

Stargate Hydrogen

enabling the industry of tomorrow

Stargate Hydrogen



Unique electrolysis technology (9 patent families) using ceramic-based catalyst materials and proprietary stack design, making the technology more scalable than competitors.



One of the few electrolyser manufacturers that received **IPCEI support from the European Commission** for its scale-up project.



Team of **65+ top professionals** with previous experience from Haldor Topsoe, Volvo Trucks, McPhy Energy, GenCell, Nel Hydrogen and Mitsubishi Heavy Industries.



Strategic partners include **ABB, Fortum, Utilitas, Repsol, Neom** and many others beyond European Union.



Stargate Hydrogen has **50+ mEUR** of committed funding to realise its scale-up plan. Starting with the new Megafactory which has 140MW yearly capacity.

Product portfolio

stellar EDGE

0.5 MW Alkaline
Electrolyser Stacks
for system integrators



starbase SERIES

5 MW Alkaline
Electrolyser Stacks
for system integrators



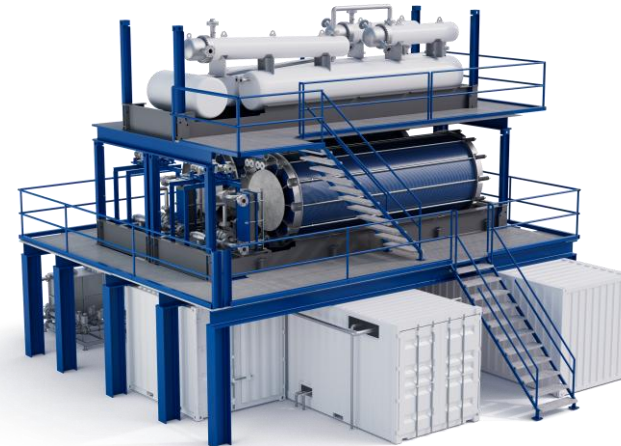
gateway SERIES

1MW Turn-key H₂
production systems
for project developers

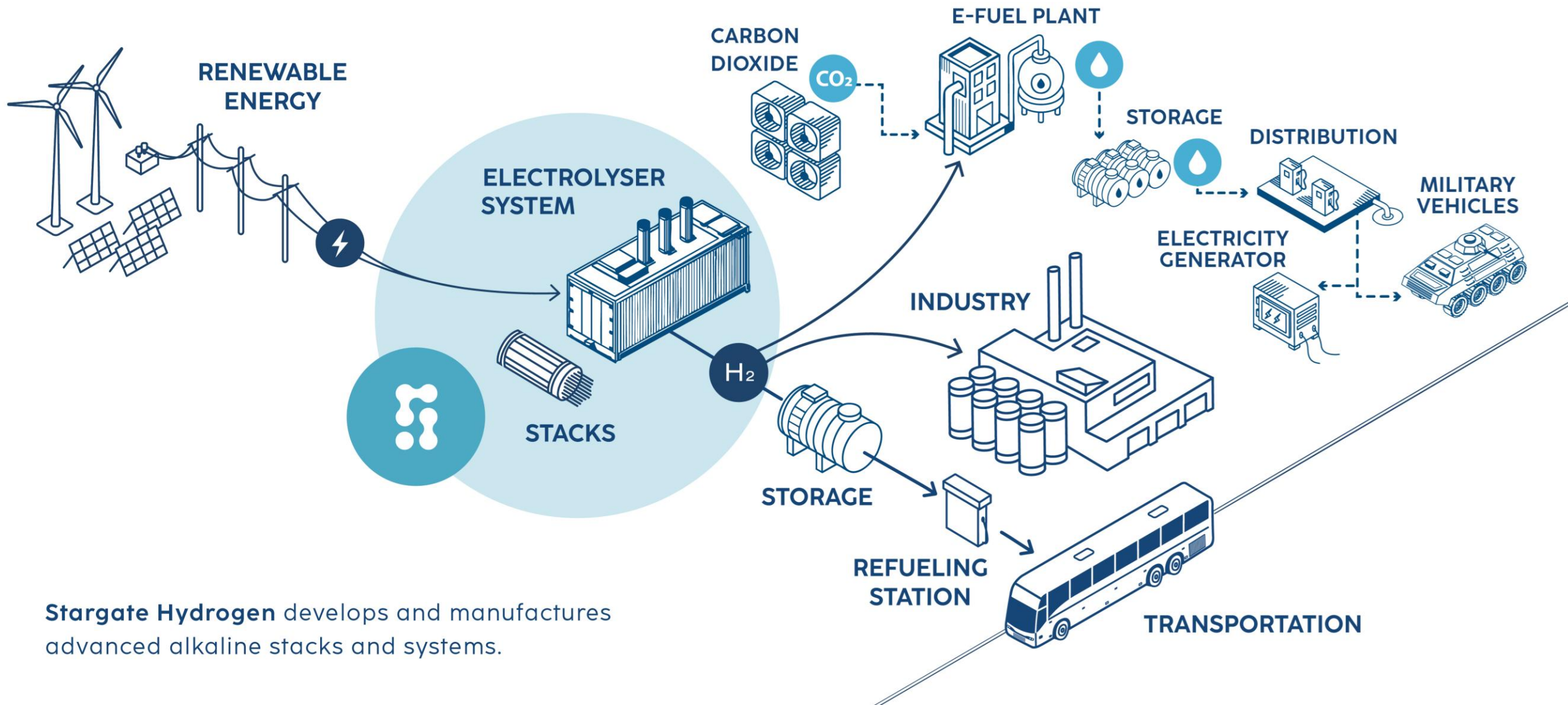


aurora SERIES

10 MW Alkaline
Electrolyser Systems
for project developers



Stargate Hydrogen value chain



Stargate Hydrogen develops and manufactures advanced alkaline stacks and systems.

Customer stack deliveries

2x STR70

Installed in a system in Germany



STR35

Installed in a system by Rockfin



Customer system deliveries



Estonia, 1 MW



Status: Commercial operations



Finland, 1 MW



Status: Site Acceptance Testing



Electrode technology



Bringing down the cost of green hydrogen

The cost of H₂ depends on:

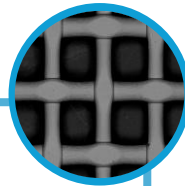
1. Electricity price
2. **Electrolyser efficiency**
3. **Electrolyser capital cost**
4. **Lifetime/reliability**
5. Electrolyser utilisation



Stargate solution:



Novel **electrode** material



Electrode
Level



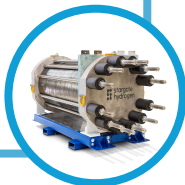
Optimised for **manufacturability**



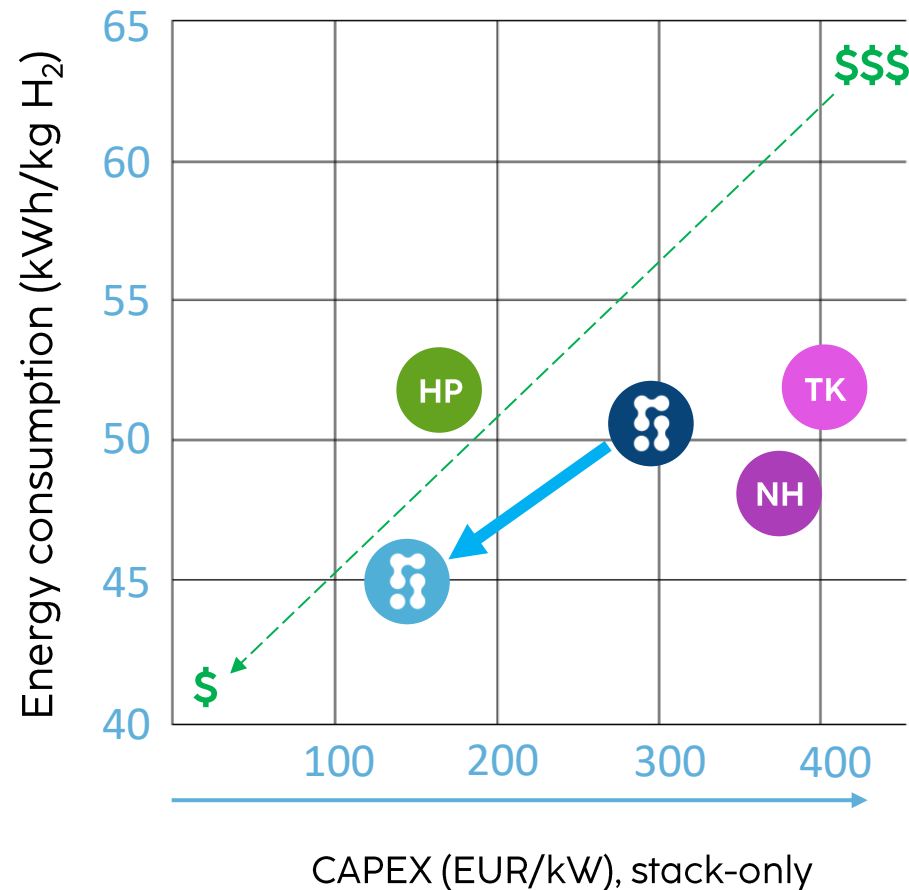
Higher reliability



Fewer components



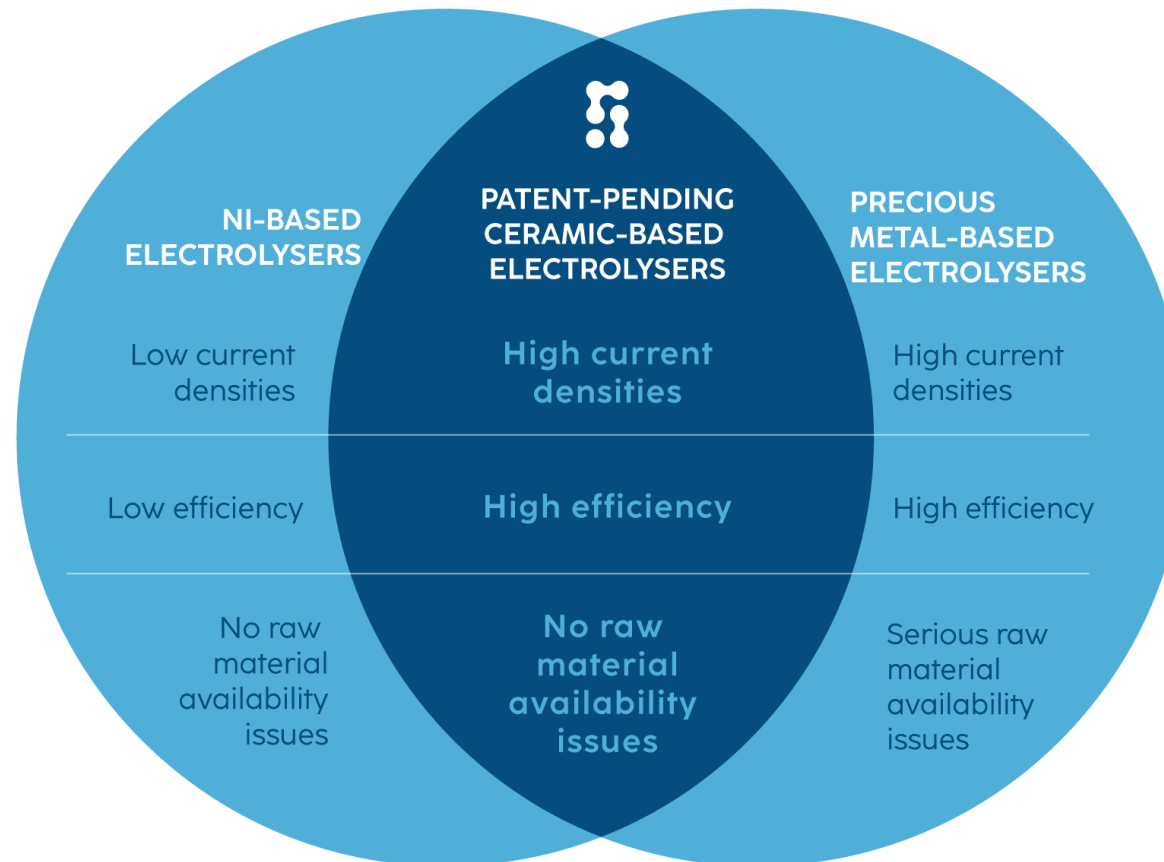
Stack
Level



- Gen 1
- Gen 2
- TK Thyssen Krupp
- NH Nel Hydrogen
- HP Hydrogen Pro



Beyond the state-of-the-art technology





100+ different active materials screened

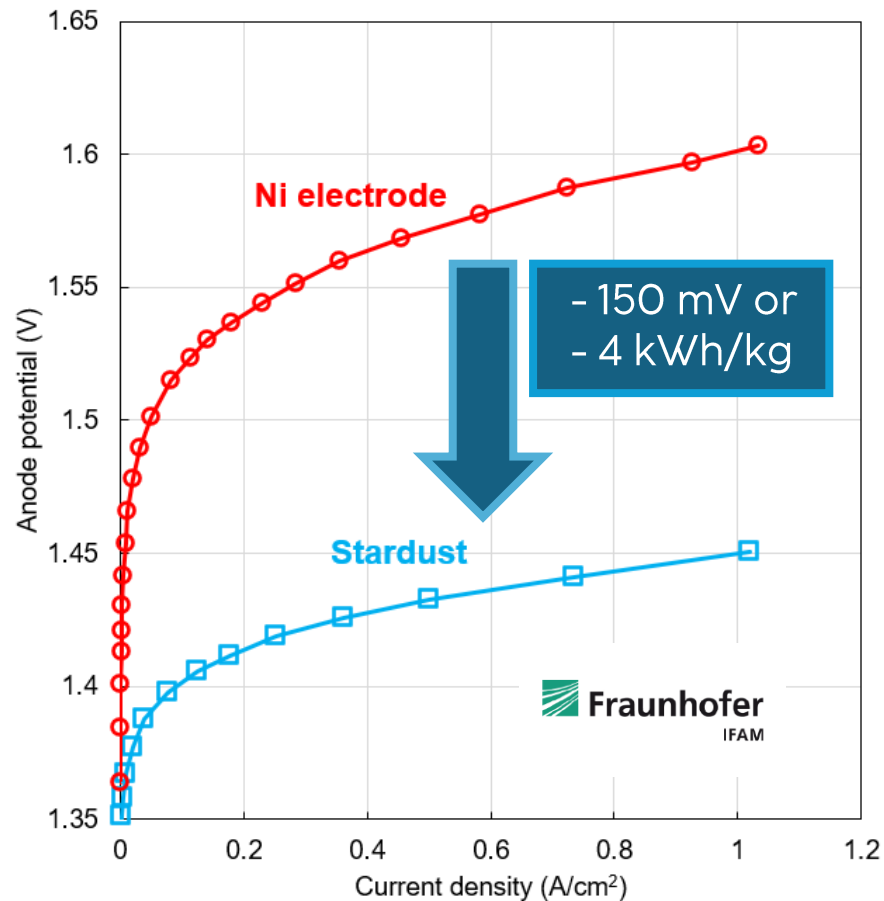
500+ electrodes tested

Most tests carried out at elevated temperature and pressure, in **30% KOH**, in a stack-like flow cell

Validation tests done by **Fraunhofer IFAM**



Electrode performance validation by Fraunhofer Institute



Dr. rer. nat. Christian Immanuel Bernäcker
Group Manager Electrochemical Technology
Fraunhofer Institute for Manufacturing Technology and Advanced Materials

“ The results of the 3-electrode measurement of the coated electrode are impressive.

The reason for the higher activity could be due to both: intrinsic activity (lower Tafel slope) or larger surface area (higher capacitance).

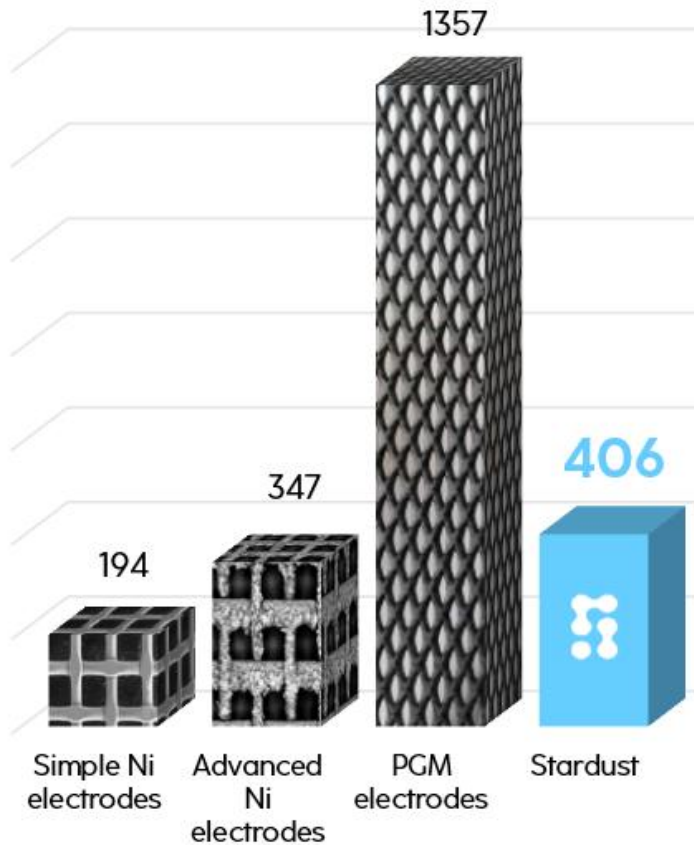
Source: e-mail dated 26/7/2023

Test conditions: 30 wt% KOH, 80°C, 1 atm, two-compartment cell, three-electrode setup, Stardust or regular Ni electrode used as anode, Pt sheet used as counter and reference electrodes (via Luggin capillary).

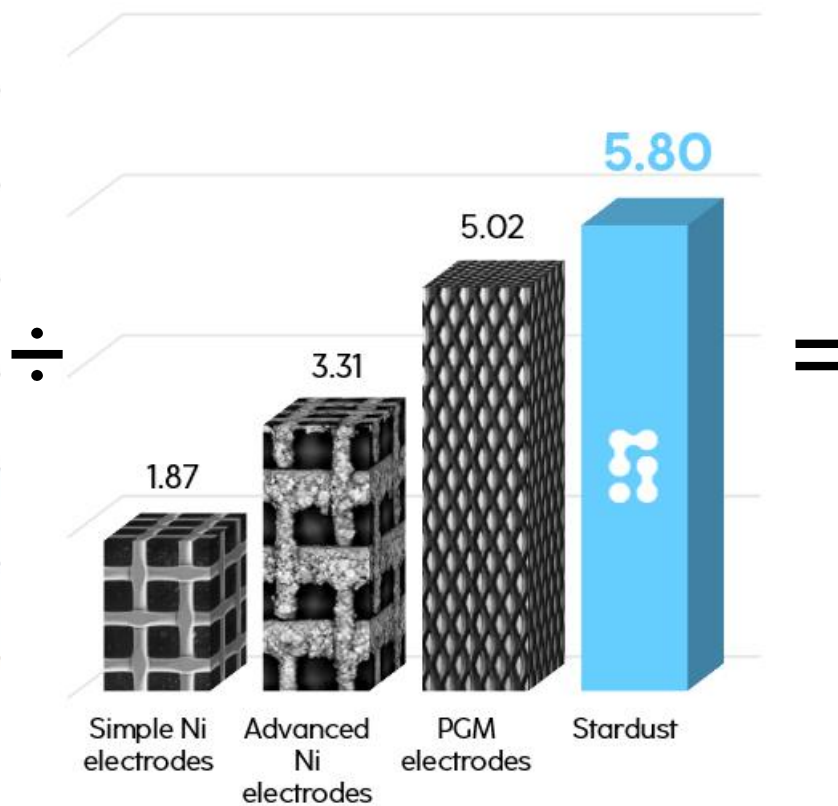


Stardust electrode technology: Value proposition

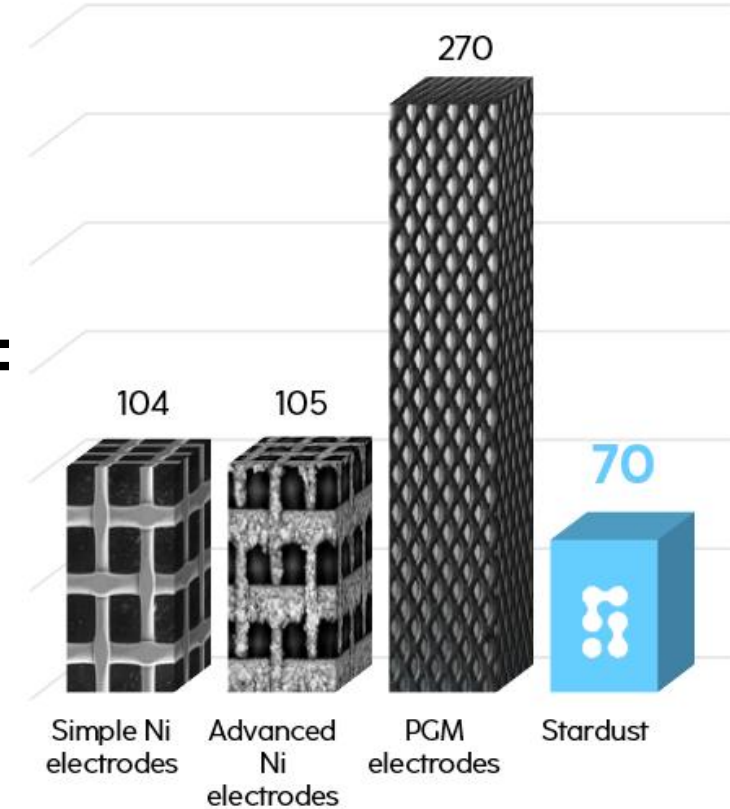
Electrode cost* (EUR/m²)



Electrode current at 1.8V** (kA/m²)



CAPEX intensity*** (EUR/kA)



* Based on commercial quotations for 4000 cm² electrodes

** Electrode current is directly proportional to H₂ production. Measured at 5 barg, 80°C, 30% KOH, Zirfon diaphragm, Simple Ni as cathode. 1.8 V/cell = 47.9 kWh/kg H₂.

*** How much investment is needed at fixed H₂ production rate?





Products & Commercial progress



Alkaline electrolyser stacks for system integrators

stellar
S E R I E S



Improved stack robustness



100 Nm³/h hydrogen production



Six-month delivery time



Comprehensive integration support



Alkaline electrolyser System for project developers

gateway
SERIES



Modular approach: 1 MW container



System efficiency of 74% HHV











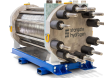

Six-month delivery time



Suitable for direct integration
with renewables



Commercial progress

Product	Client	Country	Timeline
 10 kW Stack	 ROCKFIN® <small>TRUSTED BY INDUSTRIES</small>	Poland	Delivered – July 2023
 10 kW Stack (mock-up)	Non-disclosed customer	Austria	Delivered – Sep 2023
 100 kW Stack	 MILANI <small>SPA IMPIANTI ELETTRICI E TECNOLOGICI</small>	Italy	Delivered – Nov 2023
 50 kW Stack	Non-disclosed customer	France	Delivered – Dec 2023
 Engineering support services	 NextHeat	Germany	Delivered – Feb 2024
 10 x 5 kW Stacks	 ABB	Finland	Delivered - Nov 2024
 2 x 0.5 MW Stack	Non-disclosed customer	Germany	Delivered – March 2025
 1 MW Gateway System	 UTILITAS	Estonia	Delivered – Nov 2024













Commercial progress

Product	Client	Country	Timeline
 0.5 MW Gateway System	 PLCAN	 Spain	Delivery – May 2026
 0.5 MW Stack	 Biga H ₂	 Turkey	Delivered – June 2025
 6 kW Stack	 VTT	 Finland	Delivered – Nov 2024
 1 MW Gateway System	 fortum	 Finland	Delivered – Oct 2025
 50 kW Stack	 MASMEC	 Italy	Delivered – July 2025
 100 kW Stack	 BGR TECH	 India	Delivered – May 2025
 6 kW Stack	 HORIBA	 Germany	Delivered – Jan 2025
 2x0.5 MW Stack	Non-disclosed customer	 Germany	Delivery – Jan 2026



Benchmarking Stargate Hydrogen's stack technology

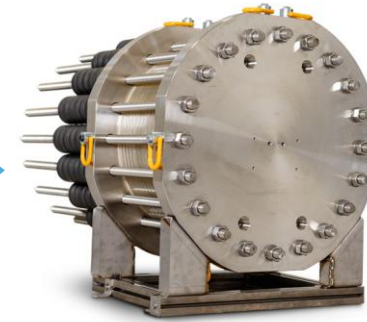
Company	Technology	Product	Efficiency (HHV)	Pressure (bar)	PGM free?	Customisable?
 stargate hydrogen	Alkaline	Stellar 100	<div> <div></div> <div>77% Gen1</div> <div>88% Gen2</div> </div>	<div> <div></div> <div>40</div> </div>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
 nel	Alkaline	A485	<div> <div></div> <div>80%</div> </div>	<div> <div></div> <div>1</div> </div>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
 thyssenkrupp nucera	Alkaline	Scalum	<div> <div></div> <div>79%</div> </div>	<div> <div></div> <div>1</div> </div>	<input type="checkbox"/>	<input type="checkbox"/>
 nel	PEM	MC500	<div> <div></div> <div>79%</div> </div>	<div> <div></div> <div>30</div> </div>	<input type="checkbox"/>	<input type="checkbox"/>
 sunfire	Alkaline	HyLink 10 MW	<div> <div></div> <div>76%</div> </div>	<div> <div></div> <div>30</div> </div>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
 John Cockerill	Alkaline	5 MW	<div> <div></div> <div>72%</div> </div>	<div> <div></div> <div>30</div> </div>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
 ITM POWER	PEM	HGAS3SP	<div> <div></div> <div>72%</div> </div>	<div> <div></div> <div>30</div> </div>	<input type="checkbox"/>	<input type="checkbox"/>
 HTEC SYSTEMS	PEM	ME450	<div> <div></div> <div>71%</div> </div>	<div> <div></div> <div>30</div> </div>	<input type="checkbox"/>	<input type="checkbox"/>
 McPhy	Alkaline	McLyzer 800-30	<div> <div></div> <div>67%</div> </div>	<div> <div></div> <div>30</div> </div>	<input type="checkbox"/>	<input type="checkbox"/>
 Cummins	Alkaline	HyStat 100-10	<div> <div></div> <div>66%</div> </div>	<div> <div></div> <div>10</div> </div>	<input checked="" type="checkbox"/>	<input type="checkbox"/>



Independent performance validation of Stargate Gen1 stack

Stargate Stellar 10 stack has undergone rigorous performance testing at **ZSW**, Zentrum für Sonnenenergie und Wasserstoff-Forschung Baden Württemberg, an independent electrolysis test center near Stuttgart, Germany.

Stack performance was within specifications and no signs of degradation were identified during a 160 hour test.



stellar
S E R I E S



The first full
value chain demo of
Green Hydrogen
production in the Baltics.

Refueling Station

Tube Trailer Parking Area

Buffer Storage

H₂ Purification System

High Pressure Compressor

Heat Exchanger

Substation & Transformers

2x Alkaline Stacks 0.5MW

Process Equipment

Electronics & Controls

Commercial and R&D partnerships

Commercial Partners



R&D Partners





Stargate facilities



Production layout



Meet our team



65+ Talents



16 Nationalities



7 PhDs
31 Masters



9 Patent families
7 Patents granted



Our team has gained **prior experience** from such companies





Selected Partnerships



Selected partnerships



Selected partnerships



- Independent validation of Stargate electrode performance
- Partner in two EU projects focusing on next generation electrodes



- Independent validation of Stargate stack performance
- Partner in an EU project focusing on electrode and short stack testing



- Bilateral collaboration on next-generation diaphragms
- Partner in an EU project focusing on catalyst-coated diaphragm structures



- Co-operation in setting up a MW-scale demonstration project at Neom and developing Hydrogen Innovation & Development Center



- Pilot project for validating novel transformer-stack configurations (together with LUT)
- **Joint development program for 10 MW system module**



- Collaboration with the group of Prof. John Irvine
- Partner in an EU project focusing on development of next-generation electrode materials



- Bilateral collaboration on stack testing, validation of Stargate stack performance
- Partner in an EU project focusing on seawater electrolysis



- Partner in EU project on seawater electrolysis, as well as in an EU project on stack development
- Collaboration on stack-level simulation activities





Go to Market Strategy



Go to Market Strategy – 0.5MW Stacks

Product

0.5 MW Alkaline Stacks

stellar
EDGE



references

Target customer:

Engineering companies

- With in-house process engineering experience.
- Limited in-house experience with electrolyzers.
- Interested to enter hydrogen value chain.
- Need to replace existing stack supplier.

Unique selling points:

- Made in Europe
- Comprehensive integration support.
- Configurable stack design.
- Pressurized high-efficiency stack technology.
- Lower risk of leakages due to novel sealing solution.



Go to Market Strategy – 1 MW System

Product

1 MW Electrolyser System

gateway
SERIES



Target customer:

Utility / RE Developer

- Interested to become hydrogen producer & seller or producer of hydrogen derivatives.
- Limited experience of installing electrolyzers or has a small in-house team.
- Industrial player interested in replacing grey hydrogen with green hydrogen.

Unique selling points:

- Made in Europe
- Modular turn-key systems
- Dynamic operation for RES
- Lowest levelized cost of hydrogen
- 12-month lead time

roadmap



UTILITAS



Go to Market Strategy – 5MW Stack

Product

5 MW Alkaline Stacks

starbase
SERIES



Target customer:

Stack Integrators and EPC Companies

- With in-house process engineering experience.
- Interested to enter the hydrogen value chain or needing to replace existing stack supplier.

Unique selling points:

- Pressurized high-efficiency stack technology.
- Comprehensive integration support.
- Lightweight design, easy installation and transport.
- Optional compact Balance-of-Stack design.
- Can be installed in a container.
- European manufacturing.

roadmap





Funding



Stargate Hydrogen is backed by strong investors



One of the leading family offices in the the Baltics, focused on energy and sustainability-related investments.



SmartCap is a state-backed Venture Capital fund, investing into funds and Greentech scale-ups with global ambitions.



Repsol is a global multi-energy company, present across the entire energy value chain and operating in nearly 100 countries.



Giga is an Estonian family office, investing into manufacturing companies, real estate and growth companies with global ambitions.



Taavi
Madiberk
skeleton+

CEO and Co-Founder of Skeleton Technologies, the global leader in graphene-based supercapacitor and battery energy storage.



Stargate Hydrogen's Grants

Stargate has been extremely successful with EU financing:

- 29 million Euro IPCEI grant (54% support rate)
- 6 million Euros of other grants (70-100% support rates)

Selected list of partners

SKELE+ON
TECHNOLOGIES



5
YEARS

54
MEUR

45
KWH/KG

1
GW/YEAR

550
EUR/KW

YEAR 1 YEAR 2 YEAR 3 YEAR 4 YEAR 5

R&D&I

FID

Research & Development & Innovation

First Industrial Deployment

WP1

Electrode R&D

WP2

Pilot Production

WP3

Smart Manufacturing

WP4

System Reliability

WP5

Blueprint plant

WP6

Gigafactory

Stargate IPCEI



Let's stay connected

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