

# About ionysis

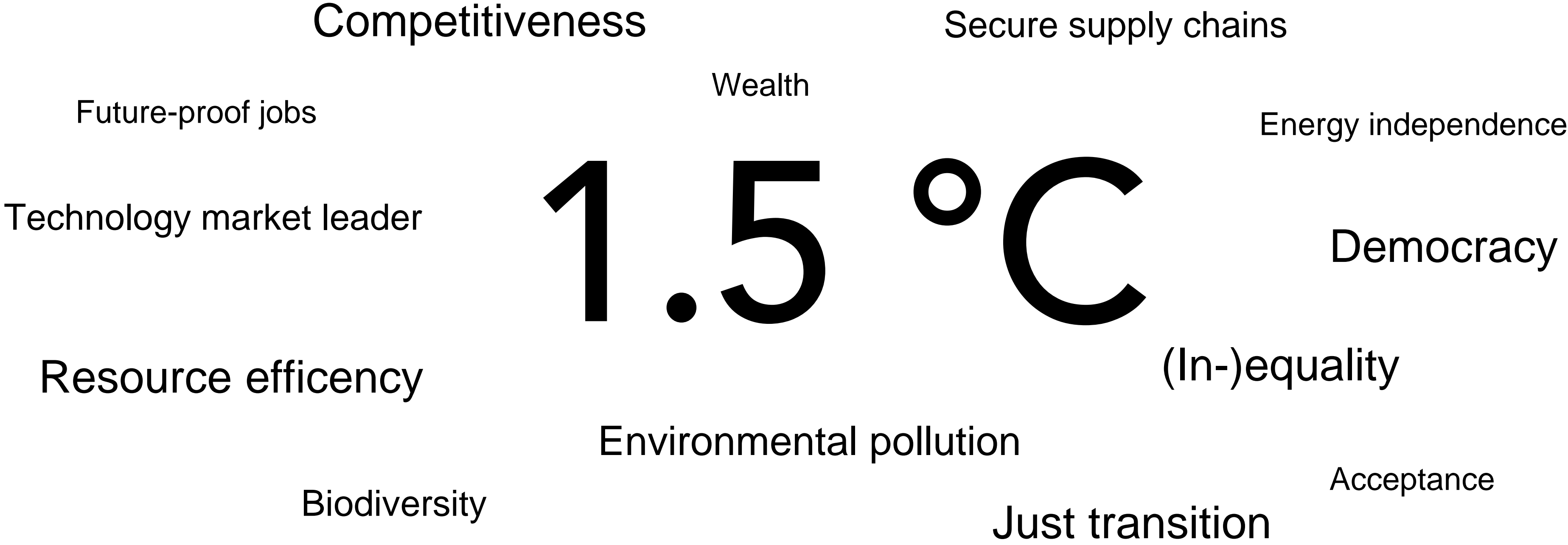
---

H<sub>2</sub>-Age Award – May 25, 2023

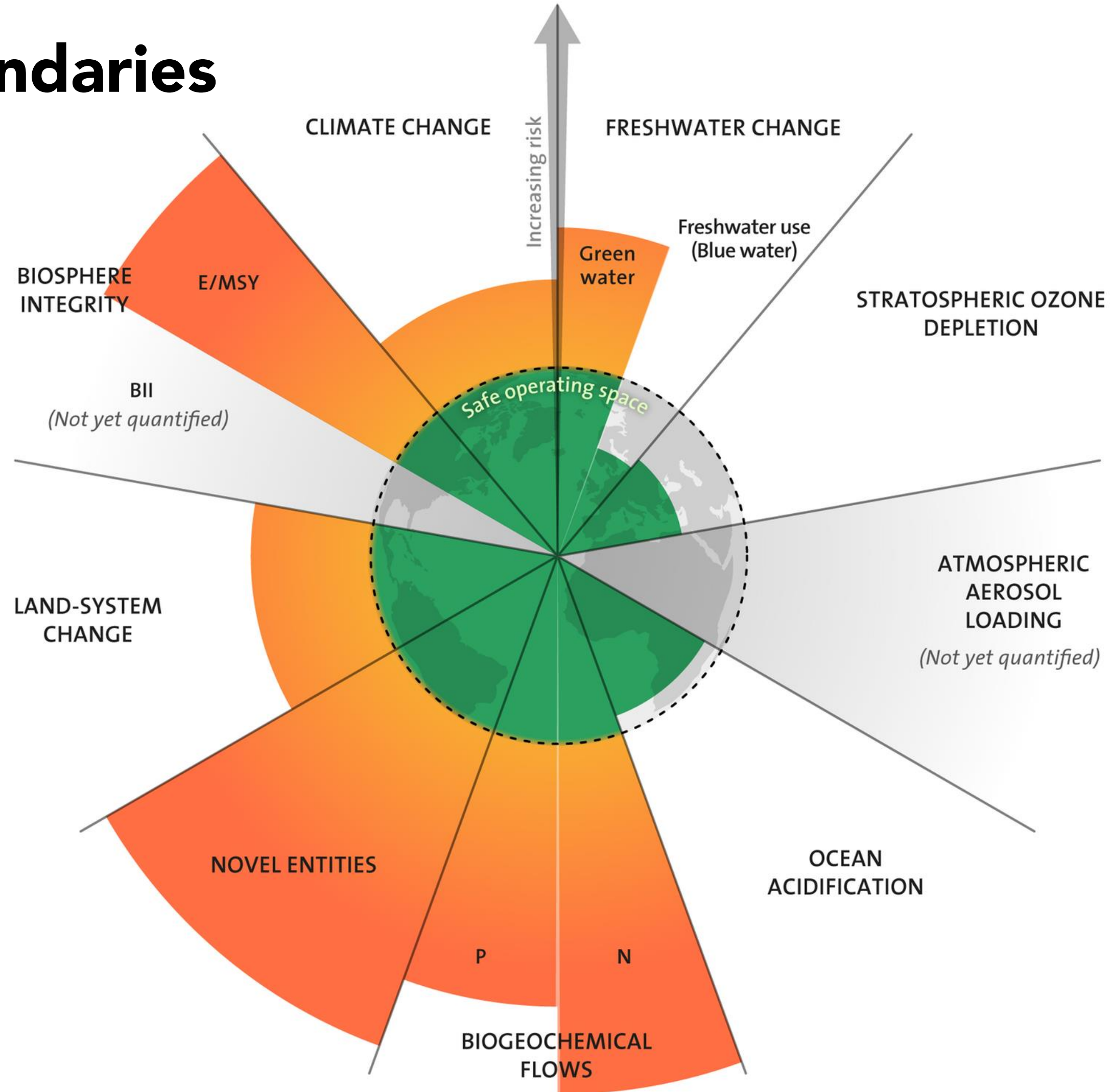
# Why hydrogen?

1.5 °C

# Fighting climate change in social and ecological ecosystems

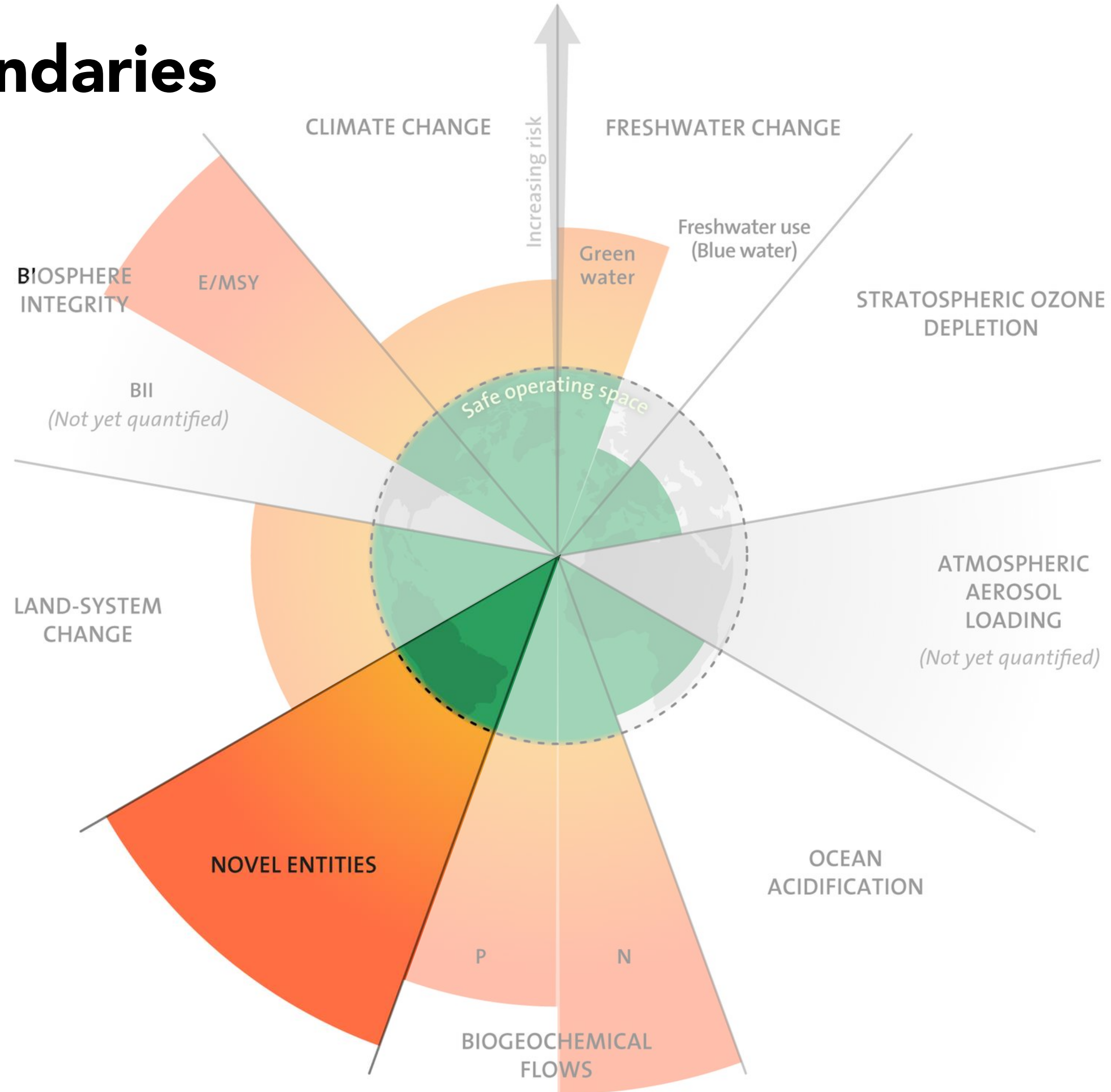


# Planetary boundaries



Stockholm Resilience Center (2022)

# Planetary boundaries



Stockholm Resilience Center (2022)

# PFAS – yes...



**Stable under intense conditions**

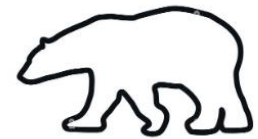


**Water and grease repellent**



**Electrical and thermal insulation**

# PFAS – yes...but!

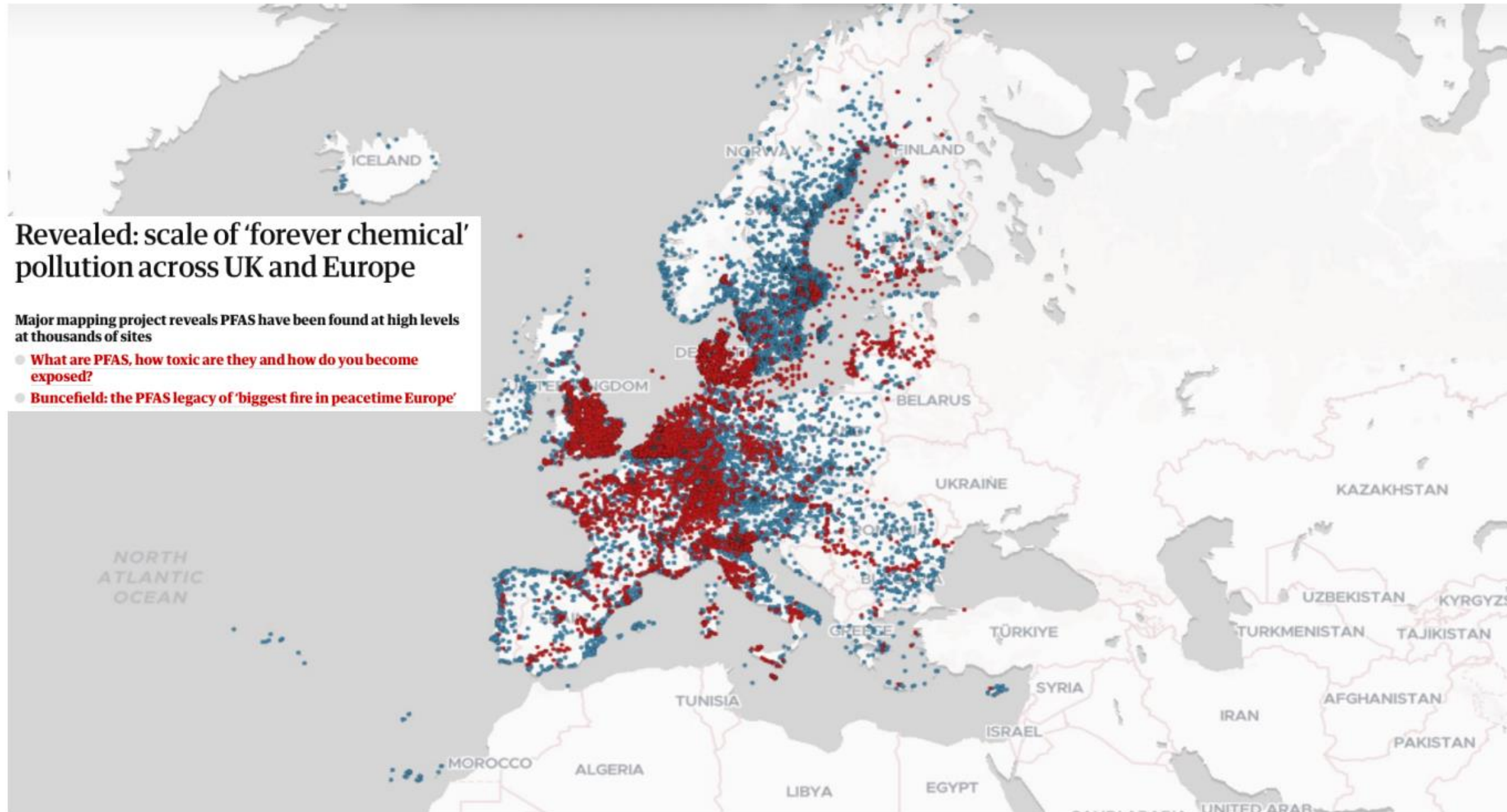


**Bio-accumulating (“Forever chemicals”)**



**Toxic and causing serious health conditions**

# Public pressure against „Forever Chemicals“ is growing



## Investors pressure top firms to halt production of toxic 'forever chemicals'

Shareholders say lawsuits over PFAS compounds linked to cancer and other diseases represent growing threat to companies' profits

## 3M to Exit PFAS Manufacturing by the End of 2025

ST. PAUL, Minn., Dec. 20, 2022 /PRNewswire/ -- 3M (NYSE: MMM) today announced it will exit per- and polyfluoroalkyl substance (PFAS) manufacturing and work to discontinue the use of PFAS across its product portfolio by the end of 2025. 3M's decision is based on careful consideration and a thorough evaluation of the evolving external landscape, including multiple factors such as accelerating regulatory trends focused on reducing or eliminating the presence of PFAS in the environment and changing stakeholder expectations.

Sources: Forever Pollution Project, 3M, Guardian



# PFAS restriction proposal is currently under evaluation by EU Chemicals Agency



## Taking action on PFAS





Food packaging, textiles, cookware and paints – per- and polyfluoroalkyl substances (PFAS) can still be found in many everyday products.

They pollute the environment and some harm our health.



### What are the concerns?

Their release and mobility in water and air causes contamination of groundwater and drinking water.

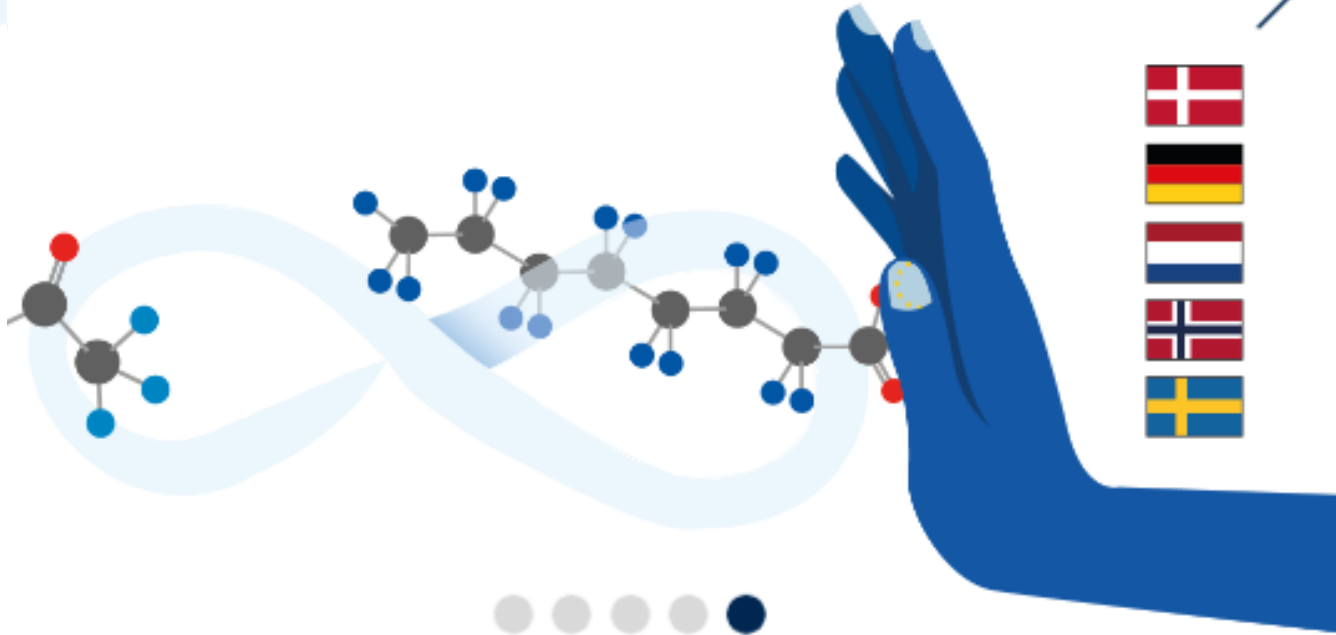
-  Some PFAS are **toxic for reproduction** and
-  Can harm the unborn child
-  Several may cause **cancer**
-  Some are suspected of **interfering with the human hormonal system**



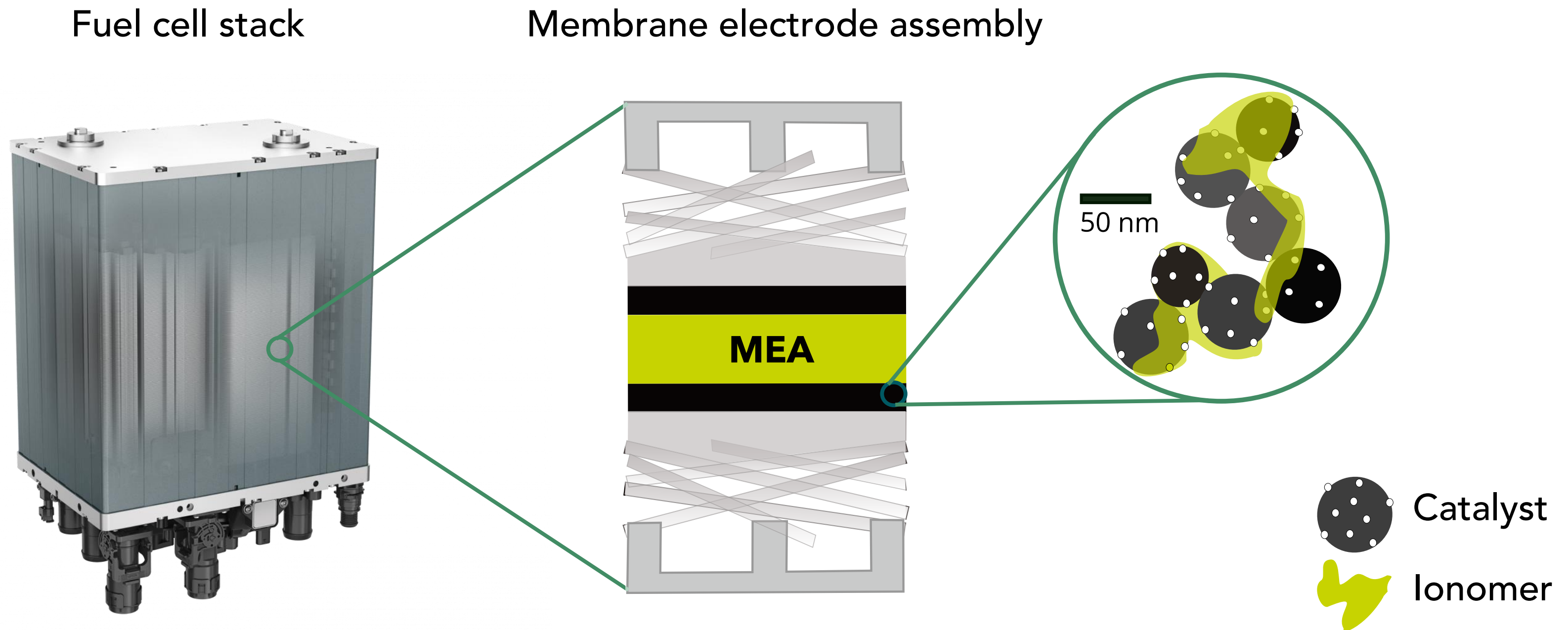
### What is the EU doing?

ECHA is evaluating a proposal by five European countries to restrict all PFAS and has proposed a gradual ban on these chemicals in firefighting foams.

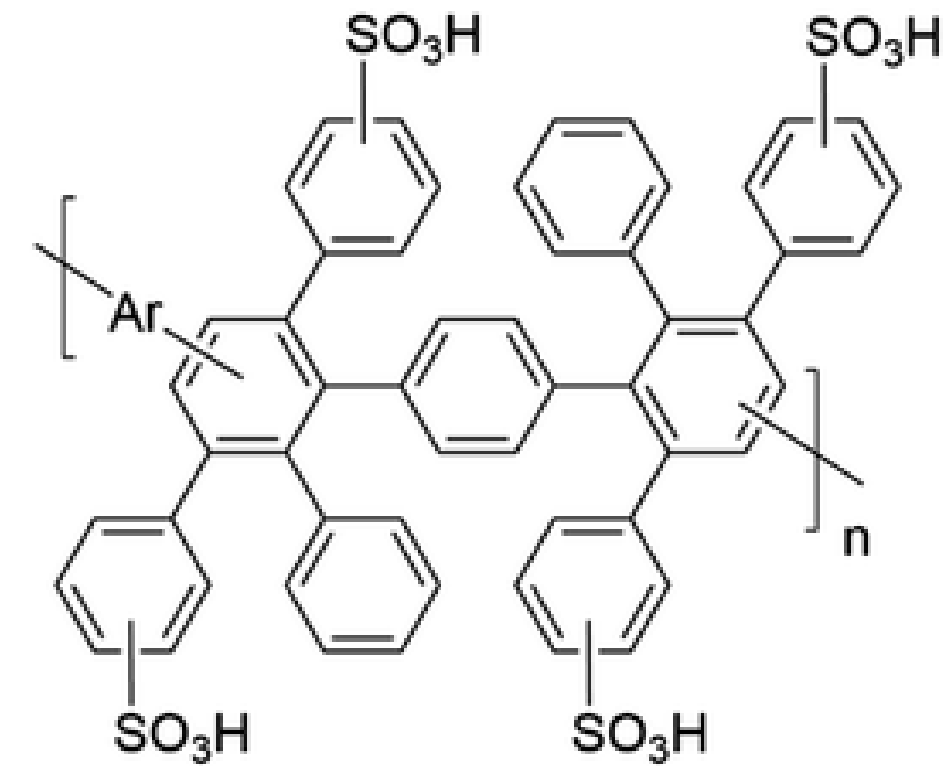
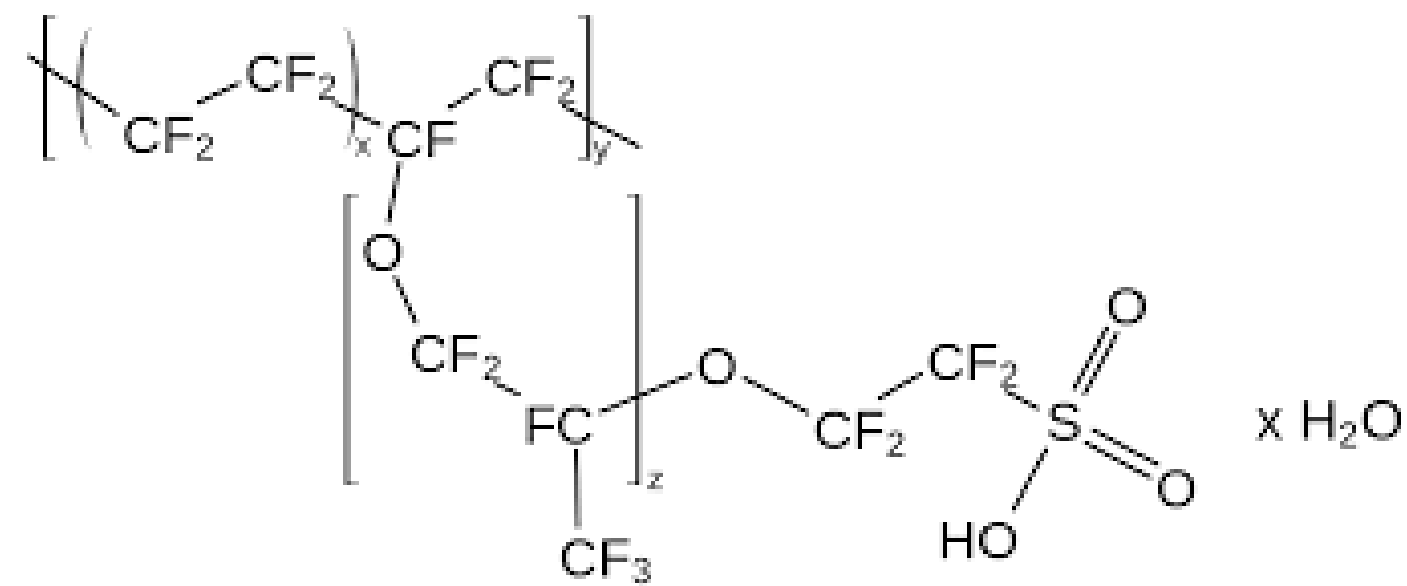
Many PFAS groups are already banned globally or restricted in the EU.



# The heart of fuel and electrolyser cells contains PFAS



# ionysis develops MEAs, replacing PFSA with innovative hydrocarbon materials



Exemplary molecule structure of PFSA (Nafion®) and a hydrocarbon ionomer

## Hydrocarbon MEAs offer various advantages



No regulatory risks



Environmentally safe and non-toxic



Stable at operating temperatures  $> 100^{\circ}\text{C}$

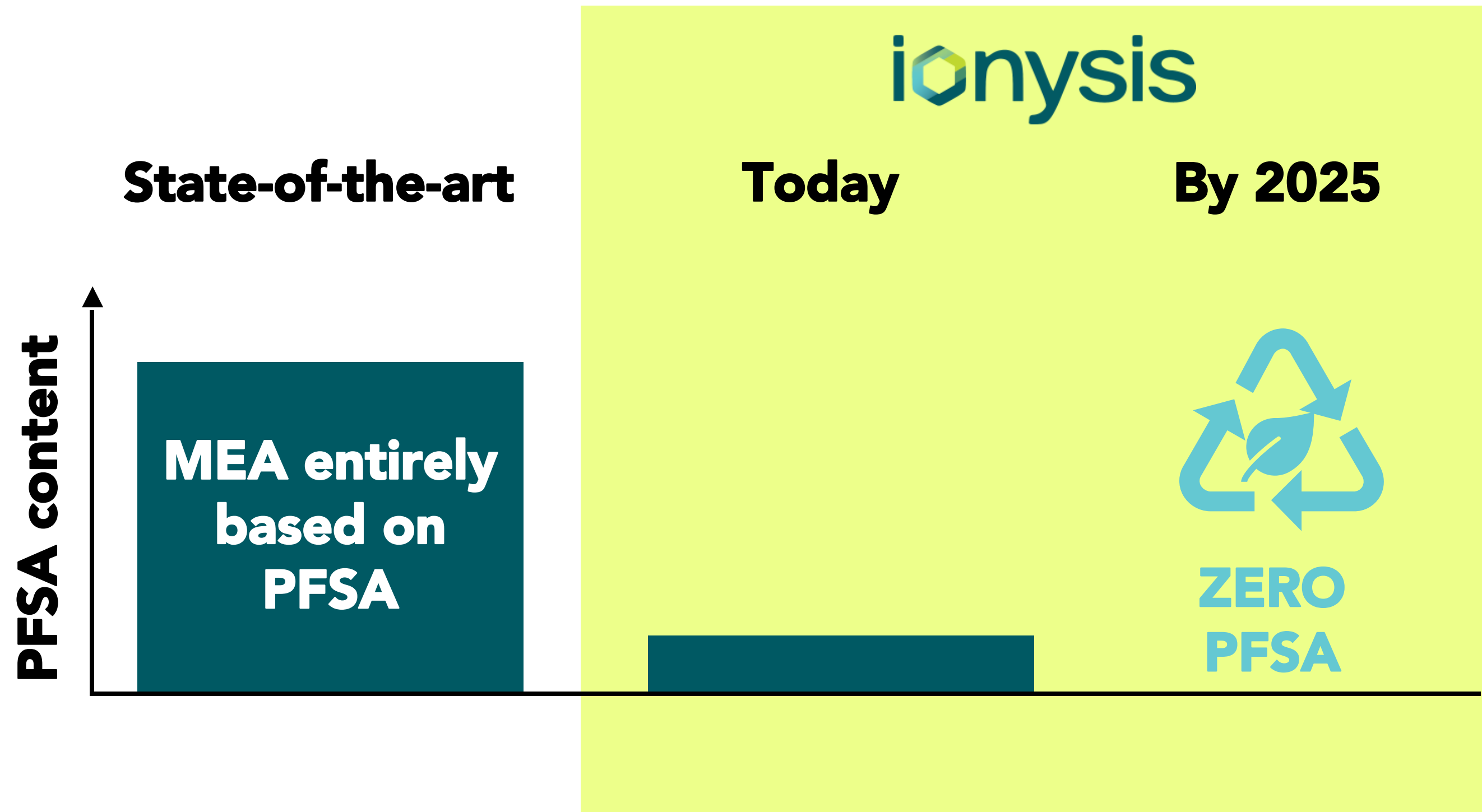


Reduced gas crossover

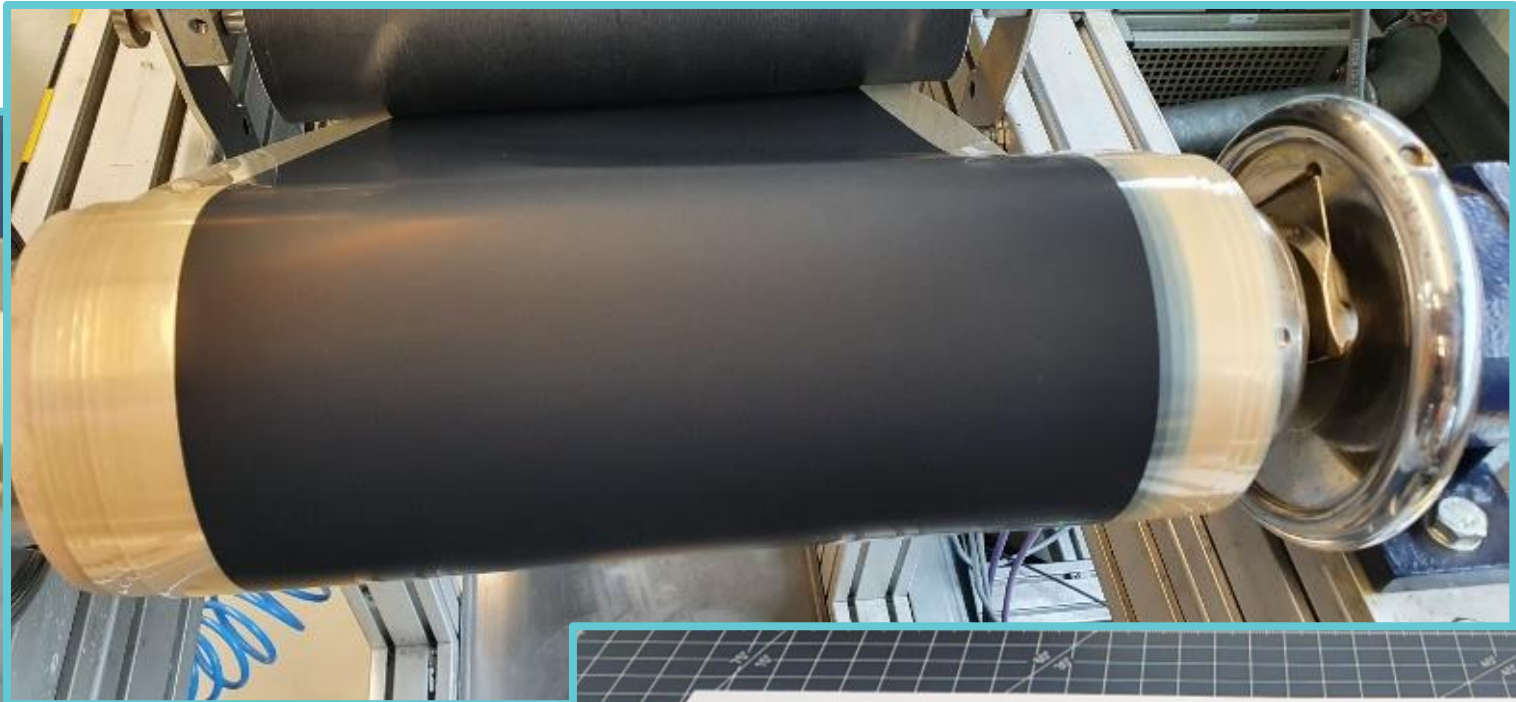


Easy to recycle precious catalysts

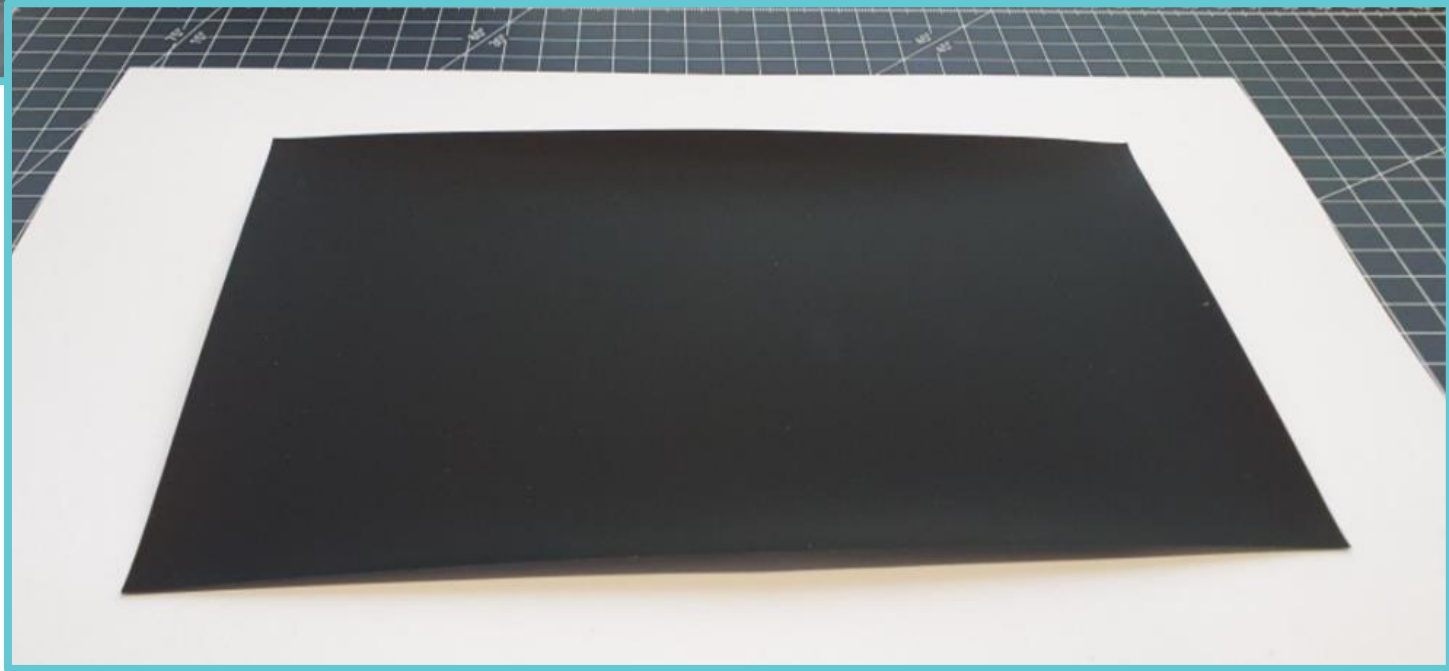
# Current state – PFSA content



# Current state - Coating



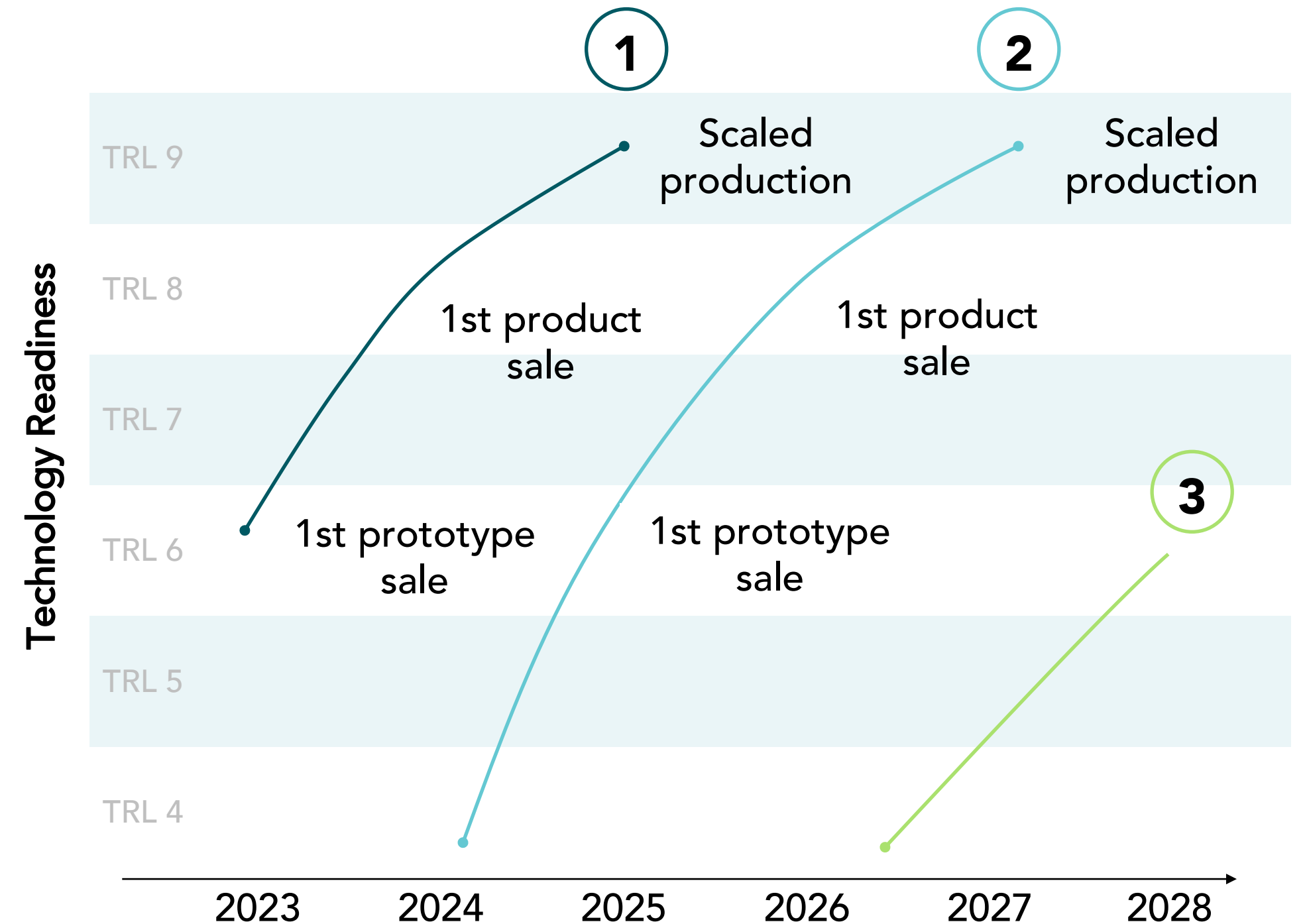
Roll-to-roll  
MEA coating



Full-size MEA (250 cm<sup>2</sup>)

# Our vision: Decarbonising the economy through innovative electrochemistry

- ① **PEM fuel cells (PEMFC) for heavy-duty applications**
  - $H_2 \rightarrow$  Electricity
- ② **AEM water electrolysis (AEMWE)**
  - Electricity  $\rightarrow H_2$
- ③ **Emerging electrochemical applications**
  - Green ammonia synthesis
  - Negative emissions technologies







# ionysis has its roots in Freiburg's academic ecosystem

ionysis

Hahn Schickard



Fraunhofer ISE



## Our supporters



Bundesministerium für Bildung und Forschung



Bundesministerium für Wirtschaft und Klimaschutz



Ministerium für Wirtschaft, Arbeit und Tourismus Baden-Württemberg



Funded by the European Union

# Let's collaborate!

**Provide your  
innovative  
materials**

**Validate our  
technology**

**Join our  
team**

# Thank you

Contact us at [info@ionysis.com](mailto:info@ionysis.com)