumed that the ban will come into force in 2025 at the earliest. The Restrictions Proposal aimed at also taking into account the substitutability of the substances including a conclusion regarding the applicable transitional period if the Restriction Option 2 recommended by ECHA is chosen. An overview of the two derogation options discussed and the envisaged criteria for possible exemptions is provided in the box on the following page.

¹ <https://www.baua.de/DE/Services/Presse/Pressemitteilungen/2023/02/pm08-23.html>

Currently proposed transitional solutions until PFAS is banned:

Option 1: Complete ban after a transitional period of 18 months without exemptions.

Option 2: Ban with application-specific exemptions after a transitional period of 18 months. The time-limited exemptions are granted depending on the substitutability of the substances in specific applications. The following exemptions are being considered:

- **5 years after the end of the transitional period of 18 months, if there is sufficient evidence that:**
 - either there are no technically and economically feasible alternatives on the market at the time of entry into force, but possible alternatives to the use of PFAS have already been identified but are still in the development phase
 - or known alternatives are not available in sufficient quantities on the market at the time of entry into force or known alternatives cannot be used before the end of the transition period.
- **12 years after the end of the transition period of 18 months, if there is sufficient evidence that**
 - either at the time of entry into force there are no technically and economically feasible alternatives available on the market, e.g. no possible PFAS-free alternatives have been identified in R&D, so that it is likely that they will not be available in the near future
 - or the certification/regulatory approval of PFAS-free alternatives cannot be achieved within a five-year exemption period.
- **Indefinite derogation after the end of the transition period for specific use cases**, e.g. for the use of PFAS in refrigerants in technical building systems in buildings in which national safety standards and building regulations prohibit the use of alternatives or when used for the calibration of measuring, for measuring instruments, as analytical reference materials or as medical agents.

Assessments from ECHA's Restriction Proposal

The report contains assessments regarding the substitutability of the substances as well as the economic and environmental impacts depending on the timing of the ban on PFAS compounds for many applications. The alternatives identified for use in the energy sector are explained from page 106 onwards.

Hydrogen

According to the report, there is sufficient evidence that alternatives already exist for membrane applications in PEM electrolysis, although they have disadvantages in terms of durability. At the same time, these alternatives will not be available in sufficient quantities for at least the next ten years. With regard to fuel cells, there is also sufficient evidence of the existence of alternatives, but in this case it will also take another five to ten years before they are commercially available.

Seals, tubes and coatings for pipes and containers

According to the report, there is weak evidence that technically feasible alternatives exist for seals, hoses and coatings for pipes and containers.

Batteries

According to the report, there is weak evidence that alternative batteries, e.g. PFAS-free solid-state batteries, can be used as substitutes for lithium-ion and flow batteries. Some stakeholders argue that alternatives do not exist, while others assume that alternatives are very likely already available or can be found for a large number of components in the near future. In the report, ECHA concludes that for some battery applications with weak evidence, there is a high substitution potential for some battery applications - without specifying which ones these are. For all other applications, it is assumed to be unclear whether there is a substitution potential.

In the assessment of the environmental impact from page 142 onwards, the emissions are recorded for the various application sectors. It is interesting to note that the energy sector has very low emissions in comparison to the quantities of PFAS used. According to the ECHA, the share is estimated at 1.8 per cent.

RECOMMENDATIONS OF THE BVES WITH REGARD TO THE USAGE OF PFAS IN THE ENERGY STORAGE SECTOR & THE RESTRICTION PROPOSAL

The BVES is committed to ensuring that protecting people and the environment from harmful substances is a top priority. Replacing PFAS compounds with harmless alternatives in the short and medium term is the right way forward. In the field of energy storage, however, it will need some time before technically functioning and marketable alternatives are available for all applications. In these cases, a balance must be found between the socio-economic costs of the lack of alternatives and the risks of continued use. Otherwise, there is a high risk that the EU will be cut off from access to system-relevant technologies and products such as efficient battery cells. If these technologies were to bypass Europe, this would also be a clear misstep in terms of competitiveness and innovative strength as well as in terms of cutting of relevant solutions for the energy transition.

On a positive note, alternatives are already on the way and will probably be available in a few years' time. There is still a lack of precise data on long-term behaviour in use, i.e. on durability and therefore also on the real costs of the alternative products.

Due to the system-critical importance of energy storage systems for a stable energy system and a climate-friendly energy supply, we consider the RO2 restriction option with exceptions to be the better option for society in the long term in terms of replaceability. The proposed time frames for exemptions still appear ambitious, so it cannot be assumed that a replacement for all applications over the entire product life cycle can be tested or simulated within these time frames. At the same time, a suitable compromise must be found for energy transition systems such as energy storage systems that does not slow down the necessary expansion too much regarding the PFAS emissions that can be easily limited in line with the goals pursued for a climate-neutral energy sector.

The facts considered in the report are insufficient at present. On the one hand, the assumptions made are not completely tenable in our view, and on the other hand, there is a lack of information in detail. In our view, the assumption of substitution possibilities for Li-ion and flow batteries by other battery technologies is not foreseeable for the entire range of applications at present or in the next 5-10 years. Regarding the substitutability of membrane applications for PEM electrolysis, the same applies to membrane applications in redox flow batteries, both in terms of the disadvantages of the durability of the alternatives and their availability on the market within the next 10 years.

In addition, there are many other energy storage technologies that were not considered in the report, and which should also be taken into account, particularly with regard to future market development and technological openness. The current Restriction Proposal lacks this perspective of assessing the ideal application possibilities of energy storage technologies and evaluating their ideal application possibilities in the energy system. The various technologies are differently suited for use as short-term or long-term storage, as power storage or as capacity storage.

BVES is advocating that an industry dialogue be held with the energy storage sector, including leading research and development institutions, and is offering its expertise so that a solid information base can be established regarding the substitutability of PFAS and the decision for exemptions for energy storage technologies ranging from supercapacitors to batteries and hydrogen. This is the only way to make a realistic assessment and ensure that there are no undesirable effects regarding the development of an energy system that is both climate-neutral and secure and that Europe is not cut off from access to these innovative technologies.