SOFC · ENERGY · AI INFRA

The Bottleneck Killing SOFC at Scale

Ni-YSZ Anode Coarsening — A Research & Business Case

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31.2%

SOFC market CAGR
2025 – 2030

$11.6B

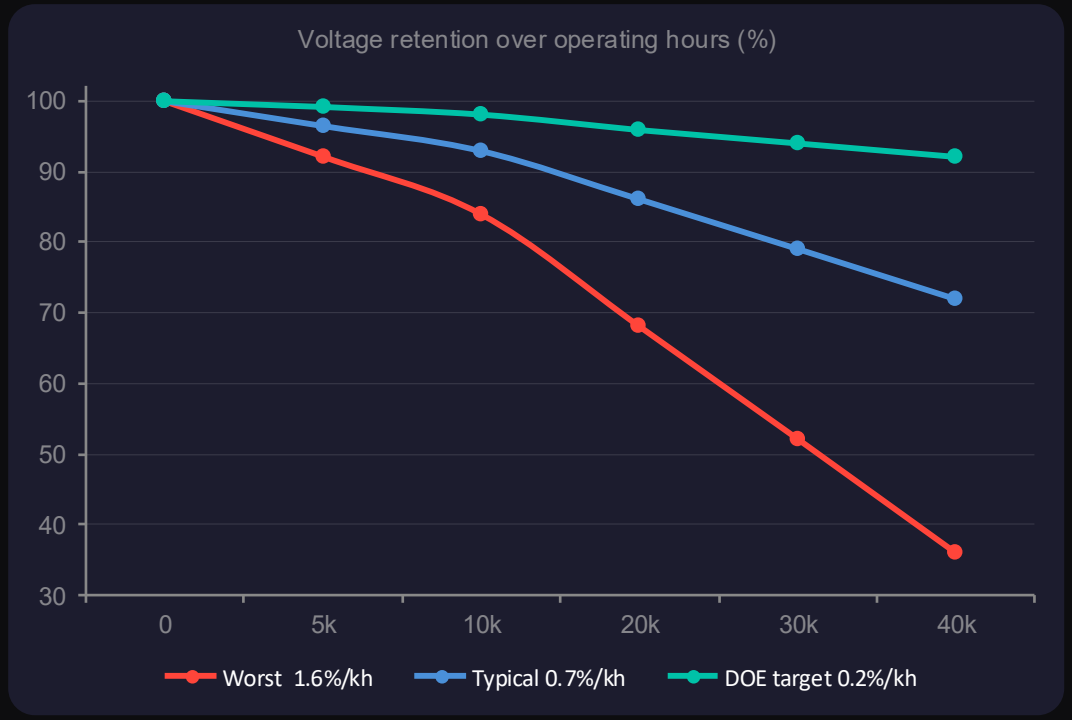
SOFC global market
by 2030

51–65%

Electrical efficiency
(field)

No Commercial Stack Has Hit the DOE Target Yet

Ni-YSZ coarsening is the primary performance bottleneck — the 0.7%/kh gap is solvable



~40% — **Ni-YSZ Coarsening**

Nickel particles grow → TPB area shrinks → electrochemical activity drops

~30% — **Cathode Poisoning**

Cr/Sr contamination blocks O_2 reduction at cathode surface sites

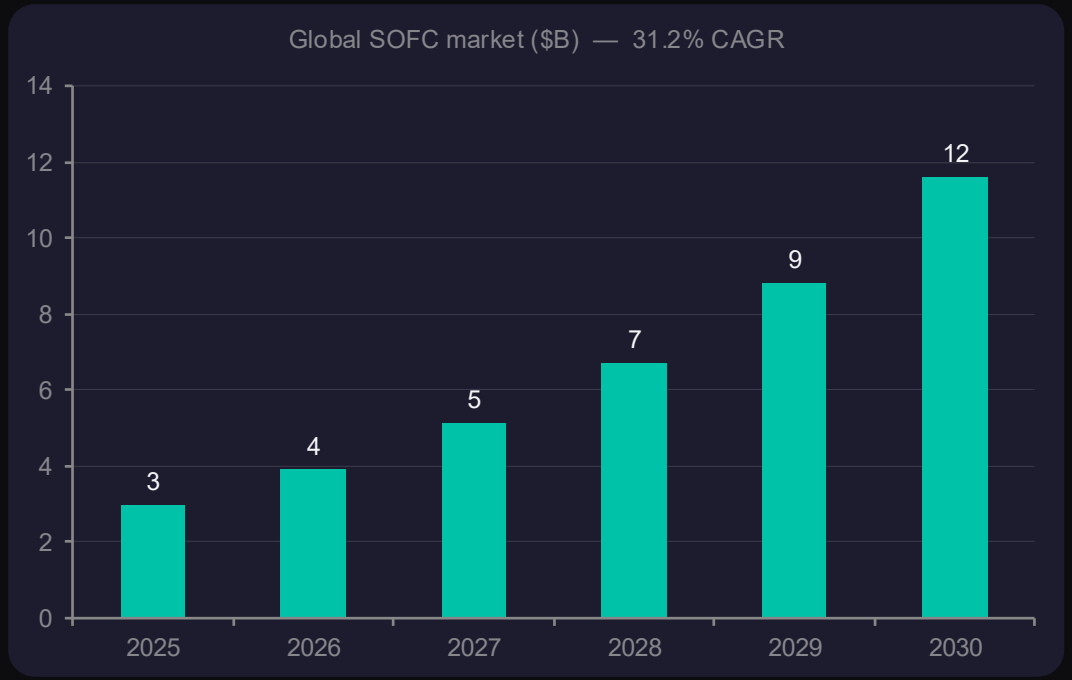
~20% — **Delamination**

Thermal cycling stress causes electrode-electrolyte interface failure

Solving coarsening alone closes ~40% of the degradation gap

AI's Energy Crisis Opens a $11.6B Door for SOFC

Data centers need on-site, grid-independent power — SOFC delivers 2× the efficiency of alternatives



31.2%
CAGR 2025–2030

55%+
Stationary / data center share

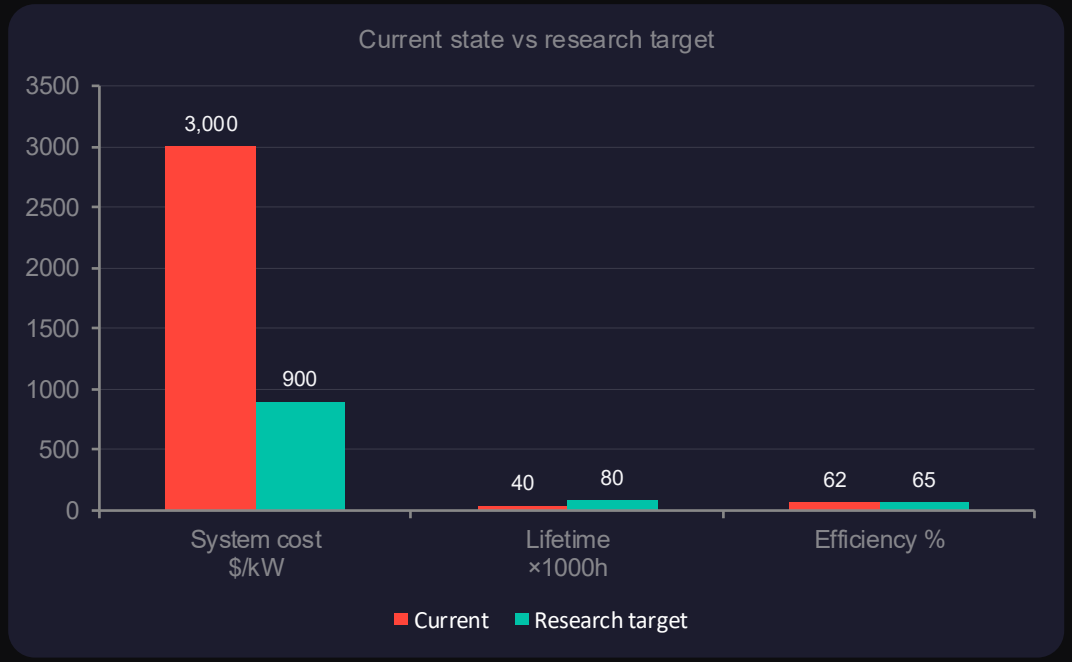
×2
Data center power doubles by 2030 (IEA)

$618M
Data center SOFC segment by 2032

Bloom Energy (SOFC) +390% in 2025 · Customers: Microsoft, Google, Samsung

Solving Coarsening: Stack Lifetime ×2 — System Cost ÷3

0.7%/kh → 0.2%/kh: the research unlock that makes SOFC cost-competitive at data center scale



01 Model Ni-YSZ coarsening kinetics via Butler-Volmer + TPB geometry

02 Predict degradation pathways under real load cycling conditions

03 Identify optimal anode microstructure for long-term stability

04 Enable 40k → 80k hour stack lifetime — halve replacement cost

$750M+	€218M	$30M
US DOE since 1995	EU FCH-JU	US Congress 2025

Let's Talk.

This research is the unlock for commercial SOFC at data center scale.

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More info

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Ni-YSZ Coarsening

TPB Degradation Modeling

SOFC Lifetime Extension

AI Energy Infrastructure