Hydrogen Council

Well-targeted PFAS regulation key to keep our net zero targets within reach

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The Hydrogen Council supports science-based evaluation of real environmental concerns and a thoughtful approach to risk mitigation and management. Simplistic bans of a whole class of materials is not warranted in this case. The proposed action will not be adequate to achieve desired reduction in human or environmental harm but will effectively negate the environmental benefits of both battery and hydrogen technologies.

The latest report released by the UN Intergovernmental Panel on Climate Change from March 2023 is 'a clarion call to massively fast-track climate efforts by every country and every sector and on every timeframe' as stated by UN Secretary General Antonio Guterres. Creating enabling frameworks to support investments in clean energy technologies today is critical to advance climate change mitigation – we cannot afford any delays.

Both the EU and the U.S. have put in place ambitious climate and energy goals to advance the adoption and integration of renewable energy sources with battery and hydrogen solutions in particular. However, these goals are at risk of being jeopardized if the regulation of critical chemicals needed to manufacture these clean solutions such as per-and polyfluoroalkyl substances (PFAS) is not well-targeted.

Simplistic bans of all subclasses of PFAS risk significantly compromising the climate targets and policy frameworks set by the EU and in the U.S. by putting investments into battery and hydrogen technologies to a halt.

PFAS are a large, complex and diverse family of manufactured chemicals that includes a broad range of substances with different physical, chemical, and toxicological properties and uses.[1] Today over 10,000 PFAS have been identified. The hazard and risk profile of various PFAS subclasses are very different. Considering the hazard and risk profile of some of the PFAS, governments across geographies, including the US and the EU, have taken initiative to restrict or ban their use. In Europe five countries (four EU Member States - Denmark, Germany, the Netherlands and Sweden - and Norway) submitted a general restriction proposal on PFAS to the European Chemicals Agency (ECHA) under the EU chemicals regulation framework (REACH) framework. The Hydrogen Council strongly urge all stakeholders to review and comment on both the ECHA proposal in the EU (before 25th September) and the U.S. EPA proposal detailing additional designations of PFAS substances under CERCLA (before 11th August).

Proposed bans on PFAS on both sides of the Atlantic must be well-targeted, and it is crucial to ensure that all PFAS are not grouped together and a one-size-fits-all regulatory approach for this wide range of substances is avoided, as it would be neither scientifically accurate nor appropriate.[2,3,4]

It is key to distinguish fluoropolymers and perfluoropolyethers used in water electrolysis and fuel cells technologies from the above mentioned PFAS. **Fluoropolymers and perfluoropolyethers such as perfluorosulfonic acid ionomers are a unique subclass of PFAS and require a different environmental and human-health risk assessment.** Fluoropolymers and perfluoropolyethers are molecules that are inert and relatively large. Moreover, fluoropolymers have thermal, chemical, photochemical, hydrolytic, oxidative, and

biological stability. Due to these properties, many of these substances are unable to penetrate biological structures and therefore present a lower risk compared to other PFAS.[4,5]

Fluorpolymers and perfluoropolyethers satisfy the OECD criteria to be considered 'Polymers of Low Concern'[2,3] as they constitute a unique subclass of PFAS inherently different from legacy PFAS such as PFOA and PFOS. Life cycle impacts of fluoropolymers does not pose any threat to human health or environment when used in the hydrogen economy provided that A) principles of responsible manufacturing[5] are respected and B) industry focuses on building robust recycling practices, many of which are already in place,[7,8,9] driven by needs for both PGM and fluoropolymer reuse.[10,11,12]

Fluoropolymers and perfluoropolyethers are vital to the critical industries that are the foundation of our sustainable future, including the hydrogen infrastructure, semiconductor manufacturing, and electric vehicle (EV) batteries. Ensuring that industry has the regulatory certainty to develop, manufacture and bring commercially viable chemistries to market in the EU and in the U.S. is essential for maintaining the EU and the U.S. industry competitiveness.

Fluoropolymers and perfluoropolyethers are key enablers for water electrolysis and fuel cell technologies, and the hydrogen economy more widely, and are crucial for their performance and durability. A blanket restriction or ban of all PFAS subclasses will have a negative impact on the introduction and commercialization of hydrogen technology and therefore significantly stall the progress towards net zero goals, without delivering the desired human health and environmental benefits.

Policies need to evolve rapidly to support manufacturing capacity as the hydrogen market grows. For example, the US Department of Energy's 2022 critical supply chain report on hydrogen electrolyzers and fuel cells plots a dramatic increase in the demand for PFSA-based electrolyser membranes manufactured in the U.S. in the next 30 years. According to the Department's analysis, by 2050, it is expected that 2.25 million square meters per year of membranes for electrolysers will need to be manufactured to meet demand.

Regulatory uncertainty will drive the downstream critical product manufacturers to postpone or move their investments from the U.S. and EU to other geographies. This would have a catastrophic effect on the domestic hydrogen supply chains for these regions and could mean that both the U.S. and EU will not have access to the critical chemistries necessary to meet the hydrogen demands of consumers, particularly those from hard-to-abate sectors.[13]

Considering the above, it is critical that decision-makers (i) recognize that fluoropolymers and perfluoropolyethers satisfy the OECD criteria to be considered 'Polymers of Low Concern' and are inherently different from legacy PFAS such as PFOA and PFOS, (ii) provide a stable and clear regulatory framework allowing the use of fluoropolymers and perfluoropolyethers in hydrogen and fuel cells industry and (iii) advance efforts to incentivize robust recycling infrastructure. Failure to provide regulatory certainty on manufacturing and use of fluoropolymers and perfluoropolyethers risks putting hydrogen economy development to a halt and precluding investments in electrolysis and fuel cells technologies both in the EU and in the US despite ambitious policy goals.

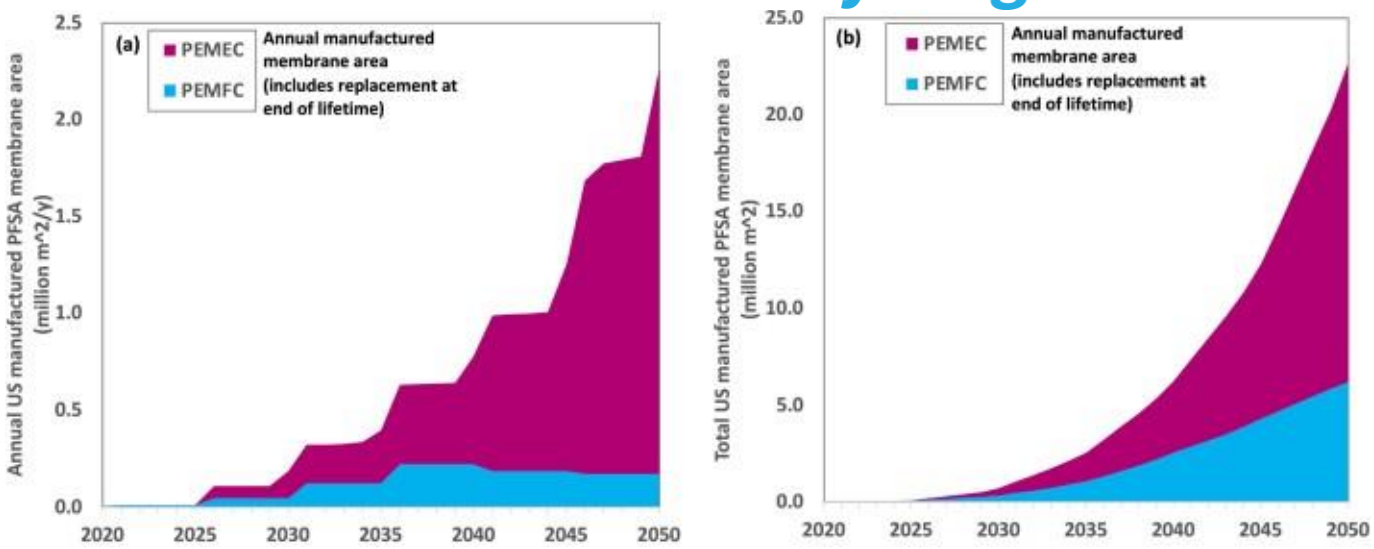

Figure 1. US annual (a) and cumulative (b)use of PFSA polymer electrolyte membrane in PEMFC and PEMEC systems from current to 2050 (original work)[14]

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