PowerCo

BATTERIES. FOR GENERATIONS TO COME.

PowerCo SE // Industriestraße Nord // 38239 Salzgitter

Salzgitter, 20.09.2023

Subject

Statement of PowerCo SE on PFAS Restriction Proposal

Dear Sir or Madam,

We, PowerCo SE, an emerging battery cell manufacturer and 100% daughter company of Volkswagen Group, write to express our strong objection to the proposed regulation aimed at forbidding the use of Per- and Polyfluoroalkyl Substances (PFAS) in battery cell production within the European Union. The statement is in accordance with the statement submitted by our mother company Volkswagen Group.

We acknowledge the EU's commitment to environmental protection and the well-being of its citizens. However, we believe that the PFAS restriction Proposal may have unintended consequences that need careful consideration.

PowerCo SE has been at the forefront of innovation in battery cell technology, consistently striving to produce high-performance and environmentally responsible battery solutions. However, the PFAS Restriction Proposal in its current form poses severe risks for the emerging European battery cell production industry and as such PowerCo SE.

Therefore, the PowerCo SE proposes that the scope of the restriction be limited to PFAS posing a risk to health or the environment. Furthermore, exemptions for applications for the production of lithium-ion batteries for transport vehicles and energy storage systems, e.g., binder for the coatings of the electrodes are requested.

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We kindly request that our objections and proposals be taken into consideration during the decision-making process regarding the regulation on PFAS. We look forward to the opportunity for constructive discussions and finding common ground for the benefit of all parties involved.

Thank you for your attention to this matter.

Yours sincerely,

Sebastian Wolf
Chief Operations Officer,
Member of the Board
PowerCo SE

Soonho Ahn
Chief Technology Officer,
Member of the Board
PowerCo SE

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Executive Summary

PowerCo SE proposes the following **amendments to the PFAS Restriction Proposal**

1. **Fluoropolymers**
   The scope of the restriction should be limited to PFAS posing a risk to health or the environment. Fluoropolymers which are to be considered as polymers of low concern should be excluded from the restriction. PowerCo SE calls for a return to a risk- and substance-based approach to restrictions.

2. **Battery**
   Batteries are key for transforming the transport sector. To secure this transformation exemptions are required for applications for the production of lithium-ion batteries for transport vehicles, e.g., binder for the coatings of the electrodes . or additives for electrolytes . Actually no substitute is available – neither in pre-development nor any level of industrial scale- to replace the commonly used PFAS-substances in batteries. Additionally, exemptions should be given for batteries for energy storage systems or transport vehicles for repurpose use e.g., as energy storage devices .

Reasons for the proposed amendments are as follows

1. **PFAS are crucial for today's battery technologies:**

- **Critical Role in Battery Performance:** PFAS play a crucial role in enhancing the performance of battery cells, including aspects such as heat resistance, dielectric properties, and chemical stability.

- **Safety and Durability:** PFAS contribute to the safety and durability of battery cells, ensuring they meet stringent quality and safety standards.

- **No Viable Alternatives:** Currently, there are no viable alternatives to PFAS for certain critical aspects of battery cell applications, making the PFAS Restriction Proposal in its current form impractical.

2. **Restriction of PFAS impacts the European Automotive industry severely**

- **Impact on Electromobility:** A ban on PFAS would disrupt battery cell production, hindering the growth of the electromobility industry, which is essential for reducing carbon emissions and combating climate change.

- **Innovation and Economic Growth**: A balanced approach ensures the establishment and continued growth of the battery cell industry within the EU, fostering innovation and economic growth.

- **Alignment with the EU Green Deal:** Such an approach aligns with the EU Green Deal, promoting both environmental protection and technological progress. A ban of PFAS and the consequent impact on battery cell production would work against the targets announced be the European Green Deal.

3. **Battery cell manufacturers as PowerCo SE are committed to fulfil their environmental responsibilities**

- **Environmental Responsibility:** We are committed to working with regulatory authorities to develop responsible regulations that safeguard the environment without stifling progress.

- **Collaborative Approach:** We advocate for a collaborative approach involving further research and development to identify environmentally friendly alternatives while allowing for a reasonable transition period for compliance.

- **Environmental Stewardship:** Battery cell manufacturers like PowerCo SE are committed to minimizing the environmental impact of PFAS and are actively researching greener alternatives. However, at the current point in time, no alternatives exist.

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Request of Amendment of specific applications of PFAS

From the perspective of PowerCo SE, this section addresses significant applications of PFAS-containing materials and proposes appropriate restriction recommendations.

1. General Considerations on the Regulation of Fluoropolymers

The suggested restriction encompasses various fluoropolymers, such as PTFE or PVDF, classified as 'polymers of low concern' by OECD criteria. OECD emphasizes that 'PFAS' is a broad term lacking specificity about the harm potential of compounds[1] . Fluoropolymers classified as Polymers of Low Concern (PLCs) do not pose risks to public health or the environment, thus not meeting Article 68(1) of the REACH regulation criteria.

A scientific study[2] on PFAS risk assessment highlights the need for a case-by-case approach rather than grouping all PFAS together. Another study[3] focusing on PTFE, ETFE, FEP, and PFA establishes these substances as immobile, non-bioaccumulative, water-insoluble, and non-toxic. Residual monomers in these fluoropolymers do not increase hazardousness.

Moreover, a study[4] demonstrates that numerous fluoropolymers, including PVDF and FKM, meet PLC criteria, indicating no substantial impact on public health or the environment.

Several national and EU regulations impose strict emission limits, such as the European Union's Industrial Emissions Directive (IED), which effectively governs emissions during fluoropolymer manufacturing. The fluoropolymer industry undergoes rigorous environmental monitoring. Manufacturers are actively researching and developing R&D programs to eliminate PFAS-based polymerization aids during fluoropolymer production.

In the proper production and use of battery cells, fluoropolymer emissions into the environment do not occur. A low possibility of release is usually limited to malfunctions or accidents. PFAS-containing components are appropriately managed during recycling, disposal, or thermal incineration[5].

A chemical approach, demonstrated in a pilot plant, can close the chemical product cycle through upcycling, minimizing waste[6].

Blanket fluoropolymer restriction is unjustified due to PLC classification and minimal emissions during manufacturing, use, and recovery. Many fluoropolymers' persistence does not warrant classification as SVHC or potential restriction, as they are neither toxic, mobile, nor bioaccumulative.

Proposed Restriction Amendment

The restriction should focus on PFAS posing health or environmental risks. Fluoropolymers classified as polymers of low concern should be exempted. PowerCo SE advocates a risk- and substance-based approach to PFAS restriction.

1) see OECD Publication: Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance Series on Risk Management No.61, 09.07.21

2) "Grouping of PFAS for human health risk assessment: Findings from an independent panel of experts" J.K. Anderson et al., Regulatory Toxicology and Pharmacology, 2022

3) "A Critical Review of the Application of Polymer of Low Concern and Regulatory Criteria to Fluoropolymers", Barbara J Henry et.al., 2017, Integrated Environmental Assessment and Management — Volume 14, Number 3—pp. 316–334

4) "A Critical Review of the Application of Polymer of Low Concern Regulatory Criteria to Fluoropolymers II: Fluoroplastics and Fluoroelastomers" S. H. Korzeniowski et.al., Integrated Environmental Assessment and Management · June 2022

5) Gehrmann et al. (2023): Pilot-Scale Fluoropolymer Incineration Study: Thermal Treatment of a Mixture of Fluoro-polymers under Representative European Municipal Waste Combustor Conditions

6) https://www.chemanager-online.com/news/cycling-von-vollfluorierten-polymeren (last access: 24.05.2023)

2. Considerations on the Regulation for Battery applications

Use Case and Significance
At PowerCo SE, PFAS, particularly PVDF, plays a vital role in Lithium-Ion battery production as a cathode binder. PFAS is also used in cell, module, and system-level applications, especially as a sealing material. All current production binders rely on PVDF, regardless of the metal oxide used. Starter batteries may also be affected if a lead ban is enforced.

New, dry electrode coating processes that are conceivable in the future for Solid-state batteries also require fluoropolymers (e.g. PTFE).

According to the current state of research, sodium-based batteries, which could possibly play a role in the future, also require PFAS-containing binders.

Currently, there are no alternative materials foreseeable that possess the same high requirements of a LIB cathode in terms of mechanical, thermal and electrochemical properties as fluoropolymers such as PVDF and PTFE.

In the future, solid-state batteries may become available using a polymeric electrolyte instead of today's liquid electrolyte. In order to ensure the performance of these batteries, it is likely that PFAS-containing electrolytes, e.g. LiTFSI, are required for this future technology.

As of now, there are no foreseeable alternative materials meeting LIB cathode requirements as well as fluoropolymers like PVDF and PTFE.

Conclusion and Proposed Amendment
Battery technology is pivotal for realizing the EU Green Deal. A ban on fluoropolymers in Lithium-ion battery production impedes electromobility adoption and EU Green Deal goals.

PowerCo SE is investing significantly in European battery cell production to reduce dependence on Asian producers. A PFAS ban jeopardizes the EU Commission's economic resilience objectives.

PVDF and PTFE, classified as polymers of low concern by OECD, should be excluded from the restriction. The restriction of fluoropolymers like PTFE, PVDF, etc., is

unwarranted as these substances are essential for battery manufacturing without posing risks to public health or the environment.

PowerCo SE proposing the following exemption from PFAS-restrictions regarding batteries:

- **Applications in the production of lithium-ion batteries for transport vehicles and energy storage systems, e.g., as binders for electrode coatings. This exemption should be reviewed and assessed by the Commission no later than 13.5 years after EiF**
- **Batteries for transport vehicles for repurposed use as energy storage devices.**
- **Additives for electrolytes in lithium-ion batteries for transport vehicles and energy storage systems. This exemption should be reviewed and assessed by the Commission no later than 13.5 years after EiF.**