

TECH FACT SHEET

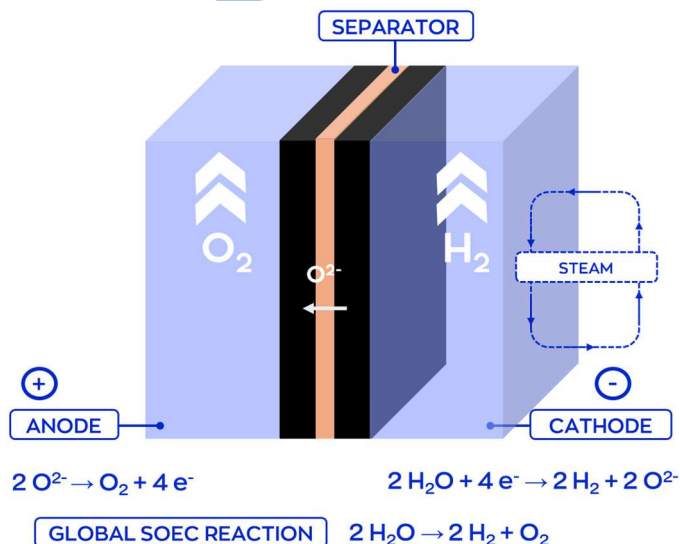
Solid Oxide Electrolysis



Solid Oxide electrolysis (SOEC) typically splits steam at high temperatures instead of a liquid electrolyte.

SOEC ELX is based on ceramic oxide membranes applied:

- For the charge carrier of the oxygen anions (O^{2-})
- To act as the separator between the anode and the cathode



TRL 5-7 - Pre Commercial



SOEC is at pilot and demonstration scale. MW range are in operation, though commercial scale is still lagging.

Expected full commercialisation: 2027-2032 in function of stack lifetime improvements and ceramic manufacturing costs.

Active Players in Market

SOEC ELX Systems

- Topsoe (Denmark)
- Elcogen (Estonia)
- Sunfire (Germany)...

SOEC ELX Materials

- 3M
- Cooksteck
- Fiaxell...

Adoption Barriers

1. Ceramic brittleness and mechanical degradation
2. Limited long-term field data (<20,000 hrs)
3. Steam supply and heat integration
4. **High operating temperature (700-900 °C) - demanding BoP**

≈ 38 kWh/kg

ELX Stack Level

*average value from two stacks

99.9%

H₂ Purity

*possible to improve with purification equipment

< 15,000 h

Demonstrated MW stack

Best suited for

- Industrial sites with abundant heat (steel)
- Projects where highest efficiency justifies complexity

Not recommended for

- Projects without waste heat source
- Applications requiring frequent SU/SD cycles
- Projects demanding proven long-term O&M track record
- Budget constrained projects - highest BoP of all

Let's tick the boxes together

I have verified that my site has a reliable high-temperature heat source (> 650°C) to unlock SOEC efficiency gains

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

I understand how thermal cycling frequency in my operation affects SOEC ceramic degradation rates

Ready to evaluate SOEC ELX for your project?

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

Talk to our team