

TECH FACT SHEET

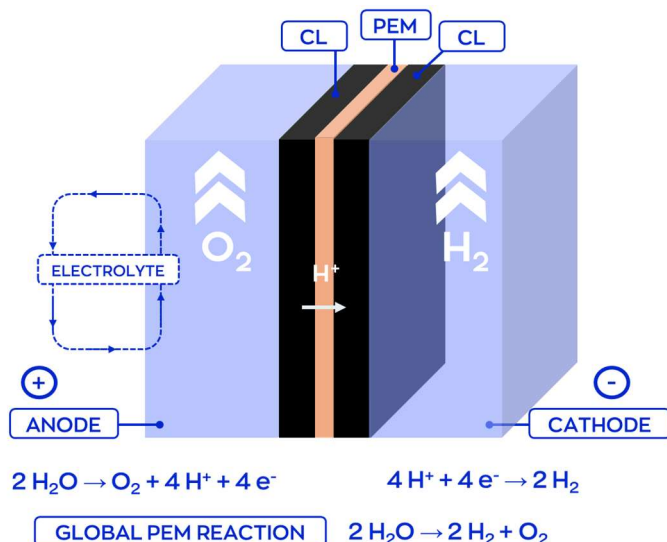
PEM Electrolysis



Proton Exchange Membrane (PEM) electrolysis is a commercially mature technology, widely deployed at industrial scale.

PEM ELX is based on acid chemistry applying a solid polymer electrolyte (PEM):

- For the charge carrier of the protons (H⁺)
- To act as the separator between the anode and the cathode



TRL 8-9 – Commercial



PEM is fully commercially deployed, with systems operating at MW-scale worldwide.

Expected continued cost reduction: 2025-2030 driven by stack scale-up and manufacturing optimisation.

Active Players in Market

PEM ELX Systems

- ITM Power (UK)
- Siemens Energy (Germany)
- Plug Power (USA)...

PEM ELX Materials

- GORE
- Bekaert
- Chemours...

Adoption Barriers

1. Membrane durability under dynamic operation
2. Limited long-term field data (<80,000 hrs)
3. Sensitivity to water purity requirements
4. **High CAPEX**

≈ 57.0 kWh/kg

ELX Stack Level

*average value from multiple stacks

99.99%

H₂ Purity

*possible to improve with purification equipment

60,000 h

Demonstrated system

Best suited for

- MW-to-GW scale green hydrogen production
- Applications requiring high H₂ purity (mobility, electronics)
- Projects with aggressive timelines requiring proven technology

Not recommended for

- Budget is extremely constrained (Higher CAPEX than ALK ELX)
- Ultra-large baseload projects where alkaline OPEX is more competitive
- Restrict access to water purification infrastructure

Let's tick the boxes together

I have assessed whether PEM's higher CAPEX is justified by my H₂ purity and dynamic operation requirements

I have benchmarked PEM stack lifetime guarantees across at least three suppliers

I understand how PEM performance degrades under my specific energy profile

Ready to evaluate PEM ELX for your project?

Fado Energy provides independent technology assessment, supplier benchmarking and procurement advisory – tailored to your application.

[Talk to our team](#)